Briefing

Measuring pavement deflection at high speed

A survey of New South Wales and Queensland roads using a Traffic Speed Deflectometer (TSD) has been undertaken recently. The hi-tech survey vehicle arrived from the Danish Road Directorate (DRD) in January 2010 and after initial shakedown trials spent as much time as possible out on the road surveying.

Having completed a 12,000 km survey of NSW roads, the TSD vehicle took a moment recently in Brisbane to showcase its technology at a hosted event on 5 May at Ballymore. The event was well attended with a lot of interest from councils, contractors and consultants.

With only two vehicles of its type in operation around the world, the interest in a vehicle that can continuously measure pavement deflections at speeds up to 80 km/h is high.

After the technology showcase at Brisbane, the vehicle has made its way around the Queensland portion of the Auslink highway network of some 5,000 km.

The Roads and Traffic Authority of New South Wales (RTA) and the Queensland Department of Transport and Main Roads along with other road authorities are providing input to an Austroads project delivered by ARRB to undertake an independent evaluation of the technology to determine its applicability in Australian conditions.

Analysis of the collected data has commenced, with initial comparisons with traditional deflection data from other devices being very promising. A final project report will be published by Austroads documenting the findings of the analysis and implications for future surveys.

Ian Steele
+61 7 3260 3503
ian.steele@arrb.com.au

Julia Kelley
+61 3 9881 1681
julia.kelley@arrb.com.au

Contents

Issue 126 June 2010

Published by ARRB Group Ltd
ISSN 1328-7206

ARRB receives ISO accreditation

Following on from the Equipment department receiving ISO certification in 2008, ARRB's Services department has now achieved formal accreditation to AS/NZS ISO 9001:2008.

The Services department has collected quality pavement and asset management data across Australia and internationally for over 30 years. The department operates an extensive fleet of modern survey vehicles collecting pavement profile, road and roadside images, road geometry and mapping information, pavement strength testing and other information.

AS/NZS ISO 9001:2008 Quality Management System is a joint Australian/New Zealand Standard that is recognised world wide. ISO 9001 certification provides a framework for ensuring total quality, including the establishment of procedures for key processes.

The certification is of great benefit to ARRB Systems and its customers as it has enabled improved efficiencies in our services work.

Bruce Clayton
+61 3 9881 1582
bruce.clayton@arrb.com.au

ARRB welcomes RDCRB, Indonesia

ARRB Group recently welcomed delegates from the Research Development Centre for Roads and Bridges (RDCRB), in Bandung, Indonesia.

Mr. Nyoman Suaryana, Mr. Ronny Anggodo and Mrs. Hindun Hasanah, all from the Road Material and Pavement Division, visited Australia to investigate various pavement management techniques and to discuss research activities with staff at ARRB's head office in Melbourne.

Owners of a Hawkeye 2000 Digital Imaging System (DIS) and Gipsi-Trac unit, RDCRB (previously IRE Bandung) has a long history of working very closely with the ARRB Group.

Barry Jan
+61 3 9881 1625
barry.jan@arrb.com.au

ARRB Group welcomes European Business Manager

ARRB's expansion into Europe continues apace with the recent appointment of Mads Genefke as European Business Manager.

Mads who has a background in business development and specialist transportation services, joined ARRB on 3 May and will operate from Grontmij-CarlBro's offices in Kolding, Denmark. ARRB and Grontmij-CarlBro formed a strategic marketing alliance four years ago.

Mads recently spent three weeks at the ARRB offices in Melbourne for induction and training on equipment, as well as an introduction to the capabilities of ARRB Group, as a whole.

Mads Genefke
+ 45 8228 1437
mads.genefke@arrb.com.au

Hawkeye Processing Toolkit v2.4 released

ARRB Systems has released the latest edition of their desktop processing software, the Hawkeye Processing Toolkit version 2.4.

This software allows users to 'virtually drive their networks', monitoring video, GPS, roughness, rutting, crossfall and a host of other road parameters, all in a simple user-friendly interface. The advanced processing, rating and reviewing options allow users to make informed decisions about their network, all from the comfort of their desk.

Version 2.4 updates a wide variety of features including:

- Google Map backgrounds
- advanced roughness processing modeling (8 processing options)
- statistical processing (Max, Min, Ave, Total, Std, %, Binning)
- multi-tab rating forms and mass-rating editors (improved rating efficiency)
- increased usability through shortcuts, layouts and options.

The licensing of Google Maps into the software allows for efficient verification of data points, as well as simple and intuitive navigation. Once verified, this data can then be exported as Excel, text, shapefile (point or polyline) or bitmap images into other GIS applications. For those who are not GIS experts, this is an easy and user-friendly environment for mapping surveys.

For more advanced users, the processing options have been opened up to allow for a range of model processing options if required. Statistical analysis, result binning and processing parameter selection allow users to fine-tune outputs to their information needs.

This latest release continues to expand the processing ability of ARRB's Hawkeye products and services, allowing clients to get the road information they need to make informed decisions.

Simon Barlow
+61 3 9881 1635
simon.barlow@arrb.com.au

Cost-benefit analysis of maintenance policies in PNG

ARRB has completed a cost benefit analysis of AusAID-funded investment in alternative maintenance policies applied to the Highlands Highway in Papua New Guinea over the last ten years.

