



## Editorial

**WELCOME TO** this, the third edition of *Transport* which is produced by the Transport Research Laboratory (TRL) on behalf of the Overseas Development Administration (ODA). In this edition we report on the presentation by ODA's Chief Engineering Adviser, John Hodges, to the Institute of Civil Engineers in London at the prestigious Unwin Lecture, where the theme was *Engineering Research for Developing Countries*.

Also in this issue is information on ODA's Technology Development and Research (TDR) projects, including a list of TDR projects which were not shown in the May issue and news on other Transport-related topics, Diary of Events, courses, and recent publications.

The second of ODA's Theme Objectives for the transport sector is T2: *Reduce the costs of constructing, rehabilitating and maintaining road infrastructure, and vehicle operations*. In general, vehicle operating costs decrease as the standard of roads increase. Understanding the link between road characteristics and vehicle operating costs and developing road investment tools which incorporate this information enables investments to be optimised. Understanding the behaviour of roads themselves and that of their component materials under tropical and sub-tropical conditions is another important element. Extreme temperatures, high axle loads and tyre pressures are particularly severe for the bituminous materials used as surfacings for most main roads and research is underway to develop improved materials and methods to cope with this. Road building materials that do not meet standard specifications (often more widespread and therefore cheaper than conventional materials) can be used very successfully in certain circumstances but research is necessary to develop appropriate specifications and methods for their use. Perhaps most important of all is *Maintenance* — for which the expression 'a stitch in time saves nine' is never more true than for roads. In many countries much of the past investment in roads has been lost through lack of timely maintenance and research is underway to improve the management of road networks.

*Transport* would be pleased to hear from readers with views, ideas and comments on this or any other topic. For further information on technical aspects of projects reported on in this issue, contact should be made to the relevant project manager, as listed. A full list of contact addresses is given on the back page.

## ODA presentation to the ICE

In April, John Hodges, Chief Engineering Adviser of ODA, presented the Unwin Lecture (a commemorative lecture given every two years) at the Headquarters of the Institution of the Civil Engineers (ICE) in London. Under the title of 'Engineering Research for Developing Countries' he discussed with an audience of over 100 from Government and Research establishments, Universities and Consultants both ODA's own Technical and Development Research (TDR) programme and the importance of engineering research for developing countries.

After highlighting the five key sectors of ODA's Engineering Division TDR programme (Transport, Urbanisation, Geoscience, Energy and Water), Mr. Hodges used examples of recent research to demonstrate the key factors behind a successful project. By reference to the ODA funded series of TRL's Overseas Road Notes, he indicated that the dissemination of the results is afforded the highest priority in order that the gap between researchers and practical users in the field can be bridged, hence encouraging the use of appropriate technology in development.

Mr Hodges highlighted the fact that each year Britain is committed to increasing its contributions to the multilateral aid agencies, leaving less to be spent on the bilateral programme. Thus, despite the success of the ODA TDR programme, research funds are diminishing. Whereas some researchers may now look towards a bigger European Union (EU) budget

for future funding, research in the engineering sector in developing countries has not been a major part of the EU programme. Those interested in advancing engineering research in developing countries can help by impressing on the EU the need to ensure a more vital role for engineering within the EU's fifth Framework for developing country research, (due to run for 4 years from 1999). The problem has been further exacerbated by the Government White Paper ('Realising our Potential'), published in 1993, which set out a new programme for UK government funded research in science, engineering and technology. It has taken time for the new emphasis to be adapted to meet the specific needs of developing countries.

In the meantime, the potential from available research funds must be maximised. This is currently being achieved through developing countries providing more resources in kind, an increased collaboration between both researchers and aid agencies to produce integrated projects and, most importantly, a move to include dissemination and/or implementation within capital projects rather than as separately funded research activities.

The ensuing discussion, and the response of the audience, showed that ODA's Engineering Division TDR programme has been very successful at solving problems, which have constrained economic progress in many developing countries, in a practicable way and has helped to give UK engineers an enviable reputation in the developing world.

## Profile



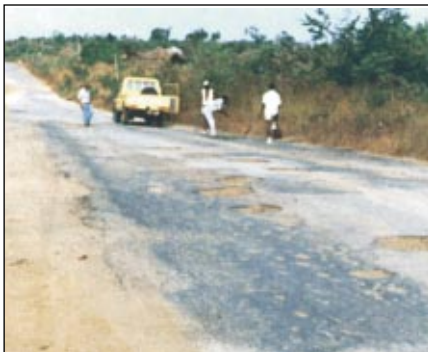
John Hodges, a Fellow of the ICE and ODA's Chief Engineering Adviser, has spent most of the last thirty years working on engineering problems in developing countries. His first overseas

assignment in 1965 was in the Highways Department of the Government of Zambia. In 1969 he joined the (then) Transport and Road Research Laboratory, where he worked in Kenya on the development of the Highway Design Model — a project funded jointly by ODA and the World Bank. He moved from TRRL in 1973 to join the staff of ODA, with over half his 23 years there spent living and working in developing countries as an Engineering Adviser, and subsequently as the Head of ODA's regional office in the Pacific.

