Briefing

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Reducing greenhouse gases

Strong growth in emissions is projected between now and 2020. Australia's emissions are projected to reach 690 Mt $CO_{2\text{-}e}$ which represents a 24% increase over 2000 levels.

In 2009 total transport $CO_{2\text{-}e}$ emissions were 83 Mt and are expected to rise by a further 15% to 97 Mt by 2020 (almost 50% above 1990 levels).

There are a number of articles on the following pages describing some of the activities that are underway to tackle this complex issue.

Contents

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Photo page 1: © Michael Clayton-Jones, Fairfax Syndication

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Greenhouse gas mitigation in transport

The Australian Low Carbon Transport Forum (ALCTF) was launched on 28 July. ARRB has played a key role in developing this initiative over the last two years. It is led by a Project Secretariat, comprising a collaboration between CSIRO, Department of Infrastructure and Transport (represented by the Bureau of Infrastructure, Transport and Regional Economics - BITRE) and ARRB.

The aim of the ALCTF is to assess the cost, potential size and limiting factors of the full range of greenhouse gas abatement (GHG) options and strategies in the transport sector. The impetus is to bring together GHG transport sector stakeholders, experts and other knowledge holders who do not normally have the opportunity to exchange information outside of their usual domain, mode or industry grouping.

Abatement options in the transport sector remain limited and poorly defined due to the diversity of the sector and limited exploration of the barriers to be overcome. Together this Forum will develop a set of realistic GHG reduction and carbon abatement options and define their potential by applying a common and transparent methodology using non-confidential contributed data and advice from participants.

The main ALCTF output will be a final report developed by the Project Secretariat. Additionally, this work will assist the transport industry by:

- establishing an influential perspective on the directions for the transport industry on emerging carbon and GHG challenges, and presenting a stimulus to governments to formulate complementary and/or enabling policy and regulatory initiatives
- being part of a wide-ranging dialogue about the 'low carbon transport' outlook among stakeholders from all fields of transport
- fostering improved collaboration and outcomes in existing strategies and initiatives between industry, research and government, as well as more effective networking and collaboration in future for new endeavours among key stakeholders and researchers on GHG and carbon reduction challenges.

The first of three workshops has been held to provide a project overview, share collective knowledge and identify knowledge gaps and options for addressing them. The workshop was attended by a broad range of Australian and State Government, industry,

Photo: V. Jaeger

CSIRO

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Australian Government
Department of Infrastructure and Transport
Bureau of Infrastructure, Transport and Regional Economics

Breaking news - save the date!

The 25th ARRB Conference will be held from 25 – 28 September 2012 at the Pan Pacific Hotel, Perth.

The call for abstracts has opened via the Conference website **www.arrb.com.au/conferences**

For further information see page 7.

Photo: J. Best

not-for-profit organisations and university participants.

On 27 May 2011, ARRB hosted the Roads Australia Sustainability Roundtable. Roads Australia, through its Sustainability Chapter, coordinated the event and engaged with Austroads, ARRB, government and industry to address the challenges of climate change as they impact on roads. The aim of this event was to investigate climate change adaptation in the context of road infrastructure. The roundtable sought to consider a framework for closer collaboration between industry and the research and public sectors on design standards, material specifications, and addressing climate change risks.

The roundtable involved key presentations from ARRB on ARRB/Austroads climate adaptation research initiatives, ARRB/Austroads asset management sustainability initiatives and modelling tools, and a review of bitumen, materials and warm mix asphalt applications.

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Carbon and asphalt – a review of environmental factors including emissions calculators

The regulatory setting for emissions reporting is tightening and large energy users or carbon dioxide emitters are now required to report carbon dioxide emissions to meet the requirements of the National Greenhouse Gas and Energy Reporting System (NGERS) that came into effect on 1 July 2008. This means that the asphalt industry needs to be both prepared and comfortable with measuring the carbon footprint of its activities, including asphalt production and its placement, and bitumen surfacing.

The asphalt industry can achieve a significant reduction in carbon dioxide equivalent emissions by improving energy efficiency in manufacturing processes. The main source of emissions in the asphalt sector arises from the heating and drying of aggregates.

Austroads established a project (TT1454: Performance of Warm Mix Asphalt Pavements) to evaluate WMA technologies for Australian road conditions. The project involves the following components:

- the development of a protocol for the evaluation of WMA technologies
- the planning and conduct of a comprehensive field assessment of a range of WMA and HMA pavements, including their laboratory performance
- a review of field trials of WMA technologies conducted overseas
- a literature review of relevant environmental factors relating to carbon emissions and asphalt pavements and a review of existing $CO_{2\text{-}e}$ emissions calculators with a view to recommending a system for inclusion into the Austroads warm mix asphalt evaluation protocol.

In terms of the latter task, six carbon calculators (three from the UK, one from the USA and two from Australia) were reviewed in terms of their applicability to Australian conditions. They included tools to determine the carbon footprint of road infrastructure and life-cycle analysis methodologies to assist with materials and technologies selection.

The development of greenhouse gas emissions factors for road construction is most developed in Europe and the UK. However, there is a need for local data to develop local emissions factors on the main elements of construction and maintenance, i.e. materials and processes. As there are few nationally agreed emissions factors that are based on local research, the adaptation and use of similar calculators would require a heavy reliance on overseas-derived factors, which will have poor accuracy for the most basic road construction elements.

It is considered that construction site and asphalt plant energy surveys would help to validate emissions calculation tools and provide industry with benchmarking information on energy efficiency performance. This would lead to improvements in process energy efficiency and reduced $CO_{2\text{-}e}$ emissions at the industry level. In the absence of sufficient Australian-based emissions factors, it is premature at the moment to recommend a carbon calculation system for inclusion into the Austroads warm mix asphalt evaluation protocol.

It is hoped that this project will encourage industry to increase their level of activity on capturing local data that will be required to meet current and future reporting requirements.

The report will be available from the Austroads website shortly.

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Researching transport and climate change

ARRB has conducted extensive research into the impacts of vehicles and transport infrastructure on the environment, and climate change implications for road transport infrastructure and operations. ARRB has experience in the areas of environmental externalities and impacts, as well as detailed knowledge of economics, policy analysis, engineering research, data systems and sustainability analysis.

Photo: iStock

Recent examples of ARRB work relating to sustainability and transport include:

- **Guidelines for Environmental Reporting (2011)** – This document provides an update and replacement of the *Austroads Guidelines for Environmental Reporting* (AP-G70/02) developed in 2002. The document summarises the key concepts, purpose, benefits and principles of environmental reporting, and sets out its relevance in the context of other practices such as environmental management and sustainability reporting.
- **Strategic Review of Future Asset Management Issues (2010)** - ARRB was commissioned by the Austroads Assets Task Force to prepare two discussion papers aimed at identifying issues that will impact on road agency asset management in the next 10 to 20 years. These comprised *Impacts of Greenhouse Gas Emissions on Asset Management* and *Impacts of Peak Oil with Increases in Bitumen and Fuel Costs on Road Use and Asset Management Funding*.
- **Impact of Climate Change on Road Performance (2010)** - This Austroads project produced software that provides climate information from 1960 up to 2099. The climate information includes mean, minimum and maximum daily temperatures, rainfall and estimates of the Thornthwaite Moisture Index (which influences pavement deterioration to some extent and is an input variable for the prediction of pavement performance).
- **Review of the Environmental Aspects of Warm Mix Asphalt (2010)** - This Austroads project commences with a brief discussion on greenhouse gases and climate change. Emissions from asphalt plants are discussed and some of the factors that affect the volume of emissions are documented.
- **Environmental and Cultural Heritage Audit Framework (ECHAF) (2009)** - ARRB was engaged by Queensland Department of Transport and Main Roads (TMR) to develop an ECHAF. It required a desktop review of the current status of auditing processes across TMR regions and development of a proforma and minimum standards for audits.
- **Climate Change Framework (2008)** – ARRB was commissioned by the Queensland Department of Transport and Main Roads (TMR) to develop a Climate Change Framework. The purpose was to provide a 'guide' of principles and techniques for the practitioner dealing with the impacts of climate change on road transport, in the context of temperature changes, changes in precipitation, rising sea levels, and increased storm activity; and examine the short and long-term impacts of climate change for road infrastructure assets and operations with specific reference to the Queensland context.

Austroads reports can be accessed from the Austroads publications website: **www.onlinepublications.austroads.com.au**

Other initiatives

Ecostation - ARRB was a Foundation Partner of Ecostation, which was a joint initiative of the Victorian Transport Association (VTA) and the Environment Protection Authority Victoria (EPA). Ecostation was a pilot program which canvassed methods to achieve an innovative program delivering greater efficiencies for freight businesses in Victoria whilst minimising their environmental impact.

Australian Low Carbon Transport Forum (ALCTF) – see page 2 for more information on the Forum.

Climate Change Focus Group - This internal group aims to build ARRB's capability in this area, coordinate climate change efforts across the organisation, and collate climate change and transport information at the international, national and jurisdictional level.