The Highlands Highway provides a transport lifeline to the Central Highlands area of PNG, beginning in the east at Morobe and ending in the mountains to the west of Goroka. It was progressively upgraded to a modern pavement in the period 1985-1990, and has since then carried substantial traffic. In its first 10 – 15 years, maintenance was minimal leading eventually to poor road conditions.

The study drew on the extensive data on road conditions and maintenance and rehabilitation history, including details at an activity and location level for the last ten years; probably one of the most detailed and reliable datasets encountered in studies of this kind.

Key outcomes of the study included:

- a marginal benefit cost ratio (MBCR) of approximately 5 for the combined AusAID-funded program relative to the earlier low maintenance policy with eventual reconstruction
- transport cost savings of approximately A$500m, with total life cycle road user cost savings (excluding crash cost savings and reduced road closures) of more than A$600m.

The study clearly demonstrated the importance of preventative maintenance policies in minimising costs, with a marginal BCR of approximately 10 estimated were a pre-emptive policy applied from the outset (in 1990).

Whereas the structure of the analysis was conventional, the calibration of road deterioration and works effects models to local conditions revealed a number of key factors peculiar to pavement performance in the region. Amongst these, the most interesting, were:

- the critical importance of timely pothole repair, with the policy of early intervention and drainage and shoulder maintenance reducing the volume of pothole repairs by a factor of four
- low deterioration rates (comparable to Australia) where Key Roads for Growth Maintenance Project (KRGMP) policies were applied immediately following reseals.

The study was part of the final activities under the AusAID funded KRGMP, with ARRB working as a subcontractor to Kellogg Brown and Root, AusAID's managing contractor for the period 2006 – 2010.

Tyrone Toole
+61 3 9881 1652
tyrone.toole@arrb.com.au

Estimating the marginal cost of road wear

For the first time in this country, detailed estimates of the marginal cost of road wear by type of vehicle and road have been derived.

ARRB, through Austroads and the National Transport Commission (NTC) funding of Austroads Project AT1394 ***Cost implication of incremental loads on road pavements***, has estimated the marginal cost of road wear for six heavy vehicle axle group types with loads ranging from axle group tare weight to several tonnes in excess of the current general mass limits (GML) regulatory framework. The estimates cover the range of road and pavement types and climates representing Australia's sealed road network.

Historically in Australia improvements in road freight productivity have arisen mainly by increasing freight vehicle payloads. The higher axle group loads associated with increased payloads on heavy freight vehicles can, in some cases, significantly increase the marginal cost of road wear caused by the increased costs of resurfacing and the bringing forward of costly major rehabilitation works.

As part of the Council of Australian Governments' (COAG) road reform agenda, plans to permit operation of larger heavier freight vehicles in Australia make this an important issue. The Productivity Commission's 2006 inquiry into road and rail infrastructure pricing has also raised the need to explore alternative road infrastructure pricing models for heavy vehicles.

Through the use of a well informed pricing system, based on these marginal road wear cost estimates, road freight operators should improve their freight productivity while road agencies would be appropriately compensated for the road wear costs. Prices, costs and revenues based on marginal road wear costs would also provide signals for effective management of their road networks in regard to the availability of targeted funds for maintaining road freight routes.

Dr Tim Martin
+61 3 9881 1564
tim.martin@arrb.com.au

Impacts of road pricing regimes on road use, the economy and community

ARRB has been working on an Austroads project that assesses the impacts of the most significant types of road pricing schemes. Operational, economic and social impacts arising from the implementation of pricing regimes were considered.

The application of direct charging for use is applied only to a select number of tolled roads across Australasia. Whilst other applications for road pricing such as congestion mitigation measures have been discussed only as theoretical processes, there is still a lack of data available on what impacts the application of road pricing would have on motorist route choices.

The objective of the project is to provide practitioners with information on the likely impacts of different pricing approaches (toll roads, HOT lanes, area pricing, cordon pricing, wide area pricing) and the behavioural responses to different price levels. Typical impacts include increased monetary costs for road users from paying the toll charges. They also impact on road users' time costs, route choice, destination, modal choice, trip frequency and trip starting times.

An intended outcome of the project is to provide road system managers with advice on the technical steps that they would have to instigate to be able to develop price elasticity measures and how they could judge the adequacy of their road use data to calculate such measures. The estimates of user response to toll charge changes reviewed by this project indicate that in most cases the demand for travel is inelastic. This is not surprising as road pricing is mostly suggested for road assets and networks which are in heavy demand.

The introduction of road pricing schemes involves challenges related to public acceptance. Failing to carry the public along the stages of planning, design and technical analysis of the scheme, can seriously impede its introduction (e.g. in the case of the Netherlands); and in some cases, lead to its abandonment altogether (e.g. in the case of the Edinburgh cordon scheme).

Different pricing schemes are likely to have equity impacts for users. Overall, well designed and planned pricing is likely to have a positive influence on equity outcomes. There are activities for which people value time highly, and public transport outcomes can be significantly improved. In special cases, the authorities can also introduce appropriate compensatory mechanisms for affected low income users.

Finally, preliminary findings indicate that there may be considerable improvements regarding environmental and road safety outcomes as a result of implementing road pricing regimes successfully.

