

Transfund Update

Benefit parameters & values used in project evaluation



A Transfund information bulletin for the land transport sector

November 2000

Project findings will affect future evaluations

Transfund New Zealand (Transfund) is currently reviewing the project evaluation benefit parameters - and their values - used for calculating:

- the benefit-cost ratios (BCRs) for road construction projects
- the efficiency ratios (ER) for alternative to roading proposals
- the patronage funding rates for passenger transport services.

Consultation with representatives from a number of industry organisations has shown that the project to review the benefit values could result in significant changes to Transfund's evaluation procedures, both in terms of the types of benefits included in the procedures and the values assigned to those benefits.

This project began a year ago with an extensive scoping study, which included a series of consultation workshops throughout the country. These workshops identified a number of key elements that may need to be added to, updated or revised in Transfund's evaluation procedures.

Why review the benefit parameters?

Transfund's mandate is "to allocate resources to achieve a safe and efficient roading system". It does this by evaluating all proposals for funding using economic analysis, in particular cost-benefit analysis.

The current set of project evaluation benefit parameters (not in order of priority) is as follows:

- travel time savings
- vehicle operating cost savings
- accident savings
- increased comfort (e.g. from sealing unsealed roads)

- reduced frustration (e.g. more passing opportunities)
- environmental factors, including carbon dioxide emissions
- community factors
- intangible effects.

Work undertaken by Transfund during the past two years has highlighted the need to update some of these parameters.

For instance in 1998, Transfund introduced values for travel in congested conditions, while in 1999 the value of vehicle operating costs was revised downwards in the light of new research showing that the cost of running motor vehicles had reduced significantly over the last 10 to 15 years.

In September 1999 Transfund decided to review all benefit values to ensure that they took account of the latest research findings, reflected industry best practice and - most importantly - that they properly reflected the values and preferences of New Zealand transport users.

A key objective of this review is to ensure that a consistent methodology is used for valuing the benefit parameters that will enhance comparability between projects. At the same time, Transfund is taking the opportunity to address any shortcomings in its current project evaluation procedures and anticipates that this review will result in significant improvements.

Consultation workshops

During January and February 2000, Transfund held 17 consultation workshops with roading industry and road user groups. The workshops involved participants from local

government, the Automobile Association, Road Transport Forum, Transit New Zealand and consultants. Feedback from this initial consultation indicated a need for project evaluations to reflect those values that will relieve driver frustration, provide improved travel comfort, and increase feelings of safety.

Some of the detailed findings from those workshops included:

- the need to reduce driver frustration, in particular through the provision of more passing lanes and more congestion relief

(over)

What's a benefit parameter?

A **parameter** defines the scope of a particular process, activity or item. Thus a **benefit parameter** defines the scope of a particular benefit.

Within the context of project evaluations, there are numerous potential **benefits**. Widening a road to provide passing lanes, for example, will produce benefits including:

- reduced driver frustration
- accident reduction
- travel time savings.

The new pavement could also produce other benefits including (for example) *reduced road noise, lower vehicle operating costs, greater passenger comfort, environmental benefits, etc.*

In the evaluation process, the scope (or extent) of each of these benefit parameters is assessed and assigned a **value** within the overall project context, so that the sum of the benefits can be measured against the total cost of the proposed project. This calculation produces a **benefit/cost ratio** (BCR), which is used to determine whether a project qualifies for funding.

00-823

- projects (for Aucklanders the latter was the top priority)
- the need for a proactive approach to safety issues, based on improving sites before accidents occur, rather than undertaking evaluations after accidents have occurred.
- the need for road consistency, especially on higher volume roads
- the desire to travel on roads with no unexpected surprises or "out-of-context elements" (e.g. low speed bends in high speed environments)
- the desire to drive on roads that provide a feeling of safety (there is a marked dislike of the perception of safety risk, e.g. the closeness of high speed oncoming traffic, narrow bridges, narrow road lanes, poor sight distances)
- the desire to see single lane and narrow two lane bridges replaced or improved (especially on State highways and other busy local roads)
- the desire for more bypasses around towns and cities
- the desire for higher quality work to be undertaken - a "get it right first time" approach so that frequent repairs or maintenance are not required
- the desire to see better road surface conditions and better types of road surfacing used
- a general dislike of unsealed roads both by commercial and private car drivers
- for heavy commercial vehicle operators, narrow roundabouts are a significant concern in terms of manoeuvrability, access and safety.

TIMETABLE	
December 2000	Identification of parameter values used internationally (to be used as a benchmark against NZ parameter values)
February 2001	Survey design work completed
March-May 2001	Surveys conducted nationally
August 2001	Detailed analysis of surveys complete and provisional recommendations on benefit parameters and values
September 2001	Testing new parameters against existing parameters, assessment of implementation issues
November 2001	Recommendations to Transfund Board on changes and additions to Transfund's evaluation procedures

A subsequent questionnaire to obtain more detailed feedback was circulated in February/March 2000. While not producing a large response, several of the above factors came up again, particularly the emphasis on road safety.

The next steps

Transfund is negotiating with a consortium of consultants to undertake the comprehensive surveys that are required to assess the values placed on benefit parameters by road and passenger transport users. The process of survey design, market research and survey evaluation is targeted to begin in November 2000. The surveys will be conducted nationally, with detailed analysis and draft recommendations on benefit parameter values expected by August 2001. A Technical Working Group of international and domestic experts will oversee the project from inception to completion.

Transfund will then integrate the draft parameters and values into its procedures, and will field test them against the existing parameters and values. The final recommended changes

will be reported to Transfund's Board in November 2001. If the changed (and additional) parameter values are adopted Transfund's evaluation procedures will be revised and the new procedures will come into effect in 2002.

How to stay informed

Further Transfund Updates will be produced to keep you up to date on this project. You can also check our progress by:

- visiting Transfund's website at www.transfund.govt.nz
- checking the monthly Transfund News for regular updates
- subscribing to the email-based information service on the website, or
- emailing Julie Booker on julie.booker@transfund.govt.nz

Transfund will again seek input from industry stakeholders, government agencies, and interested parties, during the course of the project, and prior to implementation of new or revised benefit parameter values.

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Phone 04 473-0220; Fax 04 499-0733; Email reception@transfund.govt.nz

Transfund Regional Offices

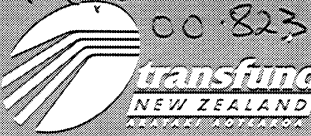
Northern PO Box 74-172, Auckland. Ph 09 529-9936; Fax 09 529-9948
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Attachments to Report 00-823



transfund
NEW ZEALAND
RESEARCH FUNDING

A newsletter published by Transfund New Zealand

October 2000 Issue 41

Effects of improving public transport

A major justification for many public transport improvement schemes is their success in attracting people out of cars, and thereby reducing road traffic volumes and congestion levels.