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Road safety consequences of changing travel modes

Photo: V. Jaeger

Increasing fuel prices and congestion are likely to lead to major changes in the way people travel, including less travel as car drivers, more travel as pedestrians, cyclists and motorcyclists, and on public transport. Travel by these modes carries a greater risk of death or injury than travel by car.

The objective of this Austroads project was to provide policy makers with information about the likely impacts of changing travel modes on road casualties to assist with long-term planning to achieve road safety targets.

Data from a 1984 survey of travel exposure was re-examined to establish the relative amount of travel by males and females of different ages at different times of day on each day of the week, separately for each travel mode. These were applied to 2006 data on vehicle travel from the ***Survey of Motor Vehicle Use***, adjusted for demographic changes determined from Census data. These estimates were then used in conjunction with 2006 fatality and serious injury data to calculate fatality and serious injury rates per 10 million km travelled.

Travel as a car passenger was found to be the safest mode, followed closely by travel as a car driver. Travel by motorcycle was the riskiest by a very large margin, with cycling and walking in between. Motorcycling at commuting times had about half the risk associated with motorcycling at recreational times.

A number of scenarios relating to changing travel modes were investigated which showed that changing from any mode to travelling as a car passenger would reduce casualties. Travel by public transport would be safety-neutral as the increased risk associated with walking would substantially offset the gains from travel by bus or train. Increases in motorcycling could have major impacts on safety outcomes.

Recommendations for research included work to put these estimates on a firmer basis with contemporary exposure data, detailed work to examine the 'safety in numbers' concept, and work on the costs and benefits of walking and cycling from a whole-of-community perspective.

Recommendations for action include the encouragement of travel as car passengers, action to improve the safety of walking, cycling and motorcycling, and rethinking the provision of facilities for walking and cycling to encourage these activities and provide a safe environment for them.

Further information can be obtained from report AP –R361/10 which is available from **www.onlinepublications.austroads.com.au**

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Photo: V. Jaeger

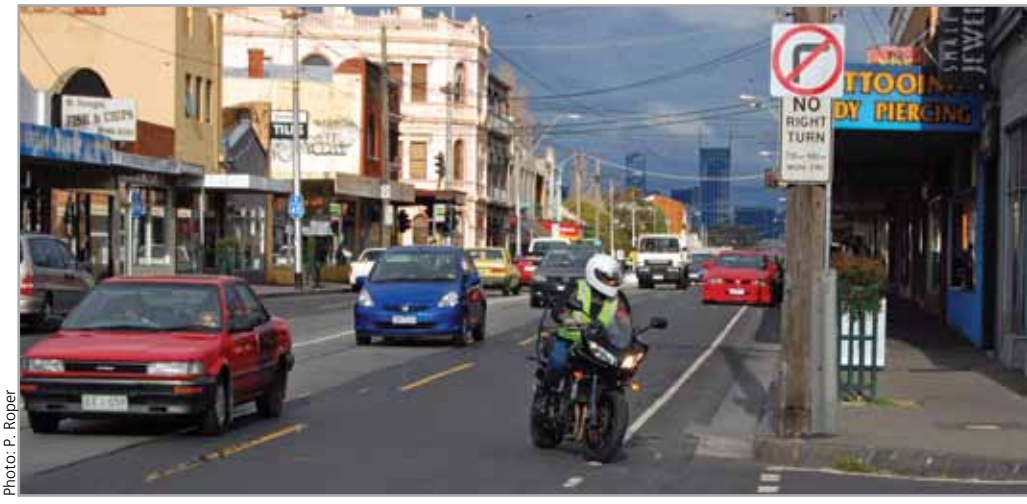

Photo: P. Roper

Modern heavy vehicle tolling systems in Europe

Photo: J. Best

Innovative distance-based heavy vehicle tolling schemes are becoming topical in Europe and have been recently implemented in Germany, Austria and Switzerland. These systems aim to primarily manage transport demand and inter-modal competition and help to create a sustainable road transport network through targeted use of re-invested toll revenue. They also encourage the achievement of emissions reduction targets in the transport sector, a sector which is currently outside the scope of the European Union's Emissions Trading Scheme.

One such toll that takes account of greenhouse gas emissions is Germany's 'Lastkraftwagen Maut' (heavy vehicle toll), implemented under the Bundesamt für Guterverkehr (Federal Department for Goods Transport), which has been operational since early 2005. Under this scheme, all heavy goods vehicles (foreign and domestic) with a gross mass over 12 tonnes are charged a distance-based fee (per kilometre travelled), intended to reflect the infrastructure cost of individual vehicle operation.

The toll amount paid by hauliers is varied based on factors that include the vehicle's emission standard according to EURO standards and number of axles. Lower per-kilometre rates are offered for vehicles with higher EURO emissions standards, and vehicles with more axles. Such differentiation is intended to encourage hauliers to invest in vehicles of higher EURO design standards on a voluntary basis.

It is estimated that the German tolling system generates approximately 2.4 billion Euros per year, 20% of which is used to cover the direct operating costs of the electronic tolling system. The remaining funds are used to maintain and improve the transport network. While a decrease in the number of 'empty' heavy goods vehicle journeys has been experienced, there are claims of a low-level increase in heavy vehicle traffic on local roads, leading to increased congestion.

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ARRB's contribution to the Austroads 2010/11 research program

In 2010/11, ARRB undertook approximately 70 research projects for Austroads across six research programs. This was the first year of the Austroads ARRB Partnership Agreement following six years under the former Technical Research Agreements.

Highlights under the Partnership Agreement included:

- continued testing of bitumen samples currently used by Australian jurisdictions, which is of growing importance as the amount of bitumen sourced internationally and produced to varying specifications increases
- collaborative work between ARRB, Australian road authorities and international researchers on the assessment of the Danish Traffic Speed Deflectometer (TSD)
- completion of the development of a two dimensional non-linear finite element pavement response to load model (AustPads)
- assessment of the effectiveness of safety barriers in reducing road trauma, and the safety benefits of replacing unforgiving poles with frangible alternatives.

A key mechanism for facilitating Austroads research into practice is the publication of Technical and Research reports and the Austroads Guides, which now comprise 96 separate parts with the addition of the ***Guide to Road Tunnels***.

ARRB personnel were involved in the authorship of 36 technical and research reports and 4 guides during 2010/11. In 2010/11 Austroads launched a new online platform for access to reports and guides (**www.onlinepublications.austroads.com.au**). Of the top 10 individual technical and research report pages visited on the Austroads publications website during the 2011 calendar year so far, 40% of those visits involved a report with an ARRB author.

Further assisting with dissemination is ARRB's knowledge transfer program. During 2010/11 over 80 workshops covering various parts of the Austroads Guides were convened across Australasia, with over 800 attendees. This was complemented by the reporting of program outputs through papers at the 24th ARRB and 2nd International Sprayed Sealing Conferences in Melbourne in October 2010.

The annual report of the Austroads ARRB Partnership Agreement for 2010/11 is due for release in coming months, and work is now underway on 2011/12 Austroads projects.

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ROMAN II Project Update

The ROMAN II software was released on 12 May 2011 after 18 months of solid work in developing and refining the RAMM and dTIMS suite of applications. In addition to development and testing of the software, ARRB has progressed the development of the required support services and assembled a comprehensive training curriculum.

Delivery of the software and associated training packages to the committed WA Local Governments commenced in May 2011. The uptake of the system has been excellent and exceeded expectations with 135 of the 141 Local Governments in WA subscribing to be part of the ROMAN II solution developed by ARRB for WALGA.

Main Roads Western Australia has worked with the ARRB team to ensure modifications required to their IRIS system to accommodate the new ROMAN II software have aligned with the required specifications. Currently 90% of the Local Government ROMAN databases have been received for cleansing and migration to the new system. All Local Government databases will have passed through this process in order for the transition from ROMAN to ROMAN II to take place accurately and smoothly.

The first round of training resulted in 36 workshops being delivered over two months covering the entire state. The training was focused on getting people familiar with the support services available to assist them, getting familiar with RAMM and the basic reporting and mapping functionality available.

With the cleansing and migration process almost complete, the team is now in the middle of the second round of training. Round 2 will result in as many workshops and a series of block sessions to take advanced users through the curriculum in a structured format. Some of the more technical data and database management skills required to maximise the benefits of ROMAN II will also be covered in the upcoming training.

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Road and Transport Research Journal

The September 2011 issue contains articles on:

- The effect of binder film thickness on asphalt cracking and ravelling
- A simple prediction model for asphalt surface texture incorporating mix gradation and air voids
- A small scale accelerated pavement testing machine
- Distribution of the noise level maxima
- Crash prediction models
- Toll roads
- The influence of a new signal offset optimiser on travel reliability.

Shorter news items and upcoming conferences are also featured. Abstracts of past issues and other information can be viewed at **www.arrb.com.au**.

Subscription enquiries should be directed to **info@arrb.com.au**

Call for abstracts

25th ARRB CONFERENCE
SHAPING THE FUTURE
Linking research, policy and outcomes

25 – 28 September 2012, Perth, Western Australia
Abstract submissions are invited.