In 1990 he was posted to ODA's office in Scotland with prime responsibility for the award of consultancy contracts. Appointed as ODA's Chief Engineering Adviser in 1993, he now has ultimate professional responsibility for all projects funded by ODA in the broad engineering sector.

## Improving the management of road networks

Although road maintenance has been perceived by many as being crucial to the survival of a road network, its overall importance has changed dramatically in the eyes of both developing countries and donors over the last twenty years or so. The turning point came in the late 1970's at a time when a substantial amount of aid had already been spent on improving roads in developing countries with the assumption that further funds would be earmarked for road maintenance and rehabilitation activities. This was not always the case and many networks fell into disrepair, leading one major donor to the conclusion that 'for every kilometre of new construction, three to four kilometres were entering the cycle of terminal decline'. Restoring the badly damaged roads and maintaining an appropriate quality of service is likely to consume more than 2 per cent of the GDP of the countries affected over the next ten years or so. Whilst the backlog remains, the additional vehicle operating costs borne by the transport sector, and ultimately by the national economy, are of the order of four times the annual shortfall in maintenance expenditure.



Badly damaged road in Southern Africa

The main problems which have led to the above situation are now well understood by ODA, the World Bank and others. Central to the problem has been the inadequacy of existing management systems, and the absence of a clear appreciation of the technical requirements of such systems and the institutional issues concerned with their sustainable implementation. What is clear is that the existence of a management system per se does not guarantee that a network will be properly managed or that road conditions will improve. In fact, in cases where TRL have been able to observe at close quarters, the opposite has often been found to be true. The lesson to learn is that systems alone cannot save roads and that future prosperity will depend on obtaining senior management commitment, ensuring a reliable source of funding and adequate motivation of staff, and promoting a 'culture of maintenance' in the organisations responsible for the upkeep of a nation's roads.

To address some of the key issues and offer better advice to policy makers and practitioners, a three year ODA funded research programme was established at TRL in 1994. The main objective is to produce a set of practical guidelines for the successful design and implementation of road management systems. The project has so far involved in-depth reviews of a variety of systems in Zimbabwe, Indonesia, Botswana and Tanzania and contacts with vendors.

Deterioration relationships are used in these systems to predict future road performance and therefore ascertain optimum strategies for future road investment. These relationships are developed using engineering expertise and validating this with data of past performance. As part of this project and for this purpose, long term monitoring studies have been continued in a number of countries and their results have contributed to the development of the new HDM4. Cooperation with the HDM team at the University of Birmingham and other organisations at the centre of the ISOHDM study has been strong, with TRL being nominated as the key organisation responsible for coordinating the development of the technical relationships for HDM4.

The draft guidelines will be available in 1997 for



Collapse resulting from erosion of embankment

peer review prior to final publication. It is also proposed to field test the guidelines in several countries during 1997 and 1998, since adaptation of the general guidance to particular circumstances is considered vital for sustainability.

For further information contact: Tyrone Toole, Overseas Centre, TRL  
Email: [ttoole@trl.co.uk](mailto:ttoole@trl.co.uk)

ODA Project Reference R6024  
"Road Network Management"  
Theme Objective T4



## Diary of Forthcoming Events

### April 1997

#### 3rd African Road Safety Congress

14-17 April, Pretoria, South Africa

Organiser: Conference Planners

Tel: +27 12 63 1681

Fax: +27 12 63 1680

E-mail: [confplan@iafrica.com](mailto:confplan@iafrica.com)

### May 1997

#### Exporail (Asia) 97

#### Intertunnel (Asia) 97

#### Highways (Asia) 97

14-16 May, Kuala Lumpur, Malaysia

Organiser: Judy Aspden, Interfama Brooks

Exhibitions

Tel: +44 (0)1707 275 641

Fax: +44 (0)1707 275 544

### June 1997

#### City Transport 97 - worldwide exhibition of public transport

2-5 June, Stuttgart, Germany

Organiser: UITP

Tel: +32 2 673 61 00 Fax: +32 2 660 10 72

#### Rehabilitation and development of civil engineering infrastructure systems

9-11 June, Lebanon

Organiser: Prof Adbul-Malak, American

University of Beirut, New York, USA

Tel: +1 212 350000 ext 3460/3461/3473

Fax: +1 212 444 5813

E-mail: [mamalak@aub.edu.lb](mailto:mamalak@aub.edu.lb)