Dr Dimitris Tsolakis
+61 3 9881 1580
dimitris.tsolakis@arrb.com.au

New edition of Austroads Glossary

The fourth edition of this essential reference for practitioners will soon be released by Austroads. The Glossary covers pavement and materials technology, bridge technology, asset management, heavy vehicle operation, road safety, traffic engineering, and transport planning and economics. It also includes a list of organisational acronyms.

Hundreds of new and revised terms, and their definitions have been added in response to user feedback and to take account of the many recent Austroads Guides and reports.

The Glossary will be available from the Austroads website: **www.austroads.com.au**. Comments and suggestions are welcome. Please email:

Peter Milne
+61 3 9881 1514
peter.milne@arrb.com.au

Clear zones and run-off-road crashes

Run-off-road crashes are a major contributor to rural road fatalities and serious injuries. In the Australian states and territories and in New Zealand, they typically account for 45-65% of rural crashes.

There are many ways of providing a safer roadside environment. Some road design features focus on reducing the likelihood of errant road departure, e.g. signs and delineation, vehicle activated signs, audio-tactile edge lines, lighting, shoulder sealing and improved skid resistance. Other road features act to reduce the likelihood of serious injury in case of a run-off-road crash, e.g. frangible poles, safety barriers and provision of adequate clear zones.

This last group of road design features has been a focus of one stage in a multi-year Austroads funded project focussed on improving roadside safety. Current guidelines on clear zone selection and roadside hazard management adopt the US approach based on the probability of roadside encroachment by drivers. This approach is based on the available research evidence generated in the 1960s and 70s. Questions have been raised over the robustness and applicability of this evidence in Australia and New Zealand in 2010 and in the Safe System context.

ARRB found a weak link between the current approach to selection of clear zones and run-off-road crash outcomes. To provide a clearer, outcome-based rationale for clear zone selection, extensive statistical modelling of rural highway crash data was carried out. The results showed that 30% of run-off-road casualty crashes occurred in clear zones exceeding 13 m. Similar results were found for deaths and serious injuries in these crashes.

The risk of run-off-road casualty crashes was 54% lower on road sections with clear zones in the 4-9 m range than in the 0-2 m range. Only a further 7% reduction was observed when clear zones increased to more than 9 m. Effects of other road and roadside features on crash outcomes were also investigated: batter slope, curve radius, lane width, sealed and unsealed shoulder width.

The study confirmed that even very wide clear zones cannot prevent fatal and serious injury outcomes for errant motorists colliding with roadside hazards (i.e. not a Safe System solution). On the other hand, providing wider clear zones can lead to a much lower incidence of run-off-road crashes. Other road features, such as sealed shoulders and audio-tactile edge lines, should be used in conjunction with wider clear zones to further drive down the incidence of run-off-road crashes and the associated trauma.

These findings will provide input into future clear zone selection guidelines and will assist in improved decision making in selection and placement of safety barriers (future stages of the Austroads project). The detailed outcomes of this research will be presented at the 2010 Australasian Road Safety Research, Policing and Education Conference in Canberra at the end of August 2010.

Chris Jurewicz
+61 3 9881 1612
chris.jurewicz@arrb.com.au

Reducing global road crashes – the Road Safety Toolkit

Currently around 3,500 people are killed each day on the world's roads, the vast majority of which occur in developing countries. Momentum for addressing this safety issue is building. 2011 will mark the start of the Decade of Action for Road Safety. Ambitious targets have been set to halve the growth in deaths by 2020.

In order to meet this optimistic objective, there is a need for a significant change in how safety is delivered, especially in developing countries. In particular, the road engineering profession needs to pick up this challenge, and implement road infrastructure treatments that are cost-effective, and that bring substantial safety benefits. These treatments need to be based on Safe System concepts, with particular emphasis on the appropriate management of vehicle speeds. Adequate capacity and the knowledge to deliver such initiatives have been identified as major stumbling blocks to improving safety in developing countries.

There have been various responses to this knowledge and capacity issue at regional and global levels. The Road Safety Toolkit directly addresses gaps in knowledge by providing information to safety professionals on the treatments that can be used to address specific road safety problems. The Toolkit (accessible at **http://toolkit.irap.org**) is a free website that provides information on measures that can be taken to improve safety on the road.

ARRB has had a leading role in the development of the Toolkit. This has been produced in association with iRAP (the international Road Assessment Program), with support from gTKP (the Global Transport Knowledge Partnership), the World Bank Global Road Safety Facility, and Austroads.

The Toolkit is designed to assist in the analysis of crashes, or issues relating to specific road user groups, and in the selection of the most appropriate road safety treatments. Based on existing crash problem types, users are offered information on a range of options that can be used to improve safety. Information is provided on the typical costs and benefits of these treatments, and how and when to apply them (and when not to). For each treatment, an estimate of the reduction in casualty crashes is provided, based on research from around the world.

The Toolkit builds upon a concept first developed for Australian road authorities, through Austroads. (The Austroads Road Safety Engineering Toolkit, available at **www.engtoolkit.com.au** fulfils a similar purpose to this website, although is aimed at Australian and New Zealand practitioners specifically). It is a comprehensive and easy-to use resource that helps engineers, policy-makers and safety practitioners from around the world find the best and most affordable countermeasures to reduce casualties. A major strength of the Toolkit is that it is a 'living document' that can be updated as the knowledge base improves.