The 25th ARRB Conference will focus on research outcomes which address emerging issues affecting the road and transport industry, and the global community. The Conference will focus on four streams:

- Safe Systems
- Sustainable infrastructure management
- Sustainable infrastructure sciences/technology
- Congestion, freight and productivity.

The Conference will be held immediately after the 35th Australasian Transport Research Forum.

For more information visit the Conference website **www.arrb.com.au/conferences**, contact the Technical Secretary on +61 3 9881 1555 or email: **25conf@arrb.com.au**

Friction Conference highly successful

ARRB hosted the 3rd International Road Surface Friction Conference on 15-18 May 2011, at Sanctuary Cove, Queensland in association with the New Zealand Transport Association (NZTA) and WDM Limited (WDM). The conference was attended by 240 delegates from 15 countries.

A series of technical papers were presented, exploring the importance of internal and external partnerships in effectively managing skid resistance at a road network level, as well as more traditional issues associated with the collection of data and the specification of materials.

The paper sessions were supplemented by workshops on the Decade of Action for Road Safety which commenced worldwide on 11 May 2011, and a Disaster Recovery session, focusing on recent natural disaster events in Queensland and New Zealand.

A demonstration day was also conducted at the Queensland Department of Transport and Main Roads (TMR) Mount Cotton driver training and test track facility (see report below).

Some key findings from the technical papers and demonstrations were:

- the effects of ABS, old versus new vehicles and under-inflated tyres
- the roles of microtexture in giving skid resistance and macrotexture to maintain skid resistance as speed increases were confirmed
- a lack of resources means that targeting of works is necessary
- a methodology was proposed to define a skid resistance performance model for current surfacings and hence demonstrate affordability of a skid policy
- the challenge of providing a uniform risk of skidding across the network
- higher speed lasers do not necessarily mean better measurements if noise increases
- data-fitting using GPS is possible and utilises the accuracy of that technology to move beyond the limitations of linear referencing
- surfacing is important but do not forget other low cost risk mitigation options such as use of vehicle activated slippery road and speed signs
- improving the life cycle costs of high friction surfacings can be achieved only if the design of the whole pavement is taken into consideration
- the greatest returns will be achieved if sharp curves are targeted for improvements in skid resistance.

A full report on the Conference will be released by ARRB shortly and will be available from the ARRB website **www.arrb.com.au.**

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Mount Cotton test track day

Photo: I. Steele

During a full day at the Queensland Department of Transport and Main Roads (TMR) Mount Cotton driver training / test track facility, delegates gained an insight into police crash investigation techniques, including the possible contribution of the road surface. They also observed a number of straight line 'skid to stop' tests demonstrating the practical effects of:

- dry and wet road surfaces
- vehicle speed
- anti-lock braking systems (ABS)
- old, average age, and new vehicles
- deflated tyres
- differential split friction (e.g. by creating a dry left hand wheelpath and wet right hand wheelpath)
- different vehicle performance e.g. trucks and motorcycles

The results obtained from the testing (including analysis and visual presentation) will be posted on **www.saferroads.org.uk**

In addition a number of static and mobile test devices for skid resistance and surface texture were displayed including:

- Grip Tester (in both tow and push modes)
- Mini Grip Tester
- SCRIM
- Network Survey Vehicle (NSV)
- Via Friction
- British Pendulum
- Sand circle (sand patch)
- TM2

Technical displays of road surface high pressure water jetting and shot blasting technology were provided along with a presentation on the latest developments in new car safety standards (e.g. ANCAP) and the contribution of in-vehicle safety systems.

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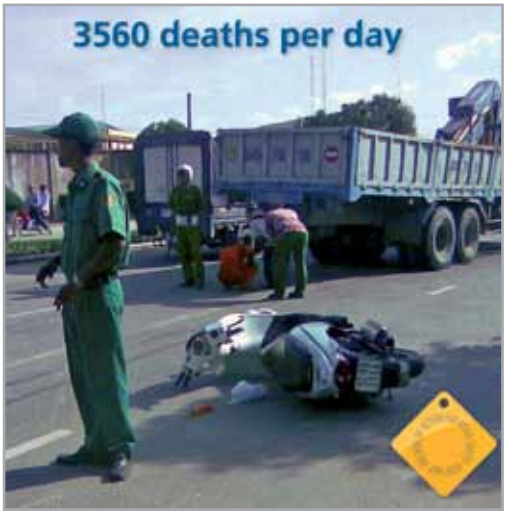
Road Safety Decade of Action - progress report



The Global Decade of Action for Road Safety commenced on 11 May 2011. The decade is a response to the 3560 deaths that occur every day on the world's roads (see ***Briefing*** Issue 130), and aims to stabilise and then reduce the forecast level of road trauma.

The launch was marked across the world, including in Australia, by many events. In Australia, key public buildings and landmarks (including the Sydney Harbour Bridge and the Brisbane Town Hall) were lit up with the decade logo, and the Australian government announced $6.2 million to help address this problem in the developing world. A global road safety pledge has been signed by various Australian organisations, including ARRB.

One of the first events under the Decade of Action was a workshop held as part of the 3rd International Surface Friction Conference on 16 May. Three issues were highlighted: the importance of engaging top decision-makers in the issue, the need to keep developing understanding of the benefits of good surface friction, and the need to ensure that key international documents such as PIARC reports include appropriate advice on surface friction.

This workshop outcome has provided a solid first step in Australia for the Decade of Action. It is to be hoped that similarly encouraging yet practical recommendations for other aspects of road safety will be put forward, and that they will be taken up with enthusiasm.

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Assessing road safety risk

Austroads commissioned ARRB to better define the relationship between road elements and crash risk, and provide methods, tools and information to better address risk on the road. The research program has culminated in a fundamental change in the way in which road safety risk is assessed in Australia and New Zealand.

The approach has evolved from a process that relied on crashes occurring to treat risk to one that can also proactively assess risk before crashes occur. The research has gained international recognition, and forms the basis of tools developed at the international level to address road safety risk.

A series of ***Road Safety Risk Reporter*** newsletters was produced to describe the results of the project. The newsletter topics include:

- The Austroads road safety engineering risk assessment research program
- Identification of network-level treatment prioritisation methods
- Integrating accident, road condition, asset management and traffic volume data
- The effect of geometric road design standards on road safety
- Crash risk migration
- Crash reduction estimates for road safety treatments
- Development of crash rates for Australian roads
- Crash rates on local government roads – trial study
- Road safety and maintenance
- Road safety treatment life
- Estimating the safety benefits when using multiple road engineering treatments
- Automatic collection of safety related road and roadside data
- Unsealed rural roads
- Crash database design
- Safety on rural roads: run-off-road, head-on and intersection crashes

To download the newsletters please visit **www.arrb.com.au/newsletters**, and select 'Road Safety Risk Reporter newsletter' from the drop down list. In addition further details on each of the topics are published in a series of (eleven) Austroads reports, available from the Austroads website (**www.onlinepublications.austroads.com.au**).

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ALF upgrade for FHWA

The ALF team in Virginia, left to right: Jason Metcalf FHWA, Roland Leschinski ARRB, Jim Johnson-Clark ARRB, Mario Tinio FHWA, Bob Wright ARRB, Chris Norquay A&D Techeng (Australia), Dennis Sixbey FHWA

ARRB Group and the Federal Highways Administration (FHWA) in the USA have a history of parallel interest in accelerated pavement testing, using Accelerated Loading Facility (ALF) technology. FHWA currently owns and operates two ALF units at the Turner Fairbank Highway Research Centre in McLean Virginia, while ARRB owns and operates the original ALF in Australia.

Over the years, ARRB has modified and upgraded our ALF to take advantage of new technologies and to improve its operation and reliability. An early improvement was the fitting of a hydraulic lift and lower system for the main trolley to replace the original mechanical lift. More recently, a Supervisory Control and Data Acquisition (SCADA) based Programmable Logic Controller (PLC) with a Windows based graphical user interface was commissioned.

ARRB has recently been awarded a contract to upgrade both machines for the FHWA. This will include a hydraulic system to replace the existing electromechanical trolley lifting device as well as a SCADA/PLC control system. The electrical systems of both machines will also be upgraded along with data monitoring and logging of parameters such as pavement temperature, loading cycles, hydraulic pressure etc.

ARRB will use local suppliers for these components and will manage their manufacture and testing in Melbourne. The new components will then be shipped to Virginia for installation and commissioning on site before the end of the year.

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HDM-4 & Hawkeye in Indonesia and PNG

ARRB has had a strong presence in Indonesia over the last 10 years providing services, training and equipment. In July, Bruce Clayton travelled to Jakarta and Bandung to provide training on HDM-4 to two organisations, specifically showcasing the latest improvements in ARRB's Hawkeye software and how it interacts with the HDM-4 asset management tool.