#### Transport Systems '97

16-18 June, Chania, Greece

Organiser: Department of Production and Management Engineering, Technical University of Crete

#### XIIIth IRF world meeting

16-20 June, Toronto, Canada

Organiser: Ministry of Transportation, Ontario, Canada. Fax: +1 416 235 5151

#### International symposium on engineering geology and the environment

23-27 June, Athens, Greece

Organiser: Hellenic Committee of Engineering Geology

Tel: +30 1 3813900/3804375/9225835

Fax: +30 1 3813900/9242570

#### International symposium on thin pavements, surface treatments and unbound roads, low cost, low volume, high tech

24-25 June, Canada

Organiser: University of New Brunswick

Tel: +1 506 453 4976 Fax: +1 506 453 3568

## MART Equipment Challenge

The Management of Appropriate Road Technology (MART) initiative has continued its collaboration with ILO ASIST (Advisory Support Information Services and Training for labour based roadworks) by holding a joint workshop in Accra, Ghana early in 1996. Addressing the issues of intermediate equipment in labour based roadworks, the workshop was hosted by the Department of Feeder Roads (DFR) Ghana and attended by specialists from both consulting and contracting backgrounds. Following this ASIST held its annual labour based roadworks seminar, discussing the practices and prospects of labour based contracting, another theme of the MART initiative.

The aim of the workshop was the development of guidelines on specification,



A bitumen heater being used for labour based roadworks

procurement and management/support of intermediate equipment. The workshop participants produced a list of 70 items of intermediate equipment and 28 equipment issues that should be addressed by the MART Guidelines. In addition, the identification of the available information and further R & D (Research and Development) needs of the 35 most important items were made together with an agreement of actions required. The findings from the workshop are given in MART working paper 5.

### Equipment challenge:

The workshop highlighted the lack of suitable proven designs for intermediate technology roadworks equipment. MART is therefore running an equipment design competition to stimulate the production of designs which may be evaluated under the project. Appropriate designs are sought for the following items of roadworks equipment:

1. Manually Operated One-Barrel Bitumen Heater Distributor
2. Manually Operated Concrete Paver Press & Testing Apparatus
3. (Tractor) Towed Dead-weight Compaction Roller

Prizes, provided by the British Public Works Association, will be awarded by a panel of experts including ODA and ILO. The closing date for submission is 31 March 1997.

For further information about the equipment challenge or the MART project in general contact Derek Miles, Director, Institute of Development Engineering, Loughborough University

ODA Project Reference R6238  
 "Management of Appropriate Road Technology"  
 Theme Objective T2



## Reducing black smoke and fuel consumption in diesel vehicles

*The emission of black smoke by diesel fuelled trucks and buses is an everyday sight in many countries.*

First impressions are of dirt and unpleasant smells, but, more seriously, it can present a health hazard through the inhalation of minute particles coated in hydrocarbons and is always a sign that the vehicle is operating inefficiently and wasting fuel.

Many operators are reluctant to perform extra work on their vehicles during maintenance periods and will not do so unless it can be proved that they will save money. Because there are no routine or random smoke checks in many countries, there are also no external incentives to improve this particular aspect of a vehicle's performance.

A recent joint project between TRL and the Central Institute for Road Transport in Pune, India, measured black smoke emissions from two fleets of vehicles and correlated the emissions with records of fuel consumed by the same vehicles.

Black smoke and fuel consumption from 25 buses and 25 trucks was monitored over a six month period. Results from the project show:

- The use of advanced smoke test equipment in routine garage operations, in adverse conditions of high temperatures and humidity, was achieved reliably and without significant problems.
- The potential for fuel savings resulting from reduced black smoke emissions was demonstrated.
- Nearly three quarters of the peak smoke levels were under the UK test limits. The vehicles sampled from both fleets were maintained to a good standard.
- The standard diesel fuel available to the fleets under test was of good quality.

The use of such smoke test equipment for random roadside tests and for routine roadworthiness inspections could make a considerable difference to black smoke emissions from diesel vehicles. Further support is needed to enable countries to implement such test procedures and to determine the benefits on a larger scale.

For further information contact: Tim Pearce, Overseas Centre, TRL.  
 E-mail: tpearce@trl.co.uk

ODA Project Reference R5594  
 "Vehicles and the Environment"  
 Theme Objective E3



Typical black smoke emissions from diesel vehicle

## Road safety education in primary schools

*ODA funded studies have shown that pedestrians account for over 40 per cent of road accident fatalities in African and Middle Eastern countries.*

**M**any of these are young people in the under-15 age group, with children representing more than 25 per cent of road accident deaths in Africa.