The Toolkit has recently been revamped and updated, and now provides additional information on road user and vehicle solutions to road safety problems. It will soon also include information on issues relating to the management of road safety.

Blair Turner
+61 3 9881 1661
blair.turner@arrb.com.au

Research Services Agreement with Main Roads WA

A Research Services Agreement has been established between Main Roads WA and ARRB Group. Its purpose is to assist in the development of highly specialised and strategic transport solutions, associated research services and innovative engineering solutions and practices.

The overall objectives of this partnering contract are:

- For MRWA to gain access to world class research capability in the areas of pavement engineering and surfacing, road safety, road network operations (heavy vehicles, traffic management, ITS, incident management, etc.) and asset management planning and operational asset management.
- To carry out research, and/or transfer knowledge from research undertaken elsewhere, that will enable the implementation of innovative road design, safety and management practices.
- To enable Main Roads to maintain good customer and community relations.
- To enhance Main Roads' level of expertise in these areas.

- To put in place mutually beneficial exchanges of staff to assist in their development.
- To facilitate the efficient and effective delivery of services

ARRB Group has previously and continues to assist Main Roads WA with research in diverse areas such as intelligent transport systems, asset management, data collection, road network strategies, safety, signage and speed limit reviews.

A total of 37 projects have been completed to date. A recent ARRB project has included the development and trialling of a side-scanning laser to measure offset to roadside objects. This information can be used for asset management and for input into risk assessment algorithms that give a safety rating to road lengths.

Dr Paul Roberts
+61 8 9227 3012
paul.roberts@arrb.com.au

ConnectEast and ARRB sign agreement

ConnectEast, the owner and operator of Melbourne's EastLink tollway, and ARRB Group have agreed to co-operate on road safety and other operational road research matters for a period of three years.

ConnectEast Managing Director, Dennis Cliche, and ARRB's Managing Director, Gerard Waldron, said the agreement between the operators of one of Victoria's safest roads and Australia's only national road transport research organisation would lead to benefits for all motorists.

'The agreement provides ConnectEast with access to ARRB's specialist road safety engineers and behavioural scientists when external expertise is needed to address operational road safety matters,' Mr Cliche said.

'ARRB's experience in road safety research, risk assessments and developing practical solutions is well-known to Australia's state and local road authorities. In addition, ConnectEast gathers detailed data on road traffic incidents and this will be provided to ARRB for further research to improve road safety in Australia.'

ARRB's Managing Director, Gerard Waldron (left) and ConnectEast Managing Director, Dennis Cliche

Mr Waldron said that ARRB was pleased to have a formal agreement with ConnectEast because ARRB's focus on solutions applies equally to private and government road operators.

'The agreement will ensure that ConnectEast is informed of emerging issues in road safety, and can access that advice, and ARRB's expertise on topics such as bituminous surfacings, pavements and heavy vehicle dynamics, at short notice,' Mr Waldron said.

ConnectEast and ARRB's offices are located only ten minutes apart, via EastLink, in Melbourne's eastern suburbs of Ringwood and Vermont South.

Gerard Waldron
+61 3 9881 1511
gerard.waldron@arrb.com.au

The RTA strengthens ties with ARRB

The Roads and Traffic Authority of NSW signed a Memorandum of Understanding (MoU) with ARRB on 10 May 2010 in relation to the secondment of RTA employees to ARRB's national and overseas projects.

The agreement was signed between ARRB's General Manager Research & Consulting, Peter Damen, and the RTA's Acting Director Corporate Services, Richard Boggon, at the RTA's North Sydney office.

This MoU recognises the importance of close co-ordination and co-operation between both organisations in facilitating knowledge transfer and the sharing of managerial, project management, professional and technical skills of their employees. It also sets out to promote professional development, career opportunities and retention of staff.

Left to right: Arjan Rensen, Richard Yeo, Peter Damen, Richard Boggon, Karen Edwards, Peter Collins

Christina Chin
+61 3 9881 1669
christina.chin@arrb.com.au

Sharing knowledge and building skills

Australia is facing a skills shortage on a national level in the roads and transport industry. Expertise across the road industry is diminishing as 'old hands' retire and others leave for opportunities overseas or in different industries. Furthermore, road authorities' capacity to nurture, develop and maintain their own specialised experts in these fields is challenged by tighter budgets, downsizing and contracting out.

The International Experts Visiting Program forms part of ARRB's campaign to gain knowledge from experts and pass this on to its members to help further knowledge in the Australian road community.

Recently Dr Peter Sweatman, Director of the University of Michigan Transportation Research Institute was in Australia at the Heavy Vehicles Transport Technology (HVTT Symposium). ARRB arranged for Peter to visit the QTMR, the Department for Transport, Energy and Infrastructure (SA) and RTA (NSW), and he visited ARRB's Melbourne office where he spoke at a seminar and met with Directors.

Dr Sweatman is an international leader in the field of heavy vehicle infrastructure for safe and sustainable transportation. His interests include the global overview of pavement research on higher productivity vehicles and performance based regimes and intelligent access programs (which are currently used in Australia).