The organisations, Institute of Road Engineering (IRE Bandung) and the Indonesian Directorate General, Highways (DG Highways), have both been operators of Hawkeye systems since 2007 and are the first to take up on the latest software developments.

The new Hawkeye software allows users to directly manipulate collected data into standardised HDM-4 formats in a simple and streamlined manner. Both organisations are based on the central island of Java, but are aiming to expand these processes across Indonesia.

This follows on from the first iRAP Indonesia trials, where 1,200 km of the Indonesian network were assessed using Hawkeye as part of the International Road Assessment Program (iRAP).

In related news, the Papua New Guinea Department of Works is also investigating using the expanded functionality of Hawkeye's HDM-4 capabilities in parallel with their ongoing National Road Network assessments that are due to be completed in 2011. This project is funded through AusAid with ARRB providing Hawkeye equipment, training and strategic advice to various agencies in PNG.

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Hawkeye Processing Toolkit new features

HAWKEYE
SCALEABLE SURVEY SOLUTIONS

Version 3.2, released June 2011

- Advanced HDM-4 export support
  - Integrated profilometry (IRI, macrotexture, rutting)
  - Average faulting algorithm
  - Integrated Gipsi-Trac geometry (superelevation, grade, rise/falls)
- Fault and report processing
  - Evaluating faulting of concrete pavements (AASHTO designation: R36-04)
- Batch shape file exports
- All-in-one desktop processing software for all Hawkeye products. Drive, review, measure, count, process and report on your road network from the comfort of your desk.

For further information on the Hawkeye Processing Toolkit, please contact **productinfo@arrb.com.au**

International Conference on Road and Airfield Pavement Technology

ARRB Group took part in the exhibition at the Conference in association with our Thai distributor, Asia Testing Equipment (ATE) and our European partners ASFT and Grontmij.

The Conference was held at the Queen Sirikit National Convention Center and attracted approximately 500 delegates over the 3 day event.

The shared exhibition booth allowed ARRB to showcase part of our equipment range by having a Walking Profiler on display, which is used by many airports to measure the profile of runways.

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Which heavy vehicles can go where?

To assist local government practitioners with the classification of local roads and heavy vehicle routes, ARRB has been contracted to develop and implement a software-based online tool and complementary PBS based route assessment guidelines.

Use of the tool will result in a consistent application of a heavy vehicle route assessment process across local governments, that will facilitate certainty of operations for industry and ensure that heavy vehicles that are granted access to local roads are able to safely operate in that environment.

Local government has a key role to play in the granting of access to heavy vehicles. Over 80% of Australia's road network is managed by local government, including in many cases the 'first and last kilometre' of potential high-productivity vehicle trips. Local government has limited resources and skills available to assess route applications for PBS vehicles, and may be on the receiving end of pressure from heavy vehicle operators for increased network access, and public resistance to increased use of larger trucks.

It is hoped the use of an independent approach to heavy vehicle route assessment based upon local government specific assessment guidelines will assist municipalities caught in this often difficult situation.

Photo: J. Best

Funded by the Federal Department of Infrastructure and Transport, National Transport Commission (NTC), Victorian Department of Transport, VicRoads and the Port of Melbourne Corporation, the online PBS Route Assessment Tool will be delivered in collaboration with the Municipal Association of Victoria (MAV) and the Victorian Freight and Logistics Council (VFLC).

The software system consists of an online tool and dedicated website that will allow a local government representative to input the necessary data for a particular route. The tool will analyse the information entered and provide a detailed report on the PBS classification for the route including the identification of points of interest, potential opportunities for infrastructure upgrades, and any assumptions and limitations relating to the classification.

In order to ensure that the tool will be of most value to local government, ARRB and the MAV have established a Technical Advisory Group made up of the funding agencies, local government engineers and industry stakeholders, including the recently formed National Heavy Vehicle Regulator, that will guide the system development.

With an expected delivery date of June 2012, the project will cover the rollout of the tool to local governments in Victoria. With high levels of interest and enthusiasm for the project from jurisdictions nationally, future developments may include the wider availability of the online tool for use by state and local governments across Australia.

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Photo: M. Moffatt

Western Australian Pavement Asset Research Centre

WAPARC

What is it?

The Western Australian Pavement Asset Research Centre was launched on 1 July 2011. It is a collaboration between Main Roads Western Australia (MRWA), the Western Australian Local Government Association (WALGA), ARRB, two WA Universities – Curtin and University of WA - and PATREC (Planning and Transport Research Centre) which brings together the relevant departments of three WA universities.

Purpose

WAPARC's purpose is twofold:

- to develop pavement research and practitioner capability in Western Australia
- to develop technical solutions and knowledge specific to Western Australia within the national context of Austroads research, technology and Guides.

These objectives were the result of the recognition that:

- The number of pavement and asset specialists in WA is too few to be regarded as a sustainable source of expertise.
- The drive for increasing productivity is increasing load stresses on WA's pavement network.
- There are some significant existing technical issues that need addressing.

Governance

WAPARC has a Board to ensure that Centre KPIs are met and a Research Technical Reference Group (RTRG) to ensure that research proposals and projects are feasible, cost-efficient and technically rigorous. Each partner has representation on the Board. The RTRG is made up of the Centre Director and a representative of each partner, as well as selected experts from the WA pavements and assets community, and potentially representation for other interested State or Territory road agencies.

Plan for 2011-2013

Main Roads WA is funding the initial three year program ($2.4m), with the intention of leveraging co-funding from industry (for specific interest projects) and from sources such as the Australian Research Council.

The strategy has deliberately focussed on short-term applied research in order to offer WAPARC the opportunity to prove the concept of the collaborative approach. A review will be initiated 24 months into the initial 36 month period to determine the Centre's success and future.

ARRB's role

ARRB has a number of critical roles to play in the Centre. In the planning stages, ARRB's research management and accelerated pavement testing specialists ran some workshops with a range of stakeholders to determine key institutional, research and equipment needs.

With operations underway, ARRB is tasked with ensuring that WAPARC's work program complements those of the Austroads research programs and complements work done in other States and Territories and internationally.

ARRB's **Geoff Jameson**, Chief Research Scientist: Pavements is the inaugural Centre Director, and chairs the Research and Technical Reference Group.

Significance of WAPARC for ARRB and its members

WAPARC's technical area is one in which ARRB holds much of the applied research capability nationally. ARRB's role in supporting its members had come to be one of conducting research on the member's behalf. ARRB's role in WAPARC breaks from that substantially in that we have been and are required to support a member agency in several ways:

- providing strategic advice on the establishment of a technical centre
- ensuring that the expertise and knowledge which ARRB currently holds is transferred to other organisations
- ensuring that the work is conducted by the organisations best placed to do so, regardless of whether or not that organisation is ARRB.

These responsibilities are closer to the spirit of the original Articles of Association which established the Australian Road Research Board (which became ARRB), than is the role of solely being a research provider. WAPARC therefore offers a model for ARRB to return to its roots, and the establishment of WAPARC and ARRB's involvement therein has been welcomed by ARRB's Board and members alike. A similar centre is also being discussed with another of ARRB's member agencies.

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Video monitoring of HV performance

ARRB was engaged by Queensland Department of Transport and Main Roads and Sinclair Knight Merz (SKM) to perform an on-vehicle video monitoring of a B-double and semi-trailer over 800 km of routes around Cairns and the Atherton Tablelands, including some particularly challenging routes through the Rex, Kuranda and Gillies Ranges.

The project aims to use this innovative approach to help assess the suitability of particular routes for heavy vehicle types, and also identify areas of the network that can be upgraded to allow more productive vehicles where appropriate.

While video data is commonly used to complement network condition data, it has not been used as a tool to assist with the route assessment for heavy vehicles to this extent. ARRB prepared a system of seven high definition cameras for both the B-double and the semi-trailer:

- one camera in a lead vehicle looking back at the heavy vehicle
- one camera in a chase vehicle looking forward at the heavy vehicle
- one camera mounted in the cab looking forward (driver's view)
- two cameras mounted on either side of the prime mover, looking rearwards down the length of the heavy vehicle
- two cameras mounted on either side of the (rear) trailer looking forward down the length of the heavy vehicle.

Arrows indicate position of cameras on cab and rear trailer

Police escort and pilot vehicles were also employed due to the tight turns, and low sight distances on some of the roads.

Approximately 200 hours of video were recorded, providing an extensive view of vehicle performance and road space requirements, and allowing identification of sections along the routes that may need upgrading.

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New RTA PMS successfully validated

RTA NSW is establishing a pavement management system (PMS) to achieve more effective and efficient management of its road assets. The PMS is being developed by a project team with resources from the RTA and ARRB.

It is being implemented in three phases: scope, design and implementation. Phase 2 has been finalised with the delivery of a functional prototype system.

The RTA PMS is a business process supported by tailored decision support software, to support policy, strategy, program development and monitoring functions associated with pavement management. The decision support function in the PMS makes full use of the recently published Austroads pavement performance models.

The system uses Deighton's Total Infrastructure Management System (dTIMS) software as the engine, complemented with purpose-built data entry and reporting tools. It will be delivered to regional and head office users via the RTA's intranet.