Research carried out by TRL's Overseas Centre into road safety behaviour, knowledge and education have shown that children's road safety knowledge in many developing countries was often inadequate, and that little road safety education was being carried out in schools. A three country study in Botswana, Pakistan and Zimbabwe of more than 1000 schools, indicated the desire of teachers to have improved road safety education curriculum materials, guides and advice on planning road safety lessons.

The development of road safety education materials and approaches that would provide models of good practice for primary schools in developing countries is the focus of an ongoing ODA TDR project. Taking account of children's and teachers' road safety knowledge and attitudes, materials were developed and after successful trials in Ghana, a teaching resource, 'Safe Ways', produced.

'Safe Ways' contains five lessons, giving children new and interesting ways to learn road

safety in the classroom, the school compound and in practical situations on or near roads. Using the 'Safe Ways' materials, children practise road safety both at school and on their journeys to and from school with key learning points being walking safely, crossing roads and identifying safe routes to and from school. As a result, children's road safety knowledge and awareness of the local traffic environment and their dangers are improved, which, hopefully, the children will pass on to their families, especially the younger members.

'Safe Ways' is a flexible resource which can readily fit into an existing school curriculum. While it has been developed for Ghana, it is hoped to be able to extend the research to produce 'Safe Ways' for other countries in the near future. A Tutor's Pack for training teachers and a Good Practice Guide are in preparation.

For more information contact Ivan Sayer, Overseas Centre, TRL  
Email: [isayer@trl.co.uk](mailto:isayer@trl.co.uk)

ODA Project Reference R6029  
"Road Safety Development and Evaluation of Educational Programmes"  
Theme Objective T1



## Road safety seminar in Bangkok

**A**n important Road Safety Seminar was held in Bangkok in September under the joint auspices of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) and the Asian Development Bank (ADB). Opened by the Deputy Minister for Transport and Communications for Thailand, it was attended by about 120 delegates representing government departments of 26 countries, senior officials from the UN, ESCAP, ADB and the World Bank and well known researchers from Australia, Canada and the UK.

The main focus of the seminar was the presentation of findings from studies undertaken by a joint Ross Silcock-TRL team, funded by ESCAP and the ADB, which identified the magnitude and nature of the safety problem in the Asia-Pacific region. In addition a set of Guidelines aimed at

senior policy makers on the main aspects of road safety were submitted to the delegates for discussion.

ODA provided funding for delegates from Bangladesh and Nepal to attend and Dr Goff Jacobs of TRL gave a presentation on ODA-funded research and technical assistance projects undertaken over the last ten years or so throughout the Asia-Pacific region. A presentation on road accident data systems was given by Chris Baguley, TRL, who recommended that MAAP5, TRL's Microcomputer Accident Analysis Package, already in use as the national database for Fiji, Indonesia, Malaysia, Papua New Guinea and Singapore, be adopted as a standard for the whole Region.

For further information contact: Chris Baguley or Goff Jacobs, Overseas Centre, TRL  
Email: [cbaguley@trl.co.uk](mailto:cbaguley@trl.co.uk) [gjacobs@trl.co.uk](mailto:gjacobs@trl.co.uk)

## PIARC sponsorship

**THE ROLE of the World Road Association (PIARC) is to facilitate international co-operation and foster progress in the formulation of road and road transport policies and the development of technology. A primary aim within this is to improve knowledge transfer, with priority given towards developing countries and countries in transition.**

The ODA has made a significant contribution towards this through its involvement in the *International Road Maintenance Handbooks*, *PIARC Catalogue of Training Courses for Developing Countries and Countries in Transition* and the *HDM-IV* model. This is now being enhanced further by providing for the active participation by representatives from developing countries through ODA sponsorship of two engineers for PIARC's 1996-1999 reporting cycle.

The sponsored engineers are currently Welford Mbvundula (Malawi) on C6 Road Management and Ephraim Ruita (Kenya) on C7 Concrete Roads. Both Mr Mbvundula and Mr Ruita were able to attend the first meeting of their committees and so provide a development focus towards the work programme of the committees over the next three years.

The involvement of these engineers has also encouraged a number of PIARC's committees to hold meetings in Southern Africa to coincide with meetings of SADC. This provides further encouraging links between PIARC and SADC following the SADC countries decision to join PIARC as a result of Mr Mbvundula's sponsorship by the ODA.

In addition to the UK sponsorship of developing country engineers by the ODA through the British National Committee (BNC) of PIARC, PIARC Head Office in Paris also runs a Special Fund for part funding engineers from developing countries and countries in transition to participate in its committees.