ARRB and BASt sign MoU


ARRB's Managing Director, Gerard Waldron (left) and Dr Peter Reichelt

At the end of March 2010, Dr Peter Reichelt, president of Germany's Bundesanstalt für Straßenwesen (BASt; Federal Highway Research Institute) visited ARRB to explore opportunities for collaboration. At that time ARRB was hosting a BASt engineer Rolf Rabe as part of the TREx program, and ARRB's Adam Ritzinger was on his way to Germany for a 12 month stint at BASt (see page 10).

During the visit, Dr Reichelt and Professor Fröhmut Wellner from the University of Dresden exchanged views and experiences with a number of ARRB's teams in the infrastructure and heavy vehicle areas, and visited ALF in Dandenong. Key VicRoads pavement and asset staff also met with Dr Reichelt and their ARRB counterparts to pool their experiences and views on upcoming

challenges in pavement and asset management.

At the end of the visit, Dr Reichelt and Gerard Waldron signed a memorandum of understanding between the two organisations, agreeing to collaborate in the areas of road condition assessment, accelerated pavement testing and pavement instrumentation for measurement of behaviour and response under loading.

Mike Shackleton
+61 3 9881 1572
mike.shackleton@arrb.com.au

Transport Researchers Exchange

Adam at BASt

As part of ARRB's Transport Researchers Exchange program (TREx), Adam Ritzinger, a research engineer, has begun a secondment to the Federal Highway Research Institute (BASt) in Germany.

BASt is a technical research institute operating under the guidance of the Federal Ministry of Transport, Building and Urban Affairs (BMVBS). BASt provides the Ministry with scientifically-supported decision aids for technical and traffic-related issues concerning road pavement and bridge construction and maintenance, automotive engineering and active vehicle safety, road user behaviour, and traffic engineering. BASt also plays a significant role in drafting transport regulations and standards.

During Adam's twelve months with BASt, he will be seeking to further the exchange of knowledge and capabilities between the two organisations, as many of BASt's research areas are similar to ARRB's. Adam will be working within the automotive engineering department, and dealing particularly with research into vehicle-pavement interaction, which covers topics including the dynamic loads applied to pavement surfaces by vehicles, the noise generated by tyres, and measuring the rolling resistance of different tyre types.

Adam will also seek to apply his skills and knowledge, and ARRB's capabilities, in the area of assessing heavy vehicle performance through computer simulation, to address local research needs regarding vehicle safety and dynamic performance.

Adam will also travel to several other technical institutions and universities throughout Germany during his stay, to further identify opportunities for collaboration and information exchange.

Adam Ritzinger
ritzinger@bast.de

Rolf at ARRB

Rolf Rabe from BASt has recently spent two months at ARRB. Rolf is a pavements engineer and his recent projects have included:

- Design and construction of a full scale asphalt pavement test track with 200 sensors for measuring pavement response and pavement performance under heavy vehicle loading and accelerated loading
- Measurement of dynamic wheel loads on highway sections and the BASt test track with conventional and interactive damping systems to assess the effectiveness of road friendly suspensions
- Comparative pavement deflection measurement using the Falling Weight Deflectometer and the Danish Traffic Speed Deflectograph (TSD). The TSD is able to collect road condition data about 20 times faster than previously possible.

While at ARRB, Rolf was able to assist with interpretation of TSD data from the 15,000 km trial road network survey in NSW & Queensland (see page 1). The data from the survey matched reasonably well with other deflection measurement devices and the TSD appears to be a suitable device for the determination of pavement strength on a network level when used in combination with additional data and information.

Additionally Rolf helped develop a plan for laboratory fatigue testing of asphalt samples. The testing would use load pulses simulating multiple axle group loads. Use of full scale response data collected by Rolf at BASt was central to this work.

Rolf Rabe
rabe@bast.de

The national ITS strategy

In November 2009, ITSA and the Victorian Government hosted the inaugural Australian ITS (Intelligent transport systems) Summit which explored ideas for the development of components of a national ITS Strategy. Outcomes from the Summit were sorted into strategic themes, project concepts, policy opportunities and potential action plan components. These have been refined by ITSA to provide the basis for a national ITS Strategy.

The Strategy is aligned to three core pillars of **Safety**, **Mobility** and the **Environment**. This matches the themes used in the program of national transport reform, under the auspices of the Australian Transport Council (ATC) and the National Transport Commission (NTC).

Within the strategy framework, an overall vision of community outcomes for each of those pillars is postulated, to provide a context for the ITS contribution. The target outcomes are seen to be:

- zero harm to users of the transport network
- zero avoidable congestion
- a significant (50-70%) reduction in transport greenhouse gas emissions.

ITSA recognises that ITS is not able to achieve such a vision on its own. Such a vision requires many other factors such as land use planning, engineering design, civil works, social behaviour, and government economic policies to all work together. However, ITS can make a very important and significant contribution to attainment of these targets and in many cases, provides a relatively low-cost way to enhance the performance of existing infrastructure and optimise the impact of new investment.

Drawing from the outcomes of the Summit, ITSA has articulated components of a vision for the contribution ITS can make to the three pillars. These are summarised in the table below.

The detailed strategy can be found at **its-australia.com.au**

Safety	Mobility	Environment
Intelligent systems will help prevent accidents wherever possible and minimise harm when they occur.	Readily accessible information will improve traveller mobility and optimal choice of modes (including public transport). Intelligent systems will support management of transport demand, increasing network productivity and reliability.	ITS will be recognised as a key enabling technology in reducing the environmental impact of transport.

