

Editorial

ON BEHALF of the Editor may I welcome you to this first edition of the Transport newsletter which will be issued twice yearly under commission from the Overseas Development Administration (ODA). The newsletter is edited and published by the Overseas Centre of the Transport Research Laboratory (TRL) and replaces the previous *TRL Overseas Newsletter* which many of you have been receiving regularly. The objective of the newsletter is to cover all transport activities under ODA's Technology Development and Research (TDR) programme as well as interesting transport related projects funded elsewhere. Other newsletters are being issued to cover Water and Sanitation, Urbanisation, Energy Efficiency, and Geoscience.

The road network and the transport system in every country is vital for development, both social and commercial. In planning, designing and constructing road networks, a broad range of professionals are called upon. This is not restricted to other disciplines in the engineering sector such as hydrologists and geoscientists, but includes sociologists, environmentalists, economists and many others.

The ODA sees this multidisciplinary approach to transport projects, and indeed development projects in general, as essential in order to promote longer term sustainability. It is planned that the multidisciplinary nature of the development process will be illustrated in the newsletter by the frequent inclusion of articles from the other professional groups in order to highlight the holistic aspects of development and the synergies between the disciplines.

Thus *Transport* differs from the previous *TRL* newsletter in a number of ways. It is intended to give all readers a broader view of ODA's activities in the transport field and a perspective on how this fits in with the activities of all aid agencies. I hope you will like the new informative and illustrative style, and please write to the Editor with your ideas and comments for future editions.

J Hodges
Chief Engineering Advisor
ODA

Any views expressed are those of the Editor and the individual contributors and not necessarily those of the ODA.

Theme Objectives

ONE OF the purposes/aims of the newsletter is to describe the ODA TDR projects and the May edition each year will contain a full list of current projects in the Transport sector. Within each sector, a number of Theme Objectives has been defined as a way of identifying the most beneficial areas of focus. Some projects, because of their multidisciplinary nature, fall under other sector objectives such as Energy Efficiency, Geoscience and Urbanisation.

The Theme Objectives for the Transport sector are:

- T1** Reduce accidents and increase road safety in rural and urban areas.
- T2** Reduce the costs of constructing, rehabilitating and maintaining road infrastructure, and vehicle operations.
- T3** Improve the availability of cost-effective transport for the rural and urban poor, including public transport and non-motorised modes.
- T4** Increase the efficiency of national and regional transport systems.

These Transport Theme Objectives will be examined in more detail in future issues.

Other sector Theme Objectives referred to in this newsletter are:

- E3** Improve end use energy efficiency in industrial, commercial, government, agricultural and transport sectors.
- G3** Improve geotechnical hazard avoidance strategies in national planning.
- G4** Improve understanding of the properties of engineering materials specific to developing countries.
- U2** Increase the efficiency of urban transport systems.

Each ODA TDR project described in the Newsletter will indicate the project reference and Theme Objective and a contact name, Fax and/or E-mail address - more information on addresses of relevant organisations can be found on the back page. In addition, this first issue contains news on publications, events and training courses.

Linda Parsley, Editor, Overseas Centre, TRL
Email: lparsley@trl.co.uk

Letters section

We welcome your contributions to this section. Please send the Editor your comments, views and ideas on this newsletter, and transport related issues which you feel will be of interest to readers. Letters will be printed at the discretion of the Editor as space allows.

Dear Editor

May I submit a short letter to welcome this first issue of the new style Transport newsletter and to promote it as a means of communication between Transport and Development practitioners of all disciplines.

Technology Development and Research (TDR) ultimately must be judged on the extent to which the

findings are taken up and used by policy makers or practitioners in the field. This requires not only that the work is of high quality but that it is effectively disseminated to potential end users. Dissemination of information about TDR work is thus the prime objective of this publication.

We also intend that our TDR work should be demand led by those who are in a position to use the results. To this end we now have a TDR Steering