For further information contact: Colin Goodwillie, PIARC BNC  
Tel: +44 (0) 171 921 4349 Fax: +44 (0) 171 921 4505

## INTERNET

The text of all the ODA newsletters is now available on the Internet on the ODA World Wide Web Home Page. At present they are listed under Publications but will in future be located under Research.

The address is :  
<http://www.oneworld.org/oda/>

## Environmental and energy models for HDM-4

The ODA is currently funding a research project to develop an energy balance and environmental assessment capability within the framework of the Highway Development and Management Tool HDM-4. In a two-year programme, appropriate methods will be identified for energy balance analyses and for linking vehicle emissions to air quality, health and other environmental impacts, and damage costs. These methods will be validated through case studies in developing countries, before implementation into the HDM-4 software.

The project is part of an international study being undertaken to produce modern tools for highway development and management (HDM-4) jointly funded with the World Bank, the Asian Development Bank (ADB), the Swedish National Road Administration (SNRA), and others. This US\$2.75 million international study builds upon the widely used HDM-III and RTIM3 models developed by the World Bank and the Transport Research Laboratory, respectively. The two models have been used for over two decades to carry out economic evaluation of road projects, programmes and strategies.

HDM-4, when completed, will be used to assess transport projects in developing countries. It is primarily a cost-benefit analysis tool used for quantifying the economic impacts of road projects,

expenditure programmes and strategies. However, the energy consumption and environmental impacts of transport projects and policies often impose 'external costs' which are commonly not paid directly by transport users and are therefore not considered by decision makers. The inclusion of 'externalities' within the HDM-4 framework will ensure that the model produces solutions which are socio-economically efficient.

The energy balance framework will provide an alternative to traditional economic evaluation used to select project alternatives based on criteria such as NPV, IRR, etc. The new ODA funded research should provide a framework for assessing transport alternatives based on total energy consumption for both motorised and non-motorised road users. Economic appraisal tends to favour motorised road users because it is difficult to quantify the economic benefits of other types of road users. The energy balance framework should provide a common measure of resource consumption by all modes of road transport.

For further information, contact Henry Kerali, School of Civil Engineering, The University of Birmingham

E-mail: R.H.G.Kerali@bham.ac.uk or J.E.Saxby@bham.ac.uk

ODA Project Reference R6486

"Development of environmental impacts and energy balance models for HDM4"

Theme Objective E3



## Guide to Traffic Signals in Developing Cities - ORN 13



Traffic signals are used throughout the world for the control of traffic at junctions. Their use in developing cities is likely to increase, despite some doubts as to their effectiveness and safety if used incorrectly.

Signals enable pre-determined levels of priority to be given to each approach to a road junction. The length of green time given to each arm was originally determined by trial and error but mathematical theory and improved technology have led to control methods which can minimise vehicle delays.

A guide to traffic signals in developing cities (ORN 13) has been produced by TRL in the ODA funded Overseas Road Note series. The purpose of the document is to assist local authority engineers in developing cities on the need for traffic signals and then how to use them optimally. It aims to provide help in the choice between the technologies available and particularly to clarify the benefits of low-cost methods, where applied correctly. ORN 13 is available from the Overseas Centre of TRL.

For further information contact: Geoff Gardner Overseas Centre, TRL  
Email: ggardner@trl.co.uk

ODA Project Reference R6016  
"Traffic Signal Control Strategy"  
Theme Objective U2



## Book Reviews



*Transport and Development in the Third World* by David Simon  
Published by Routledge, 1996

In this book David Simon takes an innovative approach to examining the complex interactions between development and the provision of transport in the third world. The book covers all of the major issues in transport including rural, urban and long distance transport as well as the policy considerations relating to these sectors. It provides a good introduction to all aspects of the contribution of transport to the development process, and the sometimes difficult decisions that poorer countries have to make on modal choice. As such, civil aviation, maritime shipping and rail are dealt with alongside conventional road vehicles and non-motorised transport options.

The book challenges conventional transport planning and stresses that transport interventions are not always neutral. Many of the new transport technologies exported from rich Northern countries are not necessarily appropriate or sustainable in the South. In addition, their impact on the environment

and the wider accessibility of society is often not addressed. The author argues that transport planning needs to take a more integrated or holistic perspective where local communities as well as outside experts and politicians are centrally involved in the planning process.

Reviewed by Simon Ellis, TRL



*At Christmas and on Rainy Days: Transport, Travel and the Female Traders of Accra* by M Grieco, N Apt and J Turner.  
Published by Avebury, 1996

This book gives an account of the social organisation of the informal transport sector in Accra, Ghana. It ranges across forms of technology, interactions within the distribution supply chain, social traditions, personal behaviour, and the special roles of women in the transport and trading system. The main research method is the use of interviews to assemble a picture of how the system operates from the perspective of all the participants.