With the completion of Phase 2 of the project, a working system is now available for roads with a flexible pavement. The system went through a preliminary validation of the selected maintenance treatments in two regions and passed with flying colours.

In the implementation phase, the PMS will be used to analyse priorities and maintenance drivers for the complete network managed by the RTA. Preliminary budgets for each region will be developed for 2012/13. Besides the tactical and strategic analytical work, the system will undergo further refinements and calibration.

Full roll-out will commence as part of the implementation phase. This will include the implementation of user-oriented, simplified interfaces that are geared to follow RTA's business processes whilst significantly reducing the learning curve required to operate the system effectively and efficiently. ARRB is expected to have a key role in successfully implementing the RTA PMS.

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Photo: Khar Yean Khoo

Implications of speed flow curves for project appraisal

Photo: V. Jaeger

A range of speed-flow curve relationships is currently in use by road authorities across jurisdictions in Australia. These relationships become critical when volume capacity ratios (VCR) approach and exceed a value of 1.0 because different queuing speeds are assumed at different VCRs across different road types. For example, some speed-flow curves have vehicle speeds falling to a very low saturation speed once a VCR of 1.25 is reached.

The use of speed-flow relationships and applicable queuing speeds also varies across jurisdictions and road types, as does the amount of resources available to undertake economic evaluations. Often, this makes the comparison of results of road project appraisals across jurisdictions difficult.

ARRB recently completed an assessment for Austroads of the implications for project appraisal of different queuing speeds at different VCR levels.

Using an example from Part 8 of the Austroads *Guide to Project Evaluation*, assumed queuing speeds (VCR = 1) were reduced from 65 km/h to 30 km/h and for saturation speeds (VCR = 1.25) from 20 km/h to 10 km/h. Assuming lower speeds for queuing and saturation speeds leads to increased benefits relative to the base case (i.e. increased savings in travel time and vehicle operating costs (VOC) because lower speeds involve worse traffic conditions). A significant effect on appraisal results was therefore observed in terms of changes in net present value (NPV), benefit cost ratio (BCR) and first year rate of return (FYRR) with, for example, increases in BCR from 1.45 to 2.62 obtained for one of the case studies.

Consultation with jurisdictions revealed that they do not regard harmonisation of speed flow relationships (VCR and queuing speeds) as a priority per se, given differences in road networks and traffic volumes across jurisdictions. However, they did acknowledge the importance and impact of the VCR-queuing speed relationship as significant in terms of its impact on economic appraisal results. This would therefore be a key issue in project appraisal and comparison of these results across jurisdictions.

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Calliope Cross Roads Interchange economic evaluation

ARRB was engaged by the Queensland Department of Transport and Main Roads (TMR) to undertake an economic evaluation of the proposed Calliope Cross Roads Interchange. This involves replacing the current four leg at-grade intersection of the Bruce Highway (route 10E) and Dawson Highway (route 46A) west of Gladstone with a grade-separated Bruce Highway over the Dawson Highway interchange.

Traffic growth projections for the analysis were incorporated into a SIDRA analysis of the intersection which then provided delay and fuel consumption data for the cost benefit analysis. A 30 year analysis period was used with 2010 as the base year, with capital works cost estimates provided for both P50 and P90 cases (the 50% and 90% probabilities that the cost estimate will not be exceeded). Discount rates of 4% and 7% were used in the analysis as required for Federally-funded projects.

Results were generated for the project in terms of net present value (NPV), benefit cost ratio (BCR) and first year rate of return (FYRR) for the proposed grade-separated interchange compared to the current at-grade intersection (base case for the evaluation). Given that the analysis generated results for variations in capital costs and discount rates, an analysis was then undertaken using a discount rate of 4% to test sensitivity of results to increases in crash rates if the interchange is not built and the intersection reaching capacity earlier than anticipated.

These results have subsequently been used by TMR in their efforts to obtain funds for development of the road network in Central Queensland in anticipation of further economic growth in the region.

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Road safety and traffic management on the Gorgon project

Source: www.chevronaustralia.com

ARRB Group's experience and expertise in road safety and traffic management on resource processing operations has seen our involvement, since June 2010, on the Gorgon Liquefied Natural Gas (LNG) project on Barrow Island located approximately 56 km off the Pilbara coast of Western Australia.

The project, developed by the Kellogg Joint Venture Gorgon (KJVG) on behalf of Chevron Australia and its partners, is to tap into massive submarine natural gas deposits and process the gas for export and domestic use. The project cost is estimated at $43 billion making it one of the biggest projects in Australia's history. Construction began two years ago and the production capacity will be 15 million tonnes of liquefied gas per year.

Barrow Island is a Class A nature reserve and only 300 ha (1.3%) of the island can be used for the project within a total island area of 23 400 ha. The island is a world-renowned habitat for numerous endemic species of marine and terrestrial flora and fauna.

Because of the environmental constraints, the size and complexity of the project and the workforce estimated at more than 5000 working day and night shifts, ARRB has been commissioned to provide a range of traffic safety and management services for the project.

This includes the development of an island-wide traffic management plan, an implementation plan for site signage, and road safety audits. More recently, ARRB has been developing a plan to assist the commuting of the workforce between accommodation and work areas. The challenge is how to transport more than 5000 people on more than 60 buses from two camps to numerous working locations across the island in a short period of time so that safety and operational efficiency are not compromised.

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IRE Bandung visit to ARRB

ARRB welcomed two senior delegates from IRE Bandung, this August. IRE (Institute of Road Engineering) is a research centre managed under the Agency for Research and Development, Ministry of Public Works in the Republic of Indonesia. The Institute assists the Ministry in the development of national, provincial and local roads.

Dr. Jawali Marbun, Director of IRE Bandung, and Mr. Samsi Gunarta, Chief of Division Programming & Institutional Collaboration, visited ARRB's head office for discussions relating to the Memorandum Of Understanding (MOU) agreement that was signed between ARRB and IRE Bandung in Indonesia late last year.

Part of the discussions included topics such as road safety, the Decade of Action and the coordination of general research projects.

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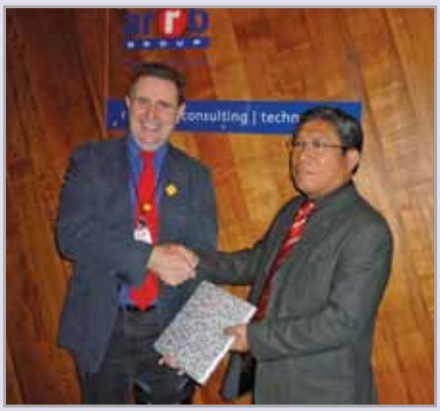

Dr. Jawali Marbun, Director of IRE Bandung with Gerard Waldron, Managing Director ARRB Group

Photo: R. Kotze

Our bridge capabilities and recent major activities

ARRB has established an expert bridge team in order to deliver excellent service to SRAs, local government as well as other private clients.

Our team is located in Brisbane and comprises Rudolph Kotze as National Technical Leader, Dr Neal Lake Principal Structural Engineer, Dr Hanson Ngo, Senior Structural Engineer and Mark Farrenden, Senior Bridge Inspector. Dr Ahmad Shayan, Chief Scientist, and Dr Aimin Xu, based in Melbourne, provide expert advice on concrete durability and laboratory testing.

The team has a wide range of bridge-related skills and experience which cover bridge inspections, condition assessment, structural assessments, maintenance planning, strategic asset management planning and research and development.

Building on the successful level 1 bridge inspection course, the team has developed an accredited training course covering level 2 bridge inspections. This course will be rolled out from September 2011 and is focused on establishing consistent industry standards for bridge inspections. The team will also be looking to develop a bridge asset management course in the near future.

ARRB has also been involved in conducting high quality level 2 bridge inspections for a range of clients and has inspected more than 500 bridges over the last 3 years. The team has provided advice to SRAs on optimisation of their bridge management systems.

There is also an ongoing involvement in delivery of the Austroads technology program. Notable completed projects include a report on the design and management of bridge bearings/expansion joints and guidelines for the design, construction, monitoring and management of buried corrugated metal culverts. These projects address specific industry concerns associated with whole-of-life design and maintenance standards.

Another project concerning the revision of the earthquake provisions in AS 5100.2 is also nearing completion which will see the introduction of a new displacement based approach as well as revisions to the existing force based approach. Current ongoing projects focus on standardisation of bridge barrier design/retrofitting and the management of bridges through deterioration models.

Increasing productivity through improved access for heavy vehicles to the road network is a key item on the national reform agenda. Bridge assessment processes are an essential part of this objective.

Studies have been undertaken for the Department of Transport and Main Roads (TMR) in this area and ARRB will be undertaking an Austroads project for the Austroads Bridge Technology Review Panel over the next 2 years to work towards developing uniform national standards and guidelines for the assessment of bridges. This will include a review of AS 5100.7 and the development of a supplementary set of guidelines for bridge assessments.