Road train speed trial

The South Australian Department for Transport, Energy and Infrastructure (DTEI) has received requests from industry to increase speed limits for road trains travelling on the Eyre Highway linking South Australia and Western Australia, and the Stuart Highway linking South Australia and the Northern Territory.

DTEI and the South Australian Road Transport Association (SARTA) have commissioned ARRB to conduct on-road trials and computer simulations of a range of road trains (A-double and A-triple) and B-triple configurations in order to understand the safety and environmental implications of operating these vehicles at higher speeds. Presently these vehicle types are limited to a maximum speed of 90 km/h in South Australia.

The combination of on-road trials and desktop based simulations will provide a comprehensive understanding of the potential ramifications of the proposed change, not only in terms of road safety but also environmental impact. This will allow DTEI to make an informed decision when considering the proposed regulatory changes.

Luke Callaway
+61 3 9881 1596
luke.callaway@arrb.com.au

The future for heavy vehicles

The 11th Heavy Vehicle Transport Technology (HVTT) Symposium was held in Melbourne from 14-17 March 2010.

HVTT11 featured over 70 technical papers focusing on the key drivers of change and how these can influence future developments and government policy formulation relating to heavy vehicles. More than 160 local and international experts attended.

Key areas of HVTT11 included environment and energy, vehicle technology and design, safety, infrastructure design and operation, standards and regulations, compliance, community issues, logistics, productivity, heavy vehicle transport policy and freight volumes and trends.

Dr Peter Sweatman discussed the pressures to innovate or not to innovate. Freight growth, safety, environment, energy and climate change were encouraging innovation whereas public perception and funding limitations were factors seen to be inhibiting innovation. Topics and issues raised during the conference were mapped projecting the path forward for heavy vehicle innovation.

The need to increase productivity was evident and the benefits of longer vehicles are compelling with a presentation from Bob Pearson providing statistics on B-doubles in Australia: 11 million tonne of greenhouse gases saved, $12b reduction in transport costs, two fatalities for B-doubles compared with 329 associated with tractor semi-trailers.

Reductions in fuel use and emissions were likely to flow from improved engine and drive-train efficiencies, reduced aerodynamic drag and use of regenerative braking (hybrids). Prof. David Cebon identified areas where major gains in fuel consumption could be achieved by up to 35% by changing logistic patterns i.e. using a tractor-semi-trailer instead of two rigids or using longer vehicles. However, even greater fuel savings (up to 50%) can be achieved by reducing traffic congestion via the following measures:

- using higher capacity vehicles for the same freight task
- eliminating night-time curfews on freight deliveries
- optimising traffic control
- reducing accidents and delays due to road maintenance.

Active steering systems and electronic braking systems were the two vehicle technologies taking precedence at the conference. The OECD heavy vehicle performance benchmarking study conducted by ARRB showed that many higher capacity vehicles have equivalent or even better intrinsic safety characteristics in some respects than most common workhorse trucks.

Other issues raised included:

- the importance of talking to the public
- the challenges facing the implementation of PBS and the uptake of high performance freight vehicles worldwide
- the complex technical, policy and approvals framework In place in Australia.

Suggestions for improving the uptake of PBS were to:

- approve vehicles for general use
- approve modular systems of components instead of just single vehicles
- classify the road network or have a better system for route assessment approvals.

More details on the Symposium can be obtained from ARRB Research Report ARR 376 ***Report on HVTT11 International Heavy Vehicle Symposium*** available as a free downloadable PDF file at **www.arrb.com.au** and from the HVTT website **www.hvttconference.com**.

Anthony Germanchev
+61 3 9881 1620
anthony.germanchev@arrb.com.au

New partnership agreement for delivery of National Technical Research Program

Austroads and ARRB work together to maximise the benefits they can provide their owners and other stakeholders. Austroads provides a forum for road agencies to promote harmonisation and consistency in their operations while ARRB undertakes research and provides consulting services and technical expertise to road agencies and the wider road industry.

A new partnership agreement between Austroads and ARRB was endorsed on 3 June 2010. The new agreement continues the fundamentals of the technical research agreement (which commenced in 2003/04) providing for longer term research funding and thereby enabling ARRB to build and maintain technical capability.

The scope of the agreement has been broadened to include network operations and traffic management in addition to the areas addressed by the original technical research agreement – namely pavements, surfacings, asset management and road safety engineering. The new agreement includes scope for dedicated technical advisers and it covers the ongoing Austroads-ARRB fellowship which provides funding for up to two concurrent PhD candidates.

For the 2010/11 technical research program there are 40 projects in total comprising asset management (15), pavements (6), surfacings (7), road safety engineering (9) and 3 new projects in network operations (in addition to a number of continuing projects). The average project value has risen to $140,000 and the program includes major projects such as long term pavement performance monitoring, optimal axle group loading (involving laboratory and full scale accelerated pavement testing), performance of warm mix asphalt and the road safety national risk assessment model. A number of smaller scoping projects will guide future research directions.

ARRB staff are finalising research work for the 2009/10 program - the highlights will be presented in the annual report in October 2010 and accessible together with electronic copies of the previous Technical Research annual reports on the ARRB website. All published technical and research reports arising from the program are available for free download from the Austroads website.