As a description of a complex set of social interactions this is fascinating. It turns out that despite immense cultural differences, the parameters

driving travel choices are not so different from those which rule in the West. Very poor people may be heavily time-constrained, suffer from unreliability, seek to overcome rigid rules such as the 'tour de role' system through various informal payment mechanisms and are willing to pay extra for better quality *At Christmas and on Rainy Days*.

Where the study is less clear is on the policy implications. The last chapter calls for a more sensitive policy approach, for example on restrictive rules, and for better planning of non-motorised transport. The work shows that households in developing countries have more complex scheduling requirements than those in developed countries. This is said to have major consequences for infrastructure policies, but it is not clear what these are. Presumably certain types of such policies could as easily destroy these social systems as improve the lot of the people within them. So, at the end of this most enjoyable book, I am left with a question – how can we use the rich descriptive material gathered here to achieve better, more sensitive policy planning?

Reviewed by Peter Mackie, Professor of Transport Studies, University of Leeds

## Further current ODA TDR projects

These projects together with those given in the May 96 issue makes a complete list of current TDR projects. They are identified by Theme, Project title, Project reference (R number) and relevant contact/organisation to whom enquiries should be made.

### THEME T2

- **Unpaved roads (R5599)**  
Tyrone Toole, TRL

The development of better deterioration relationships and effective management strategies for unsurfaced road in wet climates and to undertake reviews of research needs in order to reduce total transport costs, improve accessibility, and promote greater self reliance by increased use of local labour and locally manufactured equipment.

- **Rehabilitation design (R5610)**  
Harry Smith, TRL

To develop more reliable methods of evaluating the strength of roads and designing structural overlays to extend their life under tropical environments thereby reducing overall road construction and rehabilitation costs.

- **International study - highway development and management tools (R6472)**

Henry Kerali, University of Birmingham

Final validation, implementation and dissemination of HDM-4, a road sector investment appraisal model (replacing HDM-3 and RTIM3). This will incorporate new methods for predicting road safety, environmental and non-motorised traffic effects, traffic congestion, concrete roads, and other factors excluded from HDM-3.

- **Longer life road surfacing using bitumen modifiers (R6473)**

Harry Smith, TRL

Develop recommendations for the use of bitumen modifiers in asphalt and surface dressings which inhibit premature cracking associated with high temperatures and high levels of radiation in tropical environments.

- **Recycling of bituminous road materials (R6474)**

Harry Smith, TRL

To establish methodologies which will allow damaged bituminous materials to be recovered and modified for re-use in road structures.

### THEME T3

- **Low cost animal cart technology (R6475)**  
Dr C E Oram, University of Warwick

Field test and develop existing low-cost, highly promising DTU cart components and designs: mild steel roller bearings, cast aluminium wheels and hubs, and easy-to-build carts, and their potential for self propagation.

### THEME E3

- **Development of environmental impacts and energy balance models for HDM4 (R6486)**

Henry Kerali, University of Birmingham

To develop an environmental assessment tool for inclusion within the HDM-4 framework. The project will identify the most appropriate methods for energy balance analyses and for linking vehicle emissions to air quality, health impacts and damage costs. These will be validated through case studies in developing countries.

### THEME G1

- **Environment and roadbuilding (R6021)**  
Tony Greening, TRL

The development of environmentally acceptable methods of excavating materials for road construction and maintenance and guidelines for implementation.

### THEME U2

- **Urban mass transit (R5596)**  
Geoff Gardner, TRL

The development of guidelines on the best choice of mass transit systems for given operating conditions in developing cities. The emphasis is on contributing to sustainable, efficient city growth together with the need for affordable transport for the urban poor.

#### Key

- New Projects
- Current Projects

## Short courses in the UK

Several short courses are held each year in the UK for highway engineers and planners working in overseas countries.

ODA supported 11 of the 25 participants attending the TRL Overseas Centre's annual two week course (Roads and Transport in Developing Countries) in July. Involving over 20 of TRL's specialists, the course enabled the participants (from 15 countries) to gain valuable experience not only from the lecturers on their research work but also from each other.

In June, a successful one week course was held on Appropriate Technology Roadworks for Developing Countries by TRL and Intech Associates, with 15 participants from 9 countries.

Crown Agents/Scott Wilson Kirkpatrick, supported by TRL, again held a course on Road Management for Senior Engineers in June at the Crown Agents Training Centre in Sussex.

All three courses will be held again in 1997.



Workshop in progress during Roads and Transport course

### 1997 Courses

**16 - 27 June 1997.** Road Management for Senior Engineers. Worthing, Sussex, UK.

Contact : Chris Folwell, Training Manager, Crown Agents.