The bridge team recently completed a review of TMR technical standards and project proposals for the flood reconstruction program which included site visits to review bridge and drainage project proposals.

Based on the increased capability and recent successes of the group, we are actively working towards establishing partnerships with members and clients to deliver successful outcomes.

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Photo: V. Jaeger

Modelling the marginal cost of road wear

ARRB has conducted research in conjunction with the National Transport Commission (NTC) and Austroads in support of the Council of Australian Governments (COAG) Road Reform Plan (CRRP). This research was aimed at developing an engineering-economic model to estimate the marginal cost of road wear due to heavy vehicles on the sealed road network.

The marginal costs estimated by the model will become an input for the assessment of various pricing models that are being investigated by the CRRP project. This project is investigating the feasibility of alternative models for pricing heavy vehicles and for funding road infrastructure providers.

The marginal cost model was based on ARRB research directed at estimating road wear on a whole-of-life basis using a pavement life-cycle costing analysis. This analysis used the latest road deterioration models (rutting, roughness and strength) and work effects models (surface treatments, including rehabilitation) developed by ARRB for all state road authorities under Austroads funding.

The model assumes a network of sealed road types that is broadly representative of the actual Australian road network, allowing for inputs to cover the existing road surface and structural conditions, pavement age, local climate and maintenance and rehabilitation intervention practices.

The model also assumes a fleet of heavy vehicles to represent the Australian fleet covering axle group types and heavy vehicle configurations, mass levels carried and their travel (number of vehicles per day) on each of the road types. The marginal road wear costs by the nature of this approach are average values and not related to specific roads or jurisdictions.

The marginal cost of road wear model was critically reviewed by Professor Kenneth Small from the University of California, Professor Christopher Nash from the University of Leeds and Professor Werner Rothengatter, Gernot Liedtke and Aaron Scholtz from the Institute for Economic Policy Research at Karlsruhe Institute, Germany.

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Road use

- Road use by heavy vehicles leads to road wear.
- This results in the deterioration of the road pavement.

Road wear

- Road 'intervention' occurs once it deteriorates to a 'critical' point.
- This reflects when work is required on the road to return it to, or increase it beyond, its original condition.

Road costs

- The required road works are translated into the costs faced by road providers to maintain or improve road standards.

Marginal cost of road wear

- An additional trip made by a heavy vehicle will lead to increased frequency of critical points for intervention over the life of a road.
- The road cost difference (with and without the additional trip made) reflects the marginal cost of road wear.

Steps involved to estimate marginal cost of road wear. Source: based on NTC (2011)

Measuring pavement strength at speed

TSD configuration in Australia (Danish articulated trailer and container connected to an Australian compliant right hand drive prime mover)

Collecting pavement strength data at speed has long been a holy grail for pavement engineers.

The Traffic Speed Deflectometer (TSD) is an innovative device developed in Denmark that can measure the response of a pavement to an applied load at traffic speeds (e.g. 80 km/h). Traditional devices currently in use (e.g. falling weight deflectometers and the deflectograph) are slow and expose motorists and operators to road safety risks.

ARRB has just completed a project working with Austroads and the New South Wales (NSW) Roads and Traffic Authority (RTA) to assess the applicability of the TSD to Australian conditions and practices.

The project took advantage of the RTA initiative to bring the Danish Road Directorate (DRD) TSD to Australia during the 2009/10 Australian summer. Some 18 000 km of the NSW and Queensland (QLD) road networks were surveyed by the TSD over this period. Overseas assessments indicated the TSD could provide reliable and repeatable measurements on the mainly asphalt pavements encountered in Denmark. Its performance on granular pavements like those typically encountered in Australia was unproven.

Based on the findings of the project, it is apparent the TSD technology is effective and is capable of measuring a typical Australian pavement's response to load at trafficable speeds. This is a revolution in pavement condition measuring technology. However, it is not yet a mature technology with well-established test methodologies and equipment specifications. Findings have demonstrated that survey results are subject to a number of known and unknown influences, and robust quality management of survey operations and data processing is essential to the effective adoption and implementation of the technology.

Based upon the assessment, the TSD:

- can be used as a network level screening tool to identify suspect pavements within a network and to target follow-up testing with traditional devices
- shows considerable immediate promise as an input into the design of granular overlays on existing granular pavements, (which represent the majority of the length of the rural road network in Australia and New Zealand). However, the use of TSD data for the design of flexible overlays on other flexible pavement types is not considered currently possible
- offers a significant reduction in traffic disruption and hazard exposure for operators over traditional devices
- provides significantly more intensive data than existing systems at higher production rates and reduced costs.

Of particular interest is the research potential the device offers to investigate dynamic loading effects on Australian pavements. With enhancements to the current design it will be possible to use a single device to measure the road profile (roughness), apply a load to the pavement in the same manner as licensed heavy vehicles and simultaneously measure the applied load and the resulting deflection in the pavement.

The project is a showcase for collaborative ARRB research. Through the life of the project the project team collaborated with a working group of Australian road authorities and worked with other researchers including the UK Transport Research Laboratory (TRL), the DRD research arm and the German highway research institute BASt.

A copy of the research report can be found on the Austroads website.

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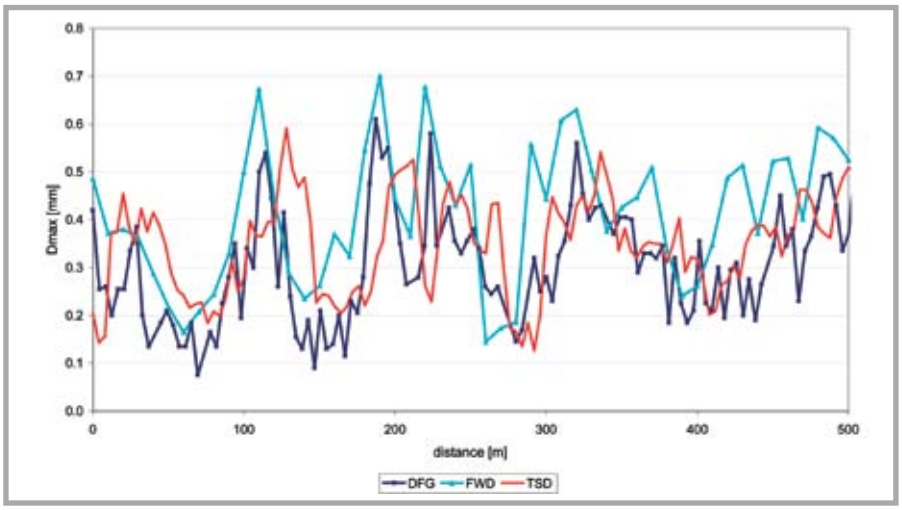

Deflection results at Illawarra site 1, deflectograph (DFG), falling weight deflectometer (FWD) and Traffic Speed Deflectograph (TSD) at 60 km/h

News from the lab

Laboratory review

ARRB has commenced a review of its laboratory facilities, which are based in Melbourne. The process has commenced with discussions with laboratory managers in several of ARRB's members, namely the DTEI (SA), VicRoads (Vic), RTA (NSW), TMR (QLD) and MRWA (WA) about their capabilities and equipment, and opportunities for sharing resources and services.

Significant expenditure within the Austroads funded research program is for laboratory testing. Much of the testing is exploratory in nature, with observations of the materials as well as the test results informing researchers about the materials being examined.

ARRB's laboratory currently also fulfils other roles, including:

Photo: P. Tredrea

- training of students and graduates as new researchers
- development of new test methods and equipment, including most recently, a wheel tracker
- independent specialist testing for councils, contractors and suppliers that do not have their own laboratories.

The last point is one that ARRB will be testing in its review. Many specialist laboratory facilities are owned by laboratories aligned to particular suppliers or contractors, or to the state and territory road authorities themselves. We believe ARRB provides an 'independent' source of specialist testing that is useful to small and medium size organisations.

The next stage of the review process will be a survey, sent to the broader 'laboratory' industry. This includes universities, contractors, suppliers and members. This will collect data about what equipment is held by different facilities, for sharing amongst other respondents. Whilst not always practical, in some circumstances this may deliver some benefits through improved utilisation of each other's equipment, enabling investment dollars to be used elsewhere.

New equipment

ARRB has received its new accelerated polishing machine. This is primarily being

used to progress Austroads project TT1611 - Replacement of control stone for PAFV.