Major projects concluding in 2009/10 are:

- Understanding wear and cost implications of incremental loads on the road network (optimal axle mass limits)
- Guide to tunnel technology
- Cost-effective structural treatments for rural highways
- Road safety engineering measures to address fatigue.

Importantly, the ARRB conferences to be held in October 2010 in Melbourne form a key component of the dissemination plans for the research. The conferences will feature significant papers arising from the technical research providing delegates with a means to be informed about the research and to interact with the research professionals. Technical tours will also be available to enable delegates further access to see first hand the research facilities and meet staff.

Richard Yeo
+61 3 9881 1503
richard.yeo@arrb.com.au

Publications from ARRB

Road and Transport Research
ARRB's journal of Australian and New Zealand research and practice

March 2010 Vol. 19 No. 1.

Abstracts of papers can be viewed on ARRB's website **www.arrb.com.au** where subscription details can be found. Subscription includes four hard copies per year and access to full text of papers as downloadable PDF files from the ARRB website.

Report on HVTT11 International heavy vehicle symposium

Editors: Peter Milne and Anthony Germanchev
Research Report ARR 376

Traffic Modelling Techniques

April 2010 newsletter has been released.

These publications are available as free downloadable PDF files from ARRB's website: **www.arrb.com.au** or for hard copies contact **booksales@arrb.com.au**, +61 3 9881 1561

New staff

Winston Fletcher has joined ARRB as a Senior Software Engineer within our Systems group. Winston comes from Swinburne University where he was a Senior Software Engineer. He has a Bachelor of Software Engineering.

John Gaffney has joined ARRB on secondment for two years from VicRoads. John has been the Vicroads Delivery Manager for Integrated Freeway Ramp Signals on Melbourne's M1 Freeway upgrade project. John managed the development and application of the technology to coordinate the signalling along 64 freeway ramps of the M1 project. The theory and technology was found in Greece, but had never been applied before.

From the early 1990s John was an Austroads Program Assistant then Assistant Director of Austroads, on secondment from VicRoads, from 1991 to 1995.

John will be joining our Transport Operations team, to work with Dr James Luk, Dr Ian Espada, Paul Bennett, David Green, Michael Levasseur and Dr Clarissa Han to develop our capability and opportunities. John will be focussing on managed freeways, vehicle-to-infrastructure and vehicle-to-vehicle communications, which is a priority for Victoria as well as other SRAs.

Shannon Malone has joined ARRB as Laboratory Manager. Shannon has over nine years of industry experience and comes from Downer EDI Works National Research and Development Laboratory where he was a Senior Laboratory Technician. Shannon has a BSc (Chemistry) from Deakin University.

Ben Mitchell has commenced in the Sydney office as a Graduate Engineer. Ben holds B.Eng (Proj Eng and Mgmt) (Hons) qualifications. He was previously an Undergraduate Engineer with Fulton Hogan responsible for costs and QA for earthworks and drainage on a $110m RTA highway expansion project.

2010 Knowledge Transfer program

The Knowledge Transfer team in conjunction with our workshop presenters are offering a broad range of workshop topics in 2010, in Australia and internationally. Look out for the following workshops scheduled this year:

NEW SOUTH WALES

- Transport modelling 31 August – 1 September 2010, Sydney
- Mining roads: safety and design 26-27 October 2010, Sydney
- Mining roads: safety and design 7-8 December 2010, Singleton
- Basic geometric road design late 2010, Sydney
- Traffic theory and applications 28-29 March 2011, Sydney

VICTORIA

- Transport modelling 6-7 July 2010, Melbourne
- Unsealed local roads 20-21 July 2010, Bendigo
- Traffic theory and applications 23-24 August 2010, Melbourne
- Basic geometric road design late 2010, Melbourne

QUEENSLAND

- Transport modelling 17-18 August 2010, Brisbane
- Mining roads: safety and design 14-15 September 2010, Brisbane
- Mining roads: safety and design 30 November – 1 December 2010, Mackay
- Treatment of crash locations late 2010, Brisbane
- Basic geometric road design late 2010, Brisbane
- Traffic theory and applications 31 March – 1 April 2010, Brisbane

WESTERN AUSTRALIA

- Mining roads: safety and design 1-2 July 2010, Perth
- Transport modelling 3-4 August 2010, Perth
- Traffic theory and applications 9-10 September 2010, Perth
- Planning and design of parking facilities 14-15 September 2010, Perth
- Basic geometric road design 21-23 September 2010, Perth

SOUTH AUSTRALIA

- Traffic theory and applications 6-7 September 2010, Adelaide
- Unsealed local roads 26-27 October 2010, Wudinna
- Basic geometric road design late 2010, Adelaide

AUSTRALIAN CAPITAL TERRITORY

- Traffic theory and applications 6-7 December 2010, Canberra

NORTHERN TERRITORY

- Basic geometric road design early 2011, Darwin

NEW ZEALAND

- Geometric road design and intersection design 27 July 2010, Auckland
- Geometric road design and intersection design 28 July 2010, Hamilton
- Geometric road design and intersection design 30 July 2010, Wellington
- Geometric road design and intersection design 2 August 2010, Christchurch
- Geometric road design and intersection design 4 August 2010, Dunedin
- Treatment of crash locations 13-14 September 2010, Auckland
- Treatment of crash locations 16-17 September 2010, Christchurch
- Traffic theory and applications 8-9 November 2010, Christchurch
- Traffic theory and applications 11-12 November 2010, Auckland
- Geotechnical investigation and design late 2010, Auckland
- Geotechnical investigation and design late 2010, Christchurch
- Basic geometric road design early 2011, Auckland
- Basic geometric road design early 2011, Christchurch