As part of a Transfund research project, Ian Wallis of Booz:Allen & Hamilton appraised international evidence on the effects of public transport improvements on changing travel behaviour, and in particular on persuading people to switch from car

continued over page



Adelaide's guided busway.

Editorial

In this issue of Transearch we publish (starting on page 4) what we intend to be the start of a comprehensive directory of New Zealand transport research organisations and individuals. The result of a survey undertaken by Transfund staff, it is designed to put researchers in touch with their potential clients - and other researchers - for the good of the whole transportation industry.

As just one organisation funding research - and of course there are many others - Transfund is aware of the benefits of up to date and accurate information on this country's research capabilities. It is in the interests of all concerned, researchers and research beneficiaries alike, that these capabilities are known and widely publicised.

To help us complete this task, please request a questionnaire (see page 3) and respond soon, if you haven't already done so.

Passenger transport usage is very much in the news at the moment, and Transfund is busy developing new funding policies to reward patronage increases. An article starting on this page reports on Booz:Allen & Hamilton's appraisal of international evidence of the effects of public transport improvements on persuading people to switch from car driving to using public transport. They found that major public transport projects can have significant effects on the shares of different transport modes, and have recommended appropriate 'diversion rates' to be used in modelling the effects of new projects in New Zealand's major urban centres.

The findings of research into the failure of 'riprap' stones placed along the toe of highway bridge abutments are reported on page 9. Both clear water and live bed tests were conducted and the researchers give valuable advice on the riprap size and apron area, as well as the filter fabrics used.

It is satisfying to report on the successful application of Transfund-funded research, and on page 12 we describe how a 1997 project to examine 'risk assessment techniques for optimizing slope-failure preventive maintenance programmes' has been put into practice for Transit New Zealand's Canterbury region. The methodology identified in the research was applied to a stretch of SH73 subject to regular slips and rock falls, and an alternative maintenance programme was proposed which was judged to be more cost effective and warranted close examination.

This particular research project also won a merit award from the Association of Consulting Engineers (ACENZ) for its researchers, Riddolls and Grocott (now Golder Associates), as reported on page 11.

All in all, this issue presents a variety of useable information, which is what Transfund's research programme aims to achieve. We hope you find it of value.

Martin Gummer
Chief Executive
Transfund New Zealand



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YOUR VIEWS

TRANSEARCH welcomes letters from readers. Letters should be addressed to:

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www.transfund.govt.nz**

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Transfund contact: **Richard O'Brien**

Editor: **Diana Moir**

TranSearch is published quarterly by Transfund New Zealand. Its purpose is to report the results of research funded through the Transfund New Zealand Research Programme, and to act as a forum for passing on national and international information to aid collaboration between all those involved – to stimulate enquiry, discussion and solutions concerning road, traffic, safety and land transport problems in New Zealand.

Contributed articles are welcome, and should be typed in double spacing and not exceed 1000 words. Illustrations may be either black and white or colour, and must be of high quality. *TranSearch* reserves the right to edit, abridge or decline any article.

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driving to using public transport.

Ian Wallis:

"We looked at the international evidence on 'diversion rates', that is, the proportion of additional public transport trips generated by public transport improvements that would otherwise have been made as car drivers. We surveyed a wide range of countries, including Britain, France, Germany, Norway, Australia, USA and Canada, and found that diversion rates vary from country to country, dependent on initial mode shares, car availability, urban density, alternative modes of transport and other factors."

Within a given country, however, the researchers found that similar diversion rates applied across a wide range of projects, such as major new transport schemes, smaller service enhancements, and general fare changes – although the absolute level of diversion varied between projects.

Higher than average diversion rates were found to apply to projects oriented particularly to motorists, such as Park and Ride projects and express bus services; lower diversion rates applied to projects with a more social focus, such as local community bus services and off-peak fare concessions.

An important finding of the research was that, while significant reductions in car traffic volumes were often predicted, the actual observed reductions on the road were often very small or undetectable.

"Take the guided busway, the Adelaide O-Bahn, for example. A reduction of up to 10% in peak road traffic in the corridor was indicated, based on a survey of users of the O-Bahn bus services; yet road traffic surveys had difficulty identifying any significant changes in traffic volumes or travel times."

Similarly, surveys of major new rail projects in France (Marseilles, Lyon, Lille) and Germany (Stuttgart) indicated that, although some motorists were attracted out of their cars, other car users then took up the road space released.

More positive effects were measured for the Manchester Metrolink (light rail) scheme, with recorded reductions of peak period car traffic in the corridor of up to 8%, and some fall in car ownership in the area affected.

"We concluded that major public transport projects can have significant effects on modal shares and road traffic levels, with between 2% and 10% of motorists in the corridors affected switching to public transport. The problem is that the road capacity released appears to be largely taken up by additional car traffic." Ian Wallis says.

"We're not suggesting that the benefits of these projects for road traffic are negligible. Even though the degree of congestion may not be significantly reduced, some car users will benefit through changing their route or time of travel, or making additional trips."

Diversion rates – recommendations for New Zealand

The final part of the project involved developing recommendations on the most appropriate diversion rates for New Zealand's major urban centres, and comparing the merits of using these against undertaking case-specific surveys.

"In light of the international evidence, we recommend the use of a 'standard' car driver diversion rate of 35% - 40% for use in New Zealand's major urban centres - i.e. experience suggests that 35% - 40% of those additional public transport users attracted by system improvements would be switching from driving their cars."

"For 'non-standard' conditions, the researchers recommend the following guidelines:

- For public transport projects oriented particularly to motorists, higher than standard diversion rates are appropriate. This includes Park and Ride projects with a suggested diversion rate of at least 70%, and express bus services with diversion rates of between 50 - 75%.
- For public transport projects with a more 'social' focus, lower than standard diversion rates are suitable. This includes off-peak fare schemes and local community bus routes, with suggested diversion rates of approximately 20 - 30 %.

"When considering smaller public transport schemes in New Zealand, the international evidence could be used to estimate the likely diversion rates, without undertaking

local market research. For larger, more complex or more unusual projects, scheme-specific market research would normally be desirable, using stated preference or similar techniques."

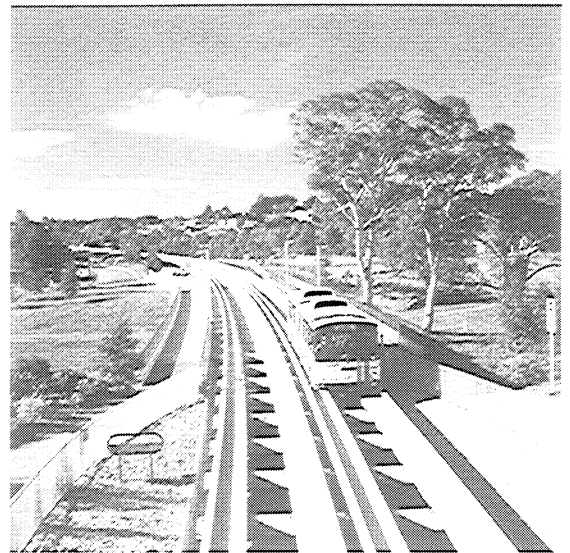
The research findings have already found important application in New Zealand.