**23 - 27 June 1997.** Appropriate Technology Roadworks for Developing Countries. Wokingham, Berkshire, UK.

Contact : Linda Parsley, Overseas Centre, TRL.

**30 June - 11 July 1997.** Roads and Transport in Developing Countries. Wokingham, Berkshire, UK.

Contact : Linda Parsley, Overseas Centre, TRL.

**2 - 11 September 1997.** International seminar 97074. Saving lives: policies and programmes for road

safety and accident prevention. Newcastle, UK.

Contact : Promotion Manager, International Seminars, The British Council (Oxford).

Course leaflets containing information / application details for some of the above courses are enclosed with this newsletter. For further information contact the relevant organisation. Applicants from overseas should be aware of the time required to obtain funds/approval and visas for travel to the UK and apply in good time. Regrettably a number of interested engineers were prevented from attending courses in 1996 because of delays in these areas.

## Recent publications

## BOOKS

GRIECO, M, N APT and J TURNER (1996). "At Christmas and on Rainy Days", Transport, Travel and the Female Traders of Accra. 268pp Published by Avebury, 1996. ISBN 1-85972-172-9 (£39.95) (Ashgate Publishing Ltd.)

SIMON, D (1996). Transport and Development in the Third World. 194pp Published by Routledge, 1996. ISBN 0-415-11905-7 (£9.99) (Routledge)

THE WORLD BANK (1996). Sustainable Transport: Priorities for Policy Reform. 131pp Published by the World Bank, 1996. ISBN 0-8213-3598-7 (The World Bank)

## REPORTS

## ORN13

Transport Research Laboratory (1996). The use of traffic signals in developing cities. *Overseas Road Note 13, ORN13*. (TRL)

## TRL 211

HILLS, B L, N THOMPSON, F JOHNSON and C D POSANAU (1996). A roadside and hospital survey of drinking and driving in Port Moresby, Papua New Guinea. *TRL Report 211*. TRL, 1996

## TRL 227

SAYER I A and A J DOWNING (1996). Pedestrian accidents and road safety education in selected countries. *TRL Report 227*. TRL, 1996.

## TRL 229

CUNDILL M A (1996). The MERLIN road roughness machine: User Guide. *TRL Report 229*. TRL, 1996.

## MART Working Paper 1

MILES, D (ed) (1996). Towards Guidelines for Labour-Based Contracting. Published by the Institute Of Development Engineering. ISBN 1-900930-00-5 (Loughborough University)

## MART Working Paper 5

LARCHER P, D MILES and R PETTS (1996). Workshop on Intermediate Equipment for Labour-Based Roadworks. Published by the Institute Of Development Engineering. ISBN 1-900930-05-6 (Loughborough University)

## PAPERS

AMPONSAH, F, J TURNER, M GRIECO and P GUITINK (1996). The commercial use of non-motorised transport: evidence from Accra, Ghana. *Transportation Research Board, 75th Annual Meeting, January 7-11, 1996, Washington, D.C.* (PA3165/96) (TRL)

HILLS, B L, N THOMPSON, F JOHNSON and C D POSANAU (1996). A roadside and hospital survey of drinking and driving in Port Moresby, Papua New Guinea. International Conference on Asian Road Safety, Beijing, 29 - 31 October 1996. (PA3193/96) (TRL)

JACOBS, G D AND S KIRK (1996). Safety problems in developing countries. *International Conference on Asian Road Safety, Beijing, 28 - 31 October 1996*. (PA3192/96) (TRL)

LAWRANCE C J, R J RICKSON and J E CLARK (1996). The effect of grass roots on the shear strength of colluvial soils in Nepal. *British Geomorphological Research Group Meeting, September 1996*. (PA3095/95) (TRL)

MAUNDER, D A C and T C MBARA (1996). Liberalisation of Urban Public Transport Services: What are the implications? *Indian Journal of Transport Management Vol. 20 No.2 February 1996*. (PA3108/95) (TRL)

McKINNON, B and W HEATH (1996). The analysis of earthwork and slope deterioration from aerial photographs. *Second Caribbean Conference on Natural Hazards and Disasters, Jamaica, 9-12 October 1996*. (PA3131/96) (TRL)

MILES, D (1995). International experience in developing private sector infrastructure capacity. *Annual Conference of the Association of Collegiate Schools of Planning (ACSP), Detroit, October 1995*. (Loughborough University)

MILES, D (1996). Promoting small contractors in Lesotho: privatisation in practice. *ICE Civil Engineering ISSN 0965-089-X* (Loughborough University)