(continued next page)

2010 Knowledge Transfer program

Basic geometric road design: Good road design will achieve operational efficiency, be safe and cost-effective, and minimise environmental impacts. The role of the road designer is to produce the most appropriate design that achieves the specified functionality using the design inputs from all relevant disciplines. The design must provide for a safe and efficient road facility that takes into account all inputs from stakeholders and road users. The workshop will cover these principles so that delegates obtain a clear understanding of the key geometric design requirements for road design.

Geometric road design and intersection design: This seminar focusses on several of the new Austroads Guides relating to the geometric design of roads and intersections. It will step participants through the new guides and facilitate understanding and discussion concerning new material contained in them. It does not and is not intended to provide training in the geometric design of roads and intersections.

Geotechnical investigation and design: The purpose of this two-day training workshop is to familiarise people with current best practice in geotechnical design considerations in road design, and to participate in case studies to learn how to identify important geotechnical issues that have an impact on various road design elements.

Mining roads: safety and design: The development of this workshop has been initiated by an identified need for formalised training of mining personnel involved in planning, design, construction, maintenance or review of mining roads. This workshop is structured to provide participants with practical and applicable knowledge in the areas of traffic safety/ management and mining road design.

Planning and design of parking facilities: The information presented will be based on the Austroads Guide to Traffic Management Part 11: Parking supplemented with additional information drawn from Australian Standard AS2890.1-5. It will cover material relating to best practice techniques, available resources, design principles, on- and off-street requirements, special needs of different users, architectural and urban design considerations, and a case study syndicate exercise to provide hands-on experience applying the latest practice.

Road safety and traffic management: The course will provide practitioners with an appreciation of the content of the new Austroads Guides on Road Safety and on Traffic Management in terms of their structure, main features, new material and inter-relationships. The seminar will step participants through the new Guides and the new material contained in them. It does not and is not intended to provide detailed training in specific aspects of road safety management or traffic management.

Traffic theory and applications: Analyses of traffic behaviour are essential to both traffic management and road design, and also have application in the broader transport planning field. This workshop will explain the key areas of traffic theory, illustrate their application to various types of traffic analysis and provide participants with hands-on practice in identifying and undertaking the analyses appropriate to different situations.

Transport modelling: A two day workshop focussing on providing delegates with an understanding of transport modelling. Estimates of future demand are essential to the formulation of transport plans and policies. Transport demand modelling is therefore one of the core skills of a transport planner. The workshop will provide participants with a working knowledge of the four-step demand model.

Treatment of crash locations: A two day training workshop on the Guide to Road Safety Part 8: Treatment of Crash Locations. The workshop will cover provision of a safe system, road safety engineering, human factors, police investigations, identifying crash locations, diagnosing crash problems at the site, selecting an effective solution, crash costs and economic appraisal.

Unsealed local roads: A two day workshop on the latest practices in the management of unsealed roads based on the popular ARRB Unsealed Roads Manual. It will cover recent research findings, best maintenance techniques and case studies demonstrating how to get greater value from available funding. The workshop will be a practical hands-on presentation with group participation, worked examples, case studies and a field inspection of unsealed road sites.

For further information:

www.arrb.com.au/workshops
+61 3 9881 1680
training@arrb.com.au

3rd International
Road Surface Friction Conference
Safer Road Surfaces – Saving Lives

15 - 18 May 2011, Gold Coast, Queensland
Call for Abstracts is now open until
13 September 2010
Visit **www.arrb.com.au/friction2011** for further information.

Victoria
500 Burwood Highway,
Vermont South, VIC 3133,
P: +61 3 9881 1555
F: +61 3 9887 8104

New South Wales
2-14 Mountain Street
Ultimo NSW 2007
P: +61 2 9282 4444
F: +61 2 9280 4430

Western Australia
191 Carr Place,
Leederville, WA 6007
P: +61 8 9227 3000
F: +61 8 9227 3030

International offices
Jakarta, Indonesia
Xiamen, China
Dubai, United Arab Emirates

Queensland
123 Sandgate Road,
Albion QLD 4010
P: +61 7 3260 3500
F: +61 7 3862 4699

South Australia
Aurora Building
Suite 507, 147 Pirie Street
Adelaide SA 5000
P: +61 8 7200 2659
F: +61 8 8223 7406

Luxmoore Parking Consulting
Ground Floor
12 Wellington Parade
East Melbourne, VIC 3002
P: +61 3 9417 5277
F: +61 3 9416 2602

www.arrb.com.au

To receive future copies of Briefing contact info@arrb.com.au
Editors: Peter Milne, John Best **Email**: peter.milne@arrb.com.au, john.best@arrb.com.au

Briefing is printed on part recycled, Australian made paper using non volatile inks based on vegetable oils from renewable sources.
Briefing is mailed in a degradable plastic bag.