Diversion rates were a key input into Transfund's Existing Passenger Services Project and the current development of proposals for a new Patronage Funding system. Ian Wallis says

"The propensity of people to switch from car to public transport if services

are improved is important in estimating road user benefits from public transport subsidies. The international diversion rate evidence, together with results from Customer Satisfaction Surveys in New Zealand, have been used to making estimations for the main centres in New Zealand."

Contact for more information: Ian Wallis, Booz-Allen & Hamilton, phone (04) 915 7777. Email: wallis_ian@bah.com



Guided busway, Adelaide

Need for communication among researchers

In talking to research organisations and individuals about the Transfund Research Programme, staff at Transfund have become aware that, by and large, researchers do not have good communication with one another.

Sometimes they meet at conferences, or they may learn through third parties of the work being done by fellow researchers, but in general there is very little contact between specialist researchers. In such a situation, the perceived image of 'backroom boffins' working in isolation may not be too far from reality.

Apart from the obvious disadvantages of researchers not being aware of the nationwide research capacity and capabilities, operating in a vacuum limits the scope for joint venture research proposals, not to mention the possibilities of overseas research submissions.

Overseas research organisations, for example, sometimes want to use New Zealand researchers for their research projects; they may also want to submit research proposals to Transfund using independent individual New Zealand researchers as project leaders, but do not have all the contacts they would like.

Transfund recently set about trying to remedy this information gap, and the list that follows is the first instalment of what we hope will prove finally to be a comprehensive directory of New Zealand's research capabilities in the roading and land transportation sectors.

Compiling the directory

A Transfund email survey of all researchers who had submitted proposals to Transfund in the past two years brought a 90 percent response (two-thirds of replies were received within two hours!), all strongly in favour of the idea of publishing a directory of researchers.

Transfund then prepared a questionnaire, which was mailed to all the researchers who had responded, asking for information

about areas of interest, capabilities and contact details. At the date of going to press with this issue, entries had been received from researchers in 24 organisations, and Transfund is hopeful of many more entries to come.

Questionnaire

It is worth underlining that only those researchers who had submitted proposals to Transfund were sent the questionnaire. We believe there are many more individuals and organisations not on Transfund's database who may have specialist research capabilities that should be listed in the directory. Relevant topics may range from the more obvious roading and transportation issues to related areas such as environmental or social impacts.

If your organisation did not receive our questionnaire, or if you have not yet returned it, and you want to be included in the published directory, please contact Ineke Broekie at Deloitte Touche Tohmatsu on 04 470 3632 or email ibroekie@deloitte.co.nz as soon as possible.

Calling research users

Transfund is also keen to encourage technology transfer by publishing news of successful uses of the research projects it funds. Such feedback might come from consultants, end users such as road controlling authorities, or from the researchers themselves.

If any reader is aware of the successful application of a particular Transfund funded research project, please contact Transearch editor Diana Moir, c/o PO Box 2331, Wellington. Subject to agreement by the parties involved, good application stories could be published in future issues of Transearch.

Transfund directory of researchers

ARRB Transport Research

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AUSTRALIA

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Fax: 0061 3 9886 4870

Contact: Rob McInerney
Email: robm@arrb.org.au

ARRB Transport Research employs over 100 staff undertaking research and consulting work covering a wide range of transport issues including:

- Road Asset Management: asset condition technologies, pavement deterioration and life cycle costing
- Road Safety: program strategies and evaluation, safe road environments and road design, fatigue studies, driver behaviour and vulnerable users
- Environmental Effects: sustainability, biodiversity, noise, energy and greenhouse issues
- Transport Planning: travel demand management, transport modelling and economic evaluation
- Pavement and Materials: design guidelines and performance characterisation of asphalt, bitumen, granular pavements and concrete.

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Auckland UniServices is the commercial contracting company of the University of Auckland, providing research and consulting services utilising the specialist expertise and other resources within the university, covering virtually all faculties, including:

- Engineering - Civil and Resource (Hydraulic Engineering, Traffic Engineering)
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- Energy and Fuels Research Unit
- Research Centre for Surface and Materials Science
- Science - School of Environmental and Marine Science
- Arts - Geography.

Projects range from short duration consulting to long term research involving academics, post graduates and other professionals. Our clients include private companies, government agencies and departments, and Crown Research Agencies.

Bartley Consultants Ltd

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North Shore City
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Frank George Bartley

Currently researching weathering characteristics of chemically modified marginal aggregate to determine if the current NZS Weathering Quality Index test is applicable or if an alternative test is required. Also examining if an additional quantity of chemical has an influence on the test result.

Ross John Peploe

Presently researching appropriate subgrade moisture conditions for pavement design to determine if the current practice in New Zealand of using soaked subgrade parameters for pavement design is overly conservative.

Booz-Allen & Hamilton (New Zealand) Ltd

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Booz-Allen & Hamilton is a leading international management and technology consultancy, with about 100 offices and 10,000 employees world-wide. In New Zealand, the company's core business is research, policy, planning and management issues in the transport sector.

The company and its senior staff have had a heavy involvement in transport sector market research in New Zealand over the last ten years. Key clients have included Transfund NZ, Transit NZ, Ministry of Transport and regional councils.

The company has developed and applied sophisticated research methods (including stated preference techniques) to assess market responses and valuations of transport policies and improved transport facilities of all types and modes.

Research projects undertaken include: motorists' valuations of the benefits of sealing unsealed roads, development of best practice guidelines on the application of stated preference procedures to establish benefit parameter valuations, and valuations of travel time and reliability benefits in a range of traffic situations.

CAPTIF (Canterbury Accelerated Pavement Testing Indoor Facility)

12 Mcleans Island Road
Harewood
Christchurch

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Fax: 03 359 6893

Contact:

David Alabaster, CAPTIF Manager
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David.Alabaster@transit.govt.nz

CAPTIF, owned and managed by Transit New Zealand, with full support from University of Canterbury technical and research staff, is a full-scale, controlled environment testing facility with the technology and personnel to test a wide range of pavement and vehicle properties, and the interaction between them. It is one of the world's most advanced pavement testing facilities.

CAPTIF carries out accelerated pavement testing for both public and private organisations. Examples of testing include:

- Pavement materials and construction techniques
- Comparative testing of different heavy vehicle suspensions, loads and tyres
- Pavement/vehicle interaction.

City Design Ltd

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Contact: Phil Consedine

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Phil Consedine

Phil researches road asset topics generally, including: surfaces, traffic impacts, asset valuation, life cycles and life cycle costing, pavement construction, traffic signals and other traffic controls, congestion effects, traffic safety and safety auditing.

Alan Roland

Alan is involved in road predictive modelling (eg dTIMS) and road asset condition modelling.