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Conferences

55th Association for the Advancement of Automotive Medicine (AAAM) Annual Conference 2011
2-5 October 2011, Paris
www.aaam.org

RoadSafe Conference 2011: Reducing Road Trauma
6-7 October 2011, Wangaratta, Victoria
www.nolanmediaevents.com.au/RoadSafe_Conference.html

2nd International Conference on Warm-Mix Asphalt
11-13 October 2011, St Louis, USA
www.warmmixasphalt.com/

18th World Congress on Intelligent Transport Systems: ITS World Congress 2011: Keeping the Economy Moving
16-20 October 2011, Orlando, USA
www.itsworldcongress.org/

8th Austroads Bridge Conference 2011: Sustainable Bridges: The Thread of Society
31 October - 5 November 2011, Sydney
www.abc2011.com.au/

National Bridge Management, Inspection, and Preservation Conference 2011: Managing the Nation's Bridges Beyond the Short Term
31 October-4 November 2011, St Louis, USA
www.tsp2.org/files/2011/03/NBMIP_Conference_2011.pdf

Australasian Road Safety Research, Policing and Education Conference 2011: Driving Research, Policy and Action Toward Zero Deaths and Injuries
6-9 November 2011, Perth
www.roadsafetyconference2011.com.au/

2011 National Local Roads and Transport Congress: Better Roads are Safer Roads
16-18 November 2011, Mount Gambier, SA
www.alga.asn.au/policy/transport/congress/

Photos: Khar Yean Khoo

ARRB and SprayLine collaborate in staff development

In the sprayed seal industry, it is essential to assist young researchers to augment their research and laboratory skills with the experience of life on the road and practical issues faced by a working sprayed sealing crew.

To this end, earlier this year a meeting was arranged between Kym Neaylon, ARRB National Technical Leader Bituminous Surfacings, and Adrian Tofful, Director Sprayline Road Services. Both parties saw the benefit of a collaborative approach for staff development, and the building of communication lines between the two stakeholders from different backgrounds but facing similar issues.

As a result, Ms Khar Yean Khoo, a sprayed seal research engineer with ARRB, spent a week on the road with a Sprayline crew headed by Barry Mulholland and his men, travelling 1,200 km. Not only were technical, management and organisational lessons learnt, but also some of the difficulties faced by crews on the road.

In return, an opportunity is available for an interested person from Sprayline to spend a week with ARRB, to see how a range of bitumen tests are done, learn why they are done, and to get a feel for the national bituminous research that is currently underway.

Another young ARRB research engineer will be given the same valuable opportunity next sprayed sealing season.

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German skid resistance expert visits

During May 2011 ARRB brought Karen Scharnigg to Australia as part of the ARRB Academy's visiting experts program. Karen is a researcher with the Federal Highway Research Institute (BASt) in Germany and specialises in skid resistance.

Her major projects are managing the third work package of 'TYROSAFE', a trans-national EU-funded project ; supervision of external and internal research projects in the field of skid resistance (e.g. measuring systems, assessment of measuring data, skid resistance of road markings) and development and further improvement of measuring systems in the field of skid resistance.

Karen presented ***TYROSAFE – tyre and road surface optimisation for skid resistance and further effects*** at the 3rd International Road Surface Friction Conference at the Gold Coast, and then gave presentations at QDTMR, DTEI SA and VicRoads.

Around Australia her presentation topics included:

- TYROSAFE – which focused not only on the road surface but also on tyres and on the interaction between the road surface and tyres. Only an optimised interaction can lead to a high level of safety for drivers on the roads in European countries while ensuring the most positive greening effect, through reduction of CO_2 output and noise emissions. This project also proposed a way forward in the context of the future objectives of European road administrations in order to optimise three key properties of European roads: skid resistance, rolling resistance and tyre/road noise emission. More information about the project is available at: **http://tyrosafe.fehrl.org**
- Innovative policies in operation in Germany addressing the skid resistance of road surfaces, such as
  - policies on the measurement and management of skid resistance, including techniques to mitigate the potentially negative effects of reduced levels of skid resistance.
  - devices used to measure skid resistance, and the quality assurance procedures associated with the use of these devices
  - test methods for the prediction of skid resistance.
- Research work and results regarding the development of low noise surfaces, including porous asphalt.
- The approach used in Germany to monitor the road profile (transverse and longitudinal evenness), and other characteristics.

ARRB Hall of Fame launched

To coincide with the release of the book ***ARRB – The First 50 Years***, an ARRB 'Hall of Fame' has been established to recognise the key contributions of former ARRB staff since its inception in 1960. Their biographies should ideally be read in conjunction with ***ARRB – The First 50 Years*** in order that their contributions can be placed in a broader context.

The following have been selected as the inaugural members of the ARRB Hall of Fame:

- Dr Ray Brindle
- Dr Ted Dickinson
- Mr Des Glynn
- Dr Jim Jarvis
- Professor Ian Johnston AM
- Professor Max Lay AM
- Mr Peter Lowe
- Professor Mary Lydon
- Dr John McLean
- Professor John Metcalf
- Mr Peter Morris
- Mr David Potter
- Mr John Scala
- Dr Peter Sweatman

For more information see **http://www.arrb.com.au/Home/ARRB-history/ARRB-Hall-Of-Fame.aspx**

A 'first stop shop for transport information'

The ARRB Library maintains the land transport publications information database, Australian Transport Index (ATRI), as part of our National Interest Services (NIS) activities. NIS is funded by the federal, state and territory road authorities to provide leadership in land transport information activities in the national interest.

ATRI is currently made available via subscription through Informit/RMIT Publishing, enabling access for not only transport libraries, but also reaching an important audience in academic institutions. Supplying quality information to the next generation of engineers and other future transport authority workers is an important part of working in the national interest.

Earlier this year the US Transportation Research Board's (TRB) TRIS database merged with the previously subscription-only International Transportation Research Documentation (ITRD) database to form TRID (**http://trid.trb.org/**), marketed as the globally accessible 'first stop shop for transport information'.

TRID now offers the opportunity to bring ATRI, a database of Australian and New Zealand land transport publications material in an international context currently containing over 170,000 records, to a much wider audience.

ARRB Library is working with TRB on the details of incorporating ATRI into TRID, which will involve many hours of information specialist expertise in matching subject terms and quality checking records. Whilst not all of the 170,000 records in ATRI will make their way into TRID, it will still be a significant contribution to a global resource.

Informit is also keen to maintain ATRI as a complementary database offered to subscribers of other services in their suite of resources, allowing the present user base to be maintained.

ARRB Library looks forward to what will be an important milestone in our information services leadership, and a likely launch in early 2012, ARRB Library's 50th anniversary year.

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Stay informed with ARRB information products and services

ARRB is committed to promoting the exchange of knowledge and information for the road and transport industry. ARRB recognises your need for information that:

- you can trust
- is easily accessible
- can be customised to your interests.

In 2011/12 ARRB is offering a range of tools, (free and via subscription), including options that allow you to manage your information requirements online.

Subscription services www.arrb.com.au/publications

- *Road and Transport Research* journal
- Local Roads Information Package

Conferences, workshops and seminars www.arrb.com.au/workshops

- Biennial ARRB conference
- Knowledge transfer workshops
- Accredited courses

MG Lay Library

- TARU (*Transport and Road Update*) **www.arrb.com.au/TARUfeeds**
- Road Research Register **www.roadresearch.com.au**
- Road Safety Contacts Register **www.arrb.com.au/RoadSafetyContacts**

Additional free services

- *Briefing*, ARRB's corporate newsletter
- *Local Roads News* newsletter
- ARRB Research Reports via online access

Visit **www.arrb.com.au/publications** or **www.arrb.com.au/newsletters** for further information.

How can you interact with us?

Simply contact us via email at **info@arrb.com.au** or call +61 3 9881 1555 …. or follow us! Find out the latest information in the industry direct from ARRB. We welcome comments, suggestions, images and feedback.

New staff

Peter Aumann has recently joined ARRB, as Principal Road Design Engineer, from the Director, Infrastructure Services position at the City of Monash, where he was responsible for the design, construction, management and maintenance of the City's infrastructure, including roads, drains, wetlands, buildings and recreational assets. Peter was a member of the Austroads, Road Design Review Panel between 2001 and 2011, representing the Australian Local Government Association and was the Project Manager for Austroads for the production of the ARRB Technical Report – ***Collection and Discharge of Stormwater from Road Infrastructure***. Peter has a BEng (Civil), Post Grad Diploma of Business (Management) and a Post Grad Diploma of Municipal Engineering.

Caroline Alymer-Brewin commenced with Luxmoore in the East Melbourne Office as Consultant - Parking. Caroline holds a BSc (Hons) Geography and has experience in parking, traffic and project engineering with local government and Mouchel.

Hugh Benbow has been appointed as Customer Support Technician within our Systems group. Hugh has a background in automotive IT support, and as a customer support/ application tester.

Rachel Beesley will be working as part of the Safe Systems team in Melbourne on a 12 month secondment from the Transport Research Laboratory (TRL). She has a BSc in Ecology and Environmental Biology and has started a second BSc in Mathematics through the Open University. Rachel has been at TRL for 5 years, first as part of the Testing Services Team, primarily doing reports and video analysis, and then with the Intelligent Transport Systems group working on road worker safety.

On secondment from TRL, **Katharine Boddington** has joined our Perth office as a Research Officer. Katharine is a consultant in TRL's transportation division where she is undertaking research to investigate innovative and cost-effective technology solutions for implementing managed motorways on the UK network. Katharine will be with ARRB for a 12 month placement and will be working with Paul Roberts team**.**

Guy Brown has joined our Sydney office as a Professional Consultant, Congestion, Freight and Productivity. Guy has spent the last seven years in the UK where most recently he was employed as a Highway Design Engineer at Ringway Jacobs covering a broad range of highway maintenance and improvement schemes.