MILES, D (1996). The Client/Contractor Relationship in Labour-based Construction and Maintenance. *Fifth ILO/ASIST Regional Seminar, Accra, April 1996*. (ASIST)

MILES, D (1995). Training across boundaries: Promoting international small enterprise development. *Cross Cultural Management: An International Journal, Vol. 2, No. 3, 1995, pp 39-46* (Loughborough University)

ROLT, J, M S HASIM, M HAMEED and Z SUFFIAN (1996). The prediction and treatment of reflection cracking in thin bituminous overlays. *Second Malaysian Road Conference '96, Innovations in Road Building, Kuala Lumpur, 10-13 June 1996*. (PA3174/96) (TRL)

SUFFIAN Z, H R SMITH and W G FORD (1996). The benefits of using chip seals in Malaysia. *Second Malaysian Road Conference '96, Innovations in Road Building, Kuala Lumpur, 10-13 June 1996*. (PA3175/96) (TRL)

TAYLOR, G (1996). Force Account or Contractors? A Comparison of Kenya and Ghana. *Fifth ILO/ASIST Regional Seminar, Accra, April 1996*. (ASIST)

WOOTTON, J and G D JACOBS (1996). Safe roads: A dream or a reality? *International Transport Conference, Dubai, 15-18 January 1996*. (PA3184/96) (TRL)

For copies of the above publications, please contact the relevant organisation - indicated in brackets

## Newsletter Editors

## Transport

Linda Parsley, Overseas Centre, Transport Research Laboratory, Old Wokingham Road, Crowthorne, Berks RG45 6AU, UK.

Tel: +44 (0)1344 770551 Fax: +44 (0)1344 770719

Email: lparsley@o.trl.co.uk

## Earthworks

Dr John Bennett, British Geological Survey, Keyworth, Nottingham NG12 5GG, UK.

Tel: +44 (0)115 936 3465 Fax: +44 (0)115 936 3474

Email: j.bennett@bgs.ac.uk

## Energy Efficiency

Dr Andrew Gilchrist, ETSU, Harwell, Oxon OX11 0RA, UK.

Tel: +44 (0)1235 433589 Fax: +44 (0)1235 433727

Email: andy.gilchrist@aeat.co.uk

## Urbanisation

Dr Andrew Cotton, Water, Energy and Development Centre, Loughborough University, Leicestershire LE11 3TU, UK.

Tel: +44 (0)1509 222885 Fax: +44 (0)1509 211079

Email: wedc@lut.ac.uk

## Water

Geoff Pearce, Overseas Development Unit, HR Wallingford, Howbery Park, Wallingford, Oxon OX10 8BA, UK.

Tel: +44 (0)1491 835381 Fax: +44 (0)1491 826352

Email: odunit@hrwallingford.co.uk

## Contact addresses

Ashgate Publishing Limited - Gower House, Croft Road, Aldershot, Hants GU11 3HR, UK.

ASIST - Information Services and Training, PO Box 60598, Nairobi, Kenya. Fax: +254 2 566234

E-mail: ilo/asist.nairobi@arso.sasa.unep.no

School of Civil Engineering, The University of Birmingham, Edgbaston, Birmingham B15 2TT, UK.

Fax: +44 (0) 121 414 3675

The British Council (Oxford) - 1 Beaumont Place, Oxford OX1 2PJ, UK, Tel: +44 (0)1865 316636

Fax: +44 (0)1865 557368/516590.

Crown Agents - St Nicholas House, St Nicholas Road, Sutton, Surrey SM1 1EL, UK. Fax: +44 (0) 181 7707448

Institute of Development Engineering, Loughborough University of Technology, LE11 3TU, UK.

Fax: +44 (0) 1509 211079

ODA - 94 Victoria Street, London W1E 5JL, UK.

Fax: +44 (0)171 917 0072

PIARC BNC - Room 4/55, St Christopher House, Southwark Street, London SE1 0TE, UK. Fax: +44 (0)171 921 4505

Routledge - 11 New Fetter Lane, London EC4P 4EE, UK.

Transport Research Laboratory - Old Wokingham Road, Crowthorne, Berkshire RG45 6AU, UK.

Fax: +44 (0)1344 770719

Department of Engineering, University of Warwick, Coventry CV4 7AL, UK. Fax: +44 (0) 1203 418922

The World Bank - 1818 H Street N.W., Washington DC 20433, USA. Fax: +1 202 522 1500

THIS NEWSLETTER is sent free of charge, aimed at those who are interested in Transport related issues in the developing world - engineers and planners, researchers and practitioners in Governments, Aid Agencies, Training Institutions, etc world-wide. Please show this newsletter to your colleagues. For you or your colleagues to be included on the mailing list for future editions, please send your name and address to the editor.