Connell Wagner

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Contact: Craig Martell

Email: Martell@conwag.com

Craig is a trained hydrologist with a range of experience in catchment analysis, open and closed channel hydraulic modelling, and flood plain management.

Douglass Consulting Services Ltd

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Contact: Malcolm Douglass

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Douglass Consulting Services provides research, planning and policy analysis services to a range of local government, both regional and city/district, and central government agencies. The services include:

- Transportation planning assessments
- Peer reviews of planning and strategic planning documents
- Environmental and resource management assessments
- Road reform analysis and submissions.

Environmental Management Services

P.O. Box 149
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Environmental Management Services have offices in Wellington, Hamilton and Napier providing a range of environmental project management and planning services within New Zealand and abroad.

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tony@francisandcambridge.co.nz

Specialists in road safety and transportation research including: road user attitudes and behaviour, surveys of public transport users, and evaluation of road safety programmes. Recent projects: 'Cycle Audit and Cycle Review: A Scoping Study' and 'Measuring Safety Culture in Relation to Speed'. Susan and Tony are currently enrolled as external part-time PhD students in Safety Science at the University of NSW.

Golder Associates (NZ) Ltd

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Golder Associates has a staff of over 270 in Australasia, providing geotechnical and environmental services to the industrial, construction and mining sectors, all levels of government, the legal profession and private individuals. Offices are located in Christchurch, Brisbane, Melbourne, Sydney, Perth, Adelaide, Cairns and Maroochydore.

Formerly Riddolls & Grocott Ltd, Golder Associates (NZ) Ltd is the New Zealand operating company of the international consulting group, Golder Associates Corporation. Founded in 1960, this employee-owned group has over 80 offices worldwide. Golder Associates employs 1900 people worldwide and has completed consulting assignments in over 140 countries.

To date, Transfund research has focussed on geotechnical aspects of road construction and operation, particularly in the fields of natural hazards, risk and the development of procedures for establishing cost optimal road maintenance programmes and cut slope designs. A recent research programme resulted in an ACENZ merit award for the company.

HTC Infrastructure Management Ltd

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HTC are specialists in professional services, data acquisition equipment, training and R&D for transport and infrastructure asset management. HTC works with clients to optimise asset conditions given prevailing constraints.

R&D work includes:

- Research and analysis related to HDM III / HDM-4 models
- Development of supplementary software ie HDM-PRD, HDM-RUE, Pavement Strength Program, RAMM Interface Program
- Implementation of NZ dTIMS project
- Asset inventory and condition data acquisition.

Key Researchers at HTC

Dr. Nabin Pradhan, specialising in road data collection systems, information management, predictive modelling, economic optimisation.

Dr. Christopher Bennett (Director) specialising in modelling, data collection systems, team leader on the ISOHDM study for HDM-4 specifications.

Douglas Wilson, Manager HTC / Lecturer - University of Auckland, specialising in research and development works related to transportation / traffic engineering.

Kerry Wood

1 McFarlane Street
Wellington 6001

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Fax: 04 971 5549

Contact: Kerry Wood

Email: kerry.wood@Paradise.net.nz

Kerry is an engineer, practicing as a consultant in sustainable transport. Studied bicycle crashes, highlighting the high-risk crash types, but declining risk with increasing cyclist numbers.

Landcare Research

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Contact: Dr Jake Overton
Email: overtonj@landcare.cri.nz

Contact: Surya Pandey
Email: pandey@landcare.cri.nz

Jake is an ecologist and modeller with extensive expertise in plant ecology, probability sampling methods and spatial analyses. Jake is currently researching the assessment of biodiversity assets and liabilities of road networks.

Surya is an Environmental Scientist with Landcare Research. He shares his appointment with the University of Waikato where he is a lecturer and convener of the Environmental Engineering programme. Surya has extensive research experience in environmental technology development, solid waste and wastewater treatment, and land application of wastes. Currently researching ways to mitigate urban runoff contaminants, including road runoff.

Massey University (Palmerston North)

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Palmerston North

Phone: 06 356 9099
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Contact: David W Fountain
Email: seeds@massey.ac.nz

Research in the use of seeds and other propagules of native and exotic plants to enhance stability of disturbed land. Basic biological processes in seeds and pollen are also studied.

NIWA (National Institute of Water and Atmospheric Research Ltd) Auckland

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NIWA is New Zealand's largest provider of environmental research and consultancy, with 600 staff in 15 locations. Work includes greenhouse gas emissions, air quality, water quality, urban waterways, run-off, sediments, monitoring, and ecosystem effects.

Dr Gerda Kuschel Email: g.kuschel@niwa.cri.nz

NIWA's expert on air emissions from transport activities, and their effects.

Dr Mike Timperley Email: m.timperley@niwa.cri.nz

NIWA's expert on water quality effects from transport activities, including heavy metals and urban stream restoration.

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John Easther

As an expert adviser to Transit, John's research interests are the development of risk management frameworks and the practical and efficient application of risk principles to the management of major roading projects.

Deborah Hume

Deborah's research interests are human and environmental risk, methodologies for the development of community of interest risk profiles, implementation of communications strategies and RMA consultation.

Prof David Elms

David's research interests are systemic risk management, peer review, stakeholder analysis and facilitory processes for applying risk management techniques to the roading industry.

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With over 30 specialist researchers at its complex in Lower Hutt, Central Laboratories is one of the leading road and transport research organisations in New Zealand. Scientists and engineers at the laboratory and within the wider OPUS organisation undertake research in all of Transfund New Zealand's research topic areas.

The programmes of research undertaken by Central Laboratories have their origins in understandings of material performance, environmental effects, road safety, social behaviour and economics revealed in fundamental research undertaken for the Public Good Science Fund (FRST). This understanding is then applied in specific projects for Transfund New Zealand and the Land Transport Safety Authority (LTSA). Implementation of the findings is through input to the Transfund Project Evaluation Manual, specification development for Transit New Zealand and specific advice for Road Controlling Authorities and Rooding Contractors.

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Email:
pinnacle.research@clear.net.nz

Passenger transport policy and evaluation frameworks, review of investment proposals, and travel behaviour - particularly alternatives to car use. Experience in SP experiments and environmental aspects of transport. Very good client network.

Svedala Barmac Ltd

Mangawhero Road
Matamata

Private Bag 4071
Matamata

Phone: 07 888 5699
Fax: 07 888 5244

Contact: Chris Glass
Email: chris.glass@svedala.com

Manufacture and market Vertical Shaft Impact Crushers worldwide. Currently researching the effect of high fines on the properties of Portland Cement Concrete, in partnership with ICAR and Vulcan Materials Company (both USA based). Other research into the development of mathematical shape model for VSI crushers.

Tonkin & Taylor Ltd

P.O. Box 5271
Wellesley Street
Auckland
Or
P.O. Box 1319
Dunedin

Phone: Auckland 09 355 6000
Fax: Auckland 09 3070 265
Phone: Dunedin 021 341 851
Fax: Dunedin 03 454 4989

Graham Salt Email: gsalt@tonkin.co.nz

Falling Weight Deflectometer interpretation for mechanistic analysis of the stresses and strains in pavements. Correlating FWD with moving wheel-load and identification of potential shallow shear using non-destructive methods.