Mahdi Darestani is a new Customer Support Engineer in our Systems Group. Mahdi has a BElecEng and has worked with Renault Iran responsible for quality and after sales support on electrics and electronics.

John Hargreaves has joined our Pavements team in the position of ALF Operation Manager. John has a wealth of experience in the mechanical engineering field having held a number of positions as Maintenance/Engineer Manager with companies such as Carter-Holt Harvey, Visy Beverage, Cargill, ABB, Skilled Engineering to name a few. John has a DipMechEng as well as Fitting and Turning qualifications.

Charles Kingsford has joined the ARRB Perth office as a Senior Traffic and Safety Engineer in the Mining and Resources team after moving from NZ. Charles has over 13 years experience in traffic and road safety engineering and over 25 years in the civil engineering industry. He has worked for local and central government organisations, contractors and consultancies in NZ and the UK. He has a BE(Civil) from Auckland University and CEng (UK).

Returning to ARRB is **Neal Lake**. Neal re-joins the bridges team in Brisbane as Principal Structural Engineer.

Cara Phillips has been appointed to the Safe Systems team in the Melbourne office as a Road Safety Engineer. Cara has a BEng (Civil) from the University of Canterbury and worked for Beca Consulting in NZ. Cara has also worked with the Public Transport Authority and the City of Melville in Perth, and most recently Manningham City Council in Melbourne as a traffic engineer.

Kim Sedgwick has joined the Perth ROMAN II team as Asset Management Consultant. Kim holds a BA (Geography) and specialises in GIS, GPS, database management and project management focussing on asset management. Kim has experience working with Opus on a number of projects for WALGA and across local government.

Obtain academic credits from ARRB workshops

In conjunction with the University of Ballarat, ARRB is progressively obtaining formal accreditation for each workshop. This means that you will be able to obtain credits which will go towards qualification for certificate IV up to Advanced Diploma levels or an Engineering degree. The qualifications available are linked to civil construction design, operations and management.

To gain the credits, the newly gained knowledge will be combined with required skills in the workplace and formally assessed following a set of instructions and individually supported by Knowledge Transfer. Once deemed competent you will receive a Statement of Attainment listing the units completed.

This accreditation will suit those who are looking to formalise their specialist knowledge, gain accreditation to move up the corporate ladder, as one of the steps in gaining recognition or organisational accreditation or for those who find themselves in a position where a specialist gap has been identified.

Our first accredited offer is Bridge Inspection Level 2 followed by Rural Roads Design & Maintenance. More information can be found by going to **http://arrb.com.au** or email **training@arrb.com.au**

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Heavy vehicle team expands

The HV team under Team Leader Anthony Germanchev in Melbourne is expanding. Adam Ritzinger has returned from a 12 month secondment to BASt in Germany. Matt Elischer is setting up a HV group in the Brisbane office to meet the demand for HV expertise in the Queensland region.

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Knowledge transfer program

NEW SOUTH WALES

- Level 1 bridge inspection, 12-13 October 2011, Port Macquarie
- Level 2 bridge inspection, 7-8 November 2011, Sydney
- Level 2 bridge inspection, 7-8 November 2011, Coffs Harbour
- Level 2 bridge inspection, 10-11 November 2011, Dubbo
- Unsealed local roads, 24-25 November 2011, Griffith
- Fundamentals of transport and accessibility modelling, 24-25 July 2012, Sydney
- Level 2 bridge inspection, mid 2012, Sydney
- Mining roads – safety and design, location TBC

VICTORIA

- Level 2 bridge inspection, 4-5 October 2011, Ballarat
- Fundamentals of transport and accessibility modelling, 9-10 November 2011, Melbourne
- Level 1 bridge inspection, 15-16 November 2011, Bendigo
- Unsealed local roads, 6-7 February 2012, Morwell
- Unsealed local roads, 9-10 February 2012, Ballarat
- Planning and design of parking facilities, early 2012, Melbourne
- Level 2 bridge inspection, late 2012, Melbourne

QUEENSLAND

- Level 2 bridge inspection, 18-19 October 2011, Brisbane
- Fundamentals of transport and accessibility modelling, 15-16 May 2012, Brisbane
- Mining roads – safety and design, mid-late 2012, Brisbane

WESTERN AUSTRALIA

- Speed limits and speed management, 27 September 2011, Perth
- Unsealed local roads, 5-6 December 2011, Albany
- Unsealed local roads, 8-9 December 2011, Bunbury
- Fundamentals of transport and accessibility modelling, 27-28 March 2012, Perth
- Mining roads – safety and design, mid-late 2012, Perth

SOUTH AUSTRALIA

- Unsealed local roads, 2-3 November 2011, Maitland
- Planning and design of parking facilities, early 2012, Adelaide
- Fundamentals of transport and accessibility modelling, early 2012, Adelaide

TASMANIA

- Unsealed local roads, 9-10 November 2011, Launceston

AUSTRALIAN CAPITAL TERRITORY

- Unsealed local roads, 21-22 November 2011, Canberra
- Fundamentals of transport and accessibility modelling, mid 2012, Canberra

NEW ZEALAND

- Treatment of crash locations, 28-29 November 2011, Auckland
- Treatment of crash locations, 1-2 December 2011, Wellington

(continued next page)

Knowledge transfer program

Fundamentals of transport and accessibility modelling: Topics will include generation and attraction models, origin-destination (OD) models, mode choice models, and network assignment techniques. Delegates will be instructed on the use of spreadsheets and special programs for transport modelling, such as Furness algorithm for OD Models and maximum likelihood estimation for the calibration of mode choice models. The ARRB Traffic Assignment Program (which is an incremental assignment and user-equilibrium assignment program) will be provided and participants will also learn the fundamentals of accessibility measurement, including the ARRB Accessibility Metric, and the use of transport models for assessing accessibility at a city and neighbourhood level.

Level 1 bridge inspection: A two-day workshop for those involved with the routine maintenance inspection of bridge structures and culverts. The workshop aims to assist participants develop skills to conduct the Level 1 inspection and complete the Level 1 inspection report form, on which to base the required maintenance intervention. Also the workshop will enable delegates to recognise and assess bridge condition problems essential for Level 2 inspections.

Level 2 bridge inspection: A two-day workshop for those involved with the inspection of bridges and culverts. A Level 2 inspection involves the identification of every bridge component and the rating of the condition of that component. This can be used to generate an overall score or rating for the bridge for the prioritisation of repairs, major maintenance, rehabilitation and or replacement. The workshop aims to assist participants develop skills to conduct the Level 2 inspection and will also including information on safety awareness around structures, special access equipment, and the recommended procedures. The Level 2 bridge inspection course is nationally accredited.

Mining roads – safety and design: A two-day training workshop on best practice in the areas of safety and design of roads associated with mining and resource processing operations. The workshop provides formalised training for mining personnel involved in planning, design, construction, maintenance or review of mining roads. The 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: Based on the background material supporting the Austroads *Guide to Traffic Management Part 11*: *Parking* supplemented with additional information drawn from Australian Standard AS2890.1-6. It will cover 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.

Speed limits and speed management: Speed management is a key factor in the safe and efficient operation of the road network. Speed limits are a key tool in speed management. Safe speed limits are an integral part of the Safe System approach to road safety. Speed limits also need to reflect varying user types, road environments and community needs such as safety, amenity and efficiency. The workshop will provide traffic and transport practitioners with an appreciation of the speed limit setting processes.

Treatment of crash locations: A two day refresher workshop on the latest practices applying to the investigation and treatment of crash locations. The new *Guide to Road Safety Part 8: Treatment of Crash Locations* is a companion document to the *Guide to Road Safety Part 6: Road Safety Audits*, and the NZTA documents *Guide to the Treatment of Crash Locations* and *High-Risk Rural Roads Guide*. It should be noted that this workshop is complementary to, and does not replace, the five day 'Road Safety Engineering' workshop conducted by NZTA.

Unsealed local roads: A two-day training workshop on the latest practices in the management of unsealed roads including practical aspects during a site inspection. The workshop will be a hands-on presentation with group participation, worked examples, and a field inspection of various unsealed road sites. Attendance at these popular workshops will be invaluable to learn and share knowledge and experience with other participants.

New workshops to look out for in 2012

Analysis of intersections: This workshop will be based on several of the Austroads Guides, including the *Guide to Road Design* and *Guide to Traffic Management*. The workshop will be ready for delivery in the latter part of 2012, in all Australian capital cities and New Zealand.

Intersection design: The workshop will be based on several of the Austroads Guides relating to intersection design, including *Guide to Road Design Part 4: Intersections and Crossings – General* and *Guide to Road Design Part 4B: Roundabouts*. The workshop will be ready for delivery in early 2012 in all Australian capital cities and New Zealand.

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