Peter Millar Email: pmillar@tonkin.co.nz

Developer of Geobeam deflectometer. Evaluation of performance of geotextiles in both laboratory and field trials. Development of specifications for use of geotextiles. Performance of non-complying aggregates.

Dave Stevens Email: dstevens@tonkin.co.nz

Software development for pavement structural evaluation, SNP and dTIMS using FWD.

Traffic Design Group Ltd

6 Raroa Road
Lower Hutt
Wellington

P O Box 30-721
Lower Hutt
Wellington

Phone: 04 569 8497
Fax: 04 569 2398

Contact: Dave Wanty
Email: dw@wn.tdg.co.nz

Dave Wanty

Dave is a Senior Traffic Engineer and registered engineer. His main research activities involve traffic monitoring programmes, continuous data and vehicle composition. He also advises the Land Safety Authority (LTSA) on safety related research.

Trevor Lee-Joe

Trevor is a Traffic Engineer with an ME (Civil), previously employed with the Injury Prevention Research Centre. He is an accomplished research organiser and analyst in traffic and safety fields.

Dr Kelly Mara

Kelly is a Consultant Statistician with vast experience who has worked closely with and for Traffic Design Group on many traffic data and safety related research projects for government agencies.

Transit New Zealand (Hamilton)

Transit New Zealand (Hamilton)
PO Box 973
Hamilton

Phone: 07 957 1610
Fax: 07 957 1437

Contact: Brian Grey
Email: bgrey@transitnz.govt.nz

Researches effects of mobilised fines on road structure; reduction of structural pavement thickness.

Transport Engineering Research New Zealand Ltd (TERNZ)

17-19 Gladding Place
Manukau City
Auckland

PO Box 97846
South Auckland Mail Centre

Phone: 09 2622 556
Fax: 09 2622 856

Contact: Peter Baas
Email: p.baas@ternz.co.nz

TERNZ is an independent transport research institute that originated over 20 years ago within DSIR. The multi-disciplinary team of 11 researchers includes Peter Baas with over 20 years of experience in transport research management and heavy vehicle safety, Dr John de Pont, an internationally recognised expert in vehicle dynamics and vehicle-road interaction and Dr Samuel Charlton with over 15 years experience in human factors and applied experimental psychology in the US and NZ.

Current projects include the human factors of overtaking lanes and signage, road friendliness suspension assessment; pavement life prediction; vehicle weights and dimensions, safety rating of transport operators, road user perceptions of risk; driver demographics; the effect of traffic on communities; driver fatigue, and log truck safety.

Riprap protection of bridge abutments

Damage to highway bridge crossings during floods can endanger the lives of the travelling public. As well, disruptions to traffic flow can have a devastating impact on local economies relying on the bridge crossing for the transport of goods and services. Bridge scour, brought about by the removal of bed material around bridge foundations due to the scouring action of water passing the bridge, can also lead to environmental damage, such as stream bed and bank erosion and destruction of downstream fish spawning beds.

To help prevent such damage, modern bridge maintenance programmes frequently include an apron of stones (riprap) as protection along the 'toe' of bridge abutments. Typically, riprap stones can vary in size from 0.2 m to 1.5 m in diameter, depending upon the particular river site and the rock sizes available. The intention is for the apron to settle into the scour hole that develops at the toe of the bridge abutment, protecting the sediment beneath and reducing the depth of the hole. Whether this practice is successful is not known in many situations, particularly where there is bed sediment movement as a result of the scouring action of the water.

Riprap failure

Riprap is subject to certain failure mechanisms, dependent on where it is placed in relation to the abutment. Riprap placed on the apron is subject to similar failure conditions as stones placed about a pier. Chiew (1965) conducted experiments into riprap failure around a pier under clear water scour conditions. Three modes of riprap failure were identified, namely, riprap shear failure, where the stones are not large or heavy enough to withstand the flow; winnowing failure, where the underlying finer bed materials are removed through the voids of the coarser riprap stones; and edge failure, where the instability of the edge riprap stones and the underlying finer material initiates a scour hole.

Further research in 1985 by Blodgett and McConaughy identified failure modes for riprap placed on sloping embankments.

Accepted guidance for the use of riprap at bridge abutments includes recommendations on stone size, the position, shape and thickness of the riprap layer, riprap gradation and filter requirement.



Camerons Creek Road Bridge, near Lake Wanaka, Central Otago, during the January 1994 flood. (Photographer: Mike O'Gain, Transit NZ)



Camerons Creek Road Bridge after the January 1994 flood, with riprap protection. (From 'Bridge Scour', by Bruce W. Melville and Stephen E. Coleman, Water Resources Publications LLC)



McCulloch's Bridge. Waihou River, Valley Road, south west of Waimate.
(From 'Bridge Scour', by Bruce W. Melville and Stephen E. Coleman,
Water Resources Publications LLC)

In a recent research project carried out for Transfund, Auckland Uniservices investigated the criteria for selecting riprap to protect bridge abutments against scour.

The experiments

The experimental investigations were approached in two stages. Firstly, a series of tests were performed under clear water conditions. Different apron configurations, such as varying the position, width, and how far around the nose the apron layer was placed, were tested for their effectiveness in protecting the abutment model against failure. The purpose of these tests was to assess the applicability of current guidelines, particularly the recommendation concerning the width of the launching apron.

A second series of tests were performed under live bed conditions, since no previous experimental data under these conditions were available.

The clear water tests were conducted in a wooden-sided 2.4 metre wide flume, which allowed for water at a controlled depth and velocity to flow through the flume from a holding tank above. The mobile bed tests took place in a glass-sided 1.52 metre wide recirculating flume.

Three abutments were constructed from the bed sediment using a mould made of

aluminium sheet metal. All had the same frontal shape and dimensions, but varied in length. Riprap was then laid on top and the experiments were carried out over 24 hours. The D_{50} (median stone diameter) of the riprap stones used in the testing varied from 16 mm to 35 mm.

Clear water tests

Clear water conditions exist when the shear velocity of the flow is less than the critical shear velocity of the bed sediment and when general mass movement of the bed material is not occurring.

The clear water tests were carried out with a riprap apron that followed the HEC-23 (Hydraulic Engineering Circular No 23) recommendation. This

recommendation was found to be conservative in all cases, and was reduced by increments in subsequent tests until an abutment failure occurred. The process was carried out for two abutment lengths and three riprap sizes.

Partial failure was judged to have occurred where riprap and sediment movement had taken place in one part of the embankment, but had not resulted in a change of the embankment slope as a whole.

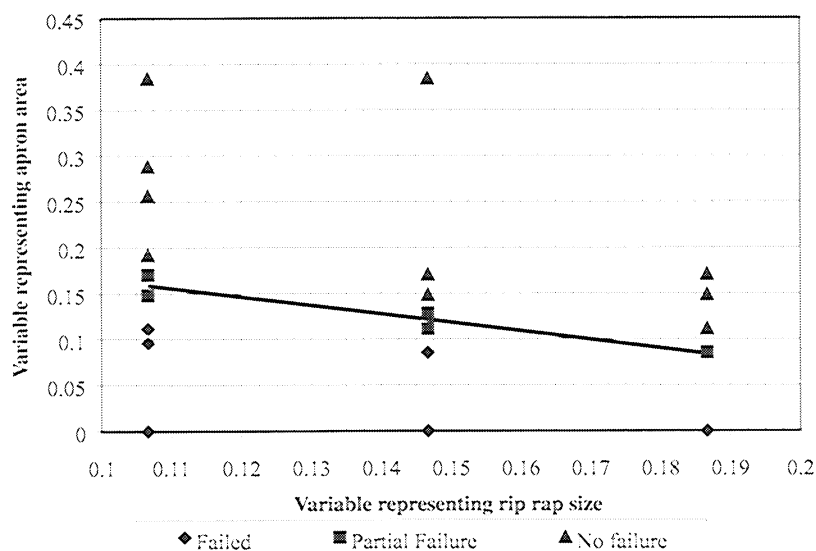
Total failure was judged to have occurred when the side slopes of the abutment, including the riprap blanket, had shifted, leaving large areas of sediment exposed, with no riprap protection.

Where the riprap layer was sufficient to protect the abutment from any change, no failure was judged to have occurred. The riprap in the apron could move, but no riprap on the abutment should have moved.

A graph was then compiled of the data, the x axis being a dimensionless variable representing the riprap size (equal to the median stone diameter, D_{50} , divided by the flow depth) and the y axis being a dimensionless variable representing the apron area. Points were plotted, representing tests with no failure, partial failure or total failure.

Researcher Nicola Eve:

"The chart had a pleasing straight line trend where the partial failures occurred, indicating a relationship between the riprap size and apron area."



Live bed tests

The second series of tests were conducted under mobile bed conditions, that is, where the water velocity was sufficient to cause dunes to form and to progress along the sediment bed.

Experiments were conducted at multiples of 1.25 and 1.5 of the critical velocity of the bed sediment. Tests were run at a flow depth of 150 mm, again for 24 hours, if the abutment did not fail before this.

The experiments revealed that an

abutment protected by a uniform riprap layer, and without a synthetic filter layer beneath, failed very rapidly at flows above the threshold velocity. This was due to winnowing of the bed sediment from the riprap voids.

Nicola Eve recommends further tests to find a failure zone under live bed conditions, varying the flow velocity, riprap size and grading, and type of filter fabric.

"Anecdotal evidence suggests that filter fabrics normally lift and roll up when

exposed at the abutment toe. The flexibility of the fabric could be investigated by testing with alternative material.

"As well, our observations suggest that filter fabric is not required on the downstream side of the abutment. We believe that significant cost savings could be achieved by reducing the amount of filter fabric required."

Contact for more information, Nicola Eve. Email: nicolaeve@hotmail.com

Award for innovative research project

A Transfund research project has won an award for its researchers at a recent Association for Consulting Engineers New Zealand (ACENZ) conference. Riddolls and Grocott, now Golder Associates (NZ) Ltd, received a merit award for a two-year research project into risk assessment procedures for selecting optimum highway slope maintenance programmes.

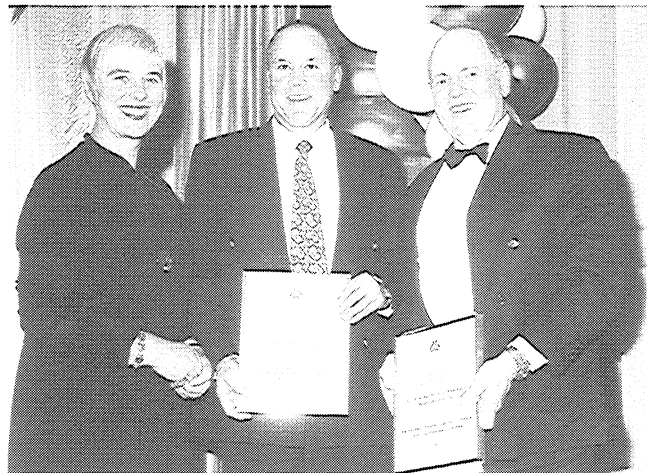
For many years now, ACENZ has run annual awards system for meritorious engineering projects to help promote the profile of consulting engineers. Submissions from members are judged by a specifically selected industry panel. Judging criteria for the awards are based on the particular merits of each project, taking into account engineering design features, environmental considerations, innovation, community or social considerations, keeping to budgets and completing within allotted time frames. A letter from the client stating how well the project met requirements is also part of the assessment.

"In any one year, submissions are judged against industry standards and not against each other, and awards are only made where it is felt appropriate," Guy Grocott of Golder Associates says.

"Our award was of particular significance as it was for research rather than the usual construction projects, which made it difficult to apply the normal judging criteria. We stressed innovation, community benefit, and completion of project within time and budget constraints in our submission."

The research study involved testing the application of probabilistic techniques for risk assessment to part of State Highway 73 near Arthurs Pass (see TranSearch article Issue 36, May 1999).

To begin with, the researchers collected data on road conditions and the rockfall history of the site, including



Mrs Steve Chadwick (MP for Rotorua) congratulates Guy Grocott (centre) and Dave MacDonald (Transfund NZ, Auckland) at the recent ACENZ conference in Rotorua.

accident and maintenance history, and made quantitative assessments as to risk posed by rockfall to road users. They then identified potential preventive maintenance activities and prepared rough order costings, taking into account their respective effectiveness in reducing accidents and repair costs. Risk assessment methodology was then used to determine the optimum maintenance programme for that section of the highway.

The last stage of the Transfund grant was used to modify the methodology so it could be used readily by consultants and roading authorities. A procedures manual was prepared together with a software template.

"A big advantage of the method is that it uses commercially available spreadsheet software and is potentially applicable to a wide range of geotechnical situations," Guy Grocott says.

Contact for more information: Guy Grocott, Golder Associates, phone (03) 377 5696, email: ggrocott@golder.co.nz

Applying the research to sections of State Highway 73

Transit NZ Canterbury asked Golder Associates to apply the methodology developed from their research studies to a stretch of highway between Springfield and Arthur's Pass on SH 73.

The existing 'minimal maintenance' programme involves regular detritus clearance and call-outs to clear slips and rock falls, carried out under contract by Fulton Hogan (Canterbury) Ltd.

Golder staff examined 27 sites where rockfall detritus was a problem, interviewed maintenance personnel on methods used for prevention and clean up and evaluated traffic accidents.

One site in particular, Paddy's Bend, is notorious for numerous non-injury accidents involving punctured sumps, tyres and tanks, and broken windows.

Eight sites, including Paddy's Bend, were then selected as being representative of 80% of the problems experienced and a cost optimal detritus maintenance programme was developed for each site.

Maintenance programme costs include both the cost of maintenance and the cost of accidents (non-injury through to fatal) occurring as a result of rockfall. Any assessment of maintenance options must therefore take into account the effectiveness of the maintenance programme in reducing accident costs.

"We analysed the sites on SH 73 according to the expected reduction, over a 25 year period, for our recommended maintenance programmes compared to the existing 'do minimum' option. This cost reduction constitutes the 'benefit' of each maintenance programme, and a benefit-cost ratio can then be determined," Guy Grocott of Golder Associates says.

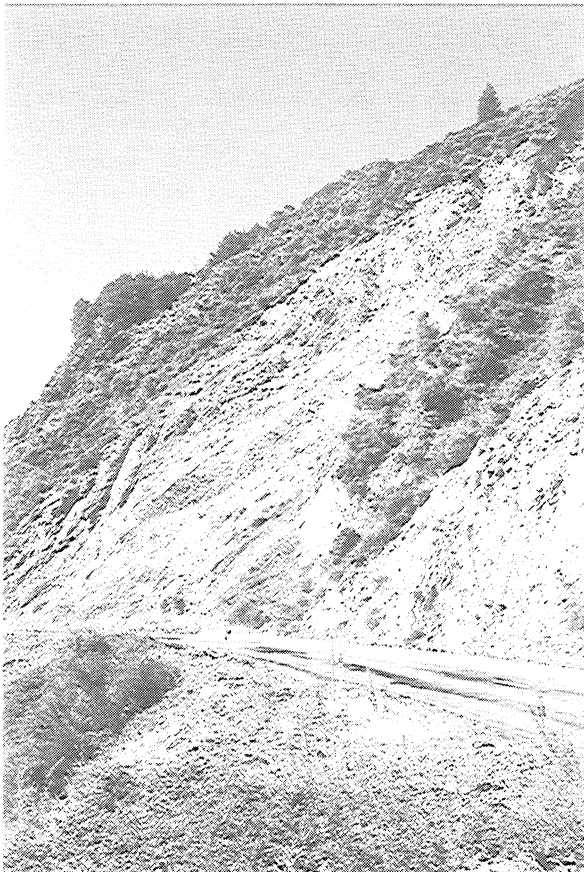
"Using the methodology, we were able to establish that a wire mesh rockfall catch fence would significantly reduce detritus reaching the road. This would

mean reduced maintenance costs as well as reducing rock fall risks to road users."

At another rockfall site, Waimakiriri Bluffs, where there have been a significant number of non-injury accidents and maintenance staff are called out on a regular basis, the researchers recommended a programme of rock bolting that would give a greatly improved benefit-cost ratio.

"Overall the study demonstrated that the existing SH 73 rockfall detritus clean up maintenance programme is not the cost optimal one for the majority of sites studied," Guy Grocott says.

"We believe that our suggested programmes would be more cost effective in the long run and warrant more detailed evaluation."



Paddy's Bend



Waimakiriri Bluffs

Notices

2000 ATA/ARTSA Technical and Maintenance Conference

Melbourne, Victoria

AUSTRALIA

12 - 14 November 2000

Organized by Australian Trucking Association (ATA), and Australian Road Transport Suppliers' Association (ARTSA)

Contact: Australian Trucking Association (ATA)

Phone: +61-2-6247-5832

Eighth Annual United States Hot Mix Asphalt Conference

Cincinnati, Ohio

USA

15 - 17 November 2000

Organized by National Asphalt Pavement Association (NAPA)

Contact: National Asphalt Pavement Association (NAPA)

5100 Forbes Blvd, Lanham, Md 20706-4413, USA

Phone: +1-301-731-4748

Fax: +1-301-731-4621

Email: napa@hotmix.org

Website: www.hotmix.org

Airbag 2000

5th International Symposium and Exhibition on Sophisticated Car Occupant Safety Systems

Karlsruhe

GERMANY

4 - 6 December 2000

Organized by Fraunhofer-Institut fuer Chemische Technologie

Contact: Manuela Wolff

Fraunhofer-Institut fuer Chemische Technologie (ICT)

PO Box 1240, D-76318 Pfingstal (Berghausen), Germany

Phone: +49-7-21-46-40-0

Fax: +49-7-21-46-40-120

Email: mw@ict.fhg.de. Website: www.ict.fhg.de

TransITech Conference

San Diego, California

USA

1 - 2 February 2001

Organized by American Public Transportation Association (APTA)

Contact: Larry Pham

American Public Transportation Association

1201 New York Avenue, N.W. Washington, DC 20005, USA.

Phone: +1-202-898-4123

Email: info@apta.com

Website: www.apta.com/meetings

2001 ITE Spring Conference: Improving Transportation Performance and Productivity

Monterey, California

USA

25 - 28 March 2001

Organized by Institute of Transportation Engineers (ITE)

Commuter Rail Conference

Seattle, Washington

USA

1 - 4 April 2001

Organized by American Public Transportation Association (APTA)

Contact: Fran Hooper

American Public Transportation Association

1201 New York Avenue, N.W. Washington, DC 20005, USA.

Phone: +1-202-898-4076

Email: info@apta.com

Website: www.apta.com/meetings

2001 IES-CTR International Symposium on Advanced Mass Transit Systems

SINGAPORE

26 - 27 April 2001

Organized by Institute of Engineers, Singapore

Contact: Interfama Brooks Exhibitions

Singapore Office, 1 Maritime Square, #09-07, World Trade Centre, Singapore 099253.

Phone: +65-276-6933

Fax: +65-276-6811

Email: info@interfama.com.sg

Abstracts due 31 December 2000

Itesafety Quad Conference

Vancouver, B.C.

CANADA

3 - 5 May 2001

Joint conference organised by the BC, Washington and Oregon Sections of ITE.

See Conference web page at www.islandnet.com/ITE_BC/Conf2001

Home page www.islandnet.com/ITE_BC

Papers sought for conference

Bus and Paratransit Conference

Calgary

CANADA

5 - 10 May 2001

Organized by American Public Transportation Association (APTA)

Contact: Jerry Trotter

American Public Transportation Association

1201 New York Avenue, N.W. Washington, DC 20005, USA

Phone: +1-202-898-4087

Email: info@apta.com

Website: www.apta.com/meetings

Eighth International Road Conference: Roads and Bridges in Europe

Budapest

HUNGARY

21 - 23 May 2001

Contact: Secretary of the Conference

CONGRESS Rendezvenyszervezo Kft.

H-1026 Budapest, Szilagyi Erzsébet fasor 79, Hungary

Phone: +36-1-212-0056

Email: congress@congress.hu

First World Conference on Urban Road Tunnels

Paris

FRANCE

14 - 15 June 2001

Organized by International Road Federation (IRF)

Contact: Colloquium/WCUR, 12, rue de La Croix-Faubin, 75557 Paris cedex 11, France

Phone: +33-1-44-64-15-15

Fax: +33-1-44-64-15-16

Email: p.fournier@colloquium.fr

Website: www.irfparis2001.com

Moving through the Millennium: 8th International Conference on Automated People Movers

San Francisco, California

USA

7 - 11 July 2001

Organized by American Society of Civil Engineers (ASCE)

Contact: ASCE - World Headquarters

1801 Alexander Bell Drive, Reston, Virginia 20191-4400, USA

Phone: +1-703-295-6300

Fax: +1-703-295-6144

Website: www.asce.org/conference/apm8

International Symposium on Transportation Technology Transfer

St Petersburg, Florida

USA

29 July - 2 August 2001

Organized by United States Federal Highway Administration (FHWA)

Contact: 2001 International Symposium

Office of International Programs, Federal Highway Administration

400 Seventh Street, SW, Suite 3325, Washington DC 20590 USA

Phone: +1-202-366-9636

Fax: +1-202-366-9626

Email: 2001symposim@fhwa.dot.gov

Website: www.international.fhwa.dot.gov

Fifth International Conference on Managing Pavements

Seattle, Washington

USA

11 August - 14 August 2001

Organized by Washington Department of Transportation

Contact: Conference Secretariat, Engineering Professional Programs, University of Washington

13030 Meridian Avenue North #301, Seattle, WA 98133-9482, USA.

Phone: +1-206-543-5539

Fax: +1-206-543-2352

Email: pavements@engr.washington.edu

Website: www.engr.washington.edu/epp/pavements

IATR Quebec 2001 Conference: International Conference on the Regulation of Transport Services

Quebec City

CANADA

9 - 12 September 2001

Organized by International Association of Transportation Regulators (IATR)

Contact: IATR Quebec 2001 Transports Quebec

700, boulevard Rene-Levesque Est, 24ieme etage, Quebec (Quebec), Canada, G1R 5H1

Phone: +1-514-864-1637

Fax: +1-514-873-0435

Email: iatr@mtq-gouv.qc.ca

Website: www.mtq-gouv.qc.ca/iatr2001

3rd International Conference on Arch Bridges

Paris

FRANCE

19 - 21 September 2001

Contact: Conference Secretariat: Mrs. Françoise Bourgain, Service des Colloques, ENPC

28 Rue des Saints-Peres, F - 75343 Paris Cedex 07, France

Phone: +33-1-44-58-28-22

Fax: +33-1-44-58-28-30

Email: bourgain@mail.enpc.fr

IPC-11: 11th International Pacific Conference on Automotive Engineering: Motor Vehicles for the 21st Century

Shanghai

CHINA

6 - 9 November 2001

Organized by Society of Automotive Engineers of China (SAE China)

Contact: Secretariat, IPC-11, Society of Automotive Engineers of China

46 Fucheng Road, Beijing 100036, P.R. China

Phone: +86-10-88127156

Fax: +86-10-88127156

Email: office@sae-china.org

Abstracts due 30 November 2000

FISITA 2002: 29th World Automotive Congress

Helsinki

FINLAND

2 - 7 June 2002

Organized by FISITA

Contact: FISITA 2002 c/o CongCreator CC Ltd

PO Box 762, FIN-00101 Helsinki, Finland

Phone: +358-9-4542-190

Fax: +358-9-4542-1930

Email: fisita2002@concreator.com

Website: www.fisita2002.com

Abstracts due 31 May 2001

International Congress: Challenges of Concrete Construction

Dundee

SCOTLAND

5 - 11 September 2002

Organized by University of Dundee, Concrete Technology Unit

Contact: Professor R.K. Dhir, Director, Concrete Technology Unit

University of Dundee, Dundee DD1 4HN, Scotland, United Kingdom

Phone: +44-1382-344-347

Fax: +44-1382-345-524

Email: r.k.dhir@dundee.ac.uk

Website: www.dundee.ac.uk/civileng/ctucongress/welcome.htm

Abstracts due 31 January 2001

New Transfund research publications

Prices include postage, handling and GST

Travel Time Values Theoretical Framework and Research Outline

Stage 1

Transfund New Zealand Research Report No 138

Booz-Allen & Hamilton (NZ) Ltd in association with Professor David Hensher

Price: \$20.00

This project reviews issues and practices relating to the valuation of travel time savings in New Zealand and internationally, appraises theoretical issues in the valuation of travel time savings and development of an appropriate analytical framework for valuation, reviews market research approaches to obtaining valuations of time savings and provides an outline research programme for establishing improved valuations of travel time savings in New Zealand.

Health Monitoring of Superstructures of New Zealand Road Bridges:*Big Wainihinihi Bridge, West Coast*

Transfund New Zealand Research Report No 165

RP Andersen, WS Roberts, RJ Heywood & TJ Heldt

Infratech Systems & Services Pty Ltd, Brisbane

Price: \$35.00

This project, carried out in 1998/99, is part of the Short-Term Health Monitoring and 'Fitness for Purpose' Assessment of 10 Bridges on New Zealand Roads. The Big Wainihinihi Bridge was selected because it is an aging single-lane steel-girder bridge with a timber deck, and because it is representative of a large number of road bridges maintained by local government agencies throughout New Zealand. While the conventional rating for it is relatively low, its Fitness for Purpose evaluation indicates that it is safely carrying the heavy vehicle traffic currently using the route.

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Editor's hands by 31 October
2000.

New Transfund research publications continued

Initial Adhesion Characteristics of Polymer Modified Binder

Transfund New Zealand Research Report No 178

MC Forbes, PR Herrington, JE Patrick

Opus Central Laboratories, Lower Hutt

Price: \$20.00

This report describes work to investigate sealing aggregate bonding to standard and polymer modified bituminous binders. It includes investigation of the variation of adhesion strength for different aggregate surfaces, the effect of water on binder-aggregate bonding and the development of a test for measuring binder spreading rates on plane surfaces. The test was then generalised to rough surfaces and the results fitted to power law equations for degrees of spreading. With further work, this test has the potential to become a standard method for evaluating aggregate-binder adhesion.

Effects of Public Transport System Changes on Mode Switching and Road Traffic Levels

Transfund New Zealand Research Report No 179

Booz-Allen & Hamilton (NZ) Ltd, Wellington

Cost: \$20.00

See article this issue

Cycle Audit and Cycle Review: A Scoping Study

Transfund New Zealand Research Report No 180

SM Cambridge and AJ Francis

Francis and Cambridge Ltd, Christchurch

An investigation to see whether the process of Cycle Audit and Cycle Review developed by the Institution of Highways and Transportation in the United Kingdom should be introduced in New Zealand. The study identifies gaps in providing for cycling in New Zealand's current design processes and makes recommendations for improvements.

Cost: \$20.00

For Further Information

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www.transfund.govt.nz
ISSN 1170-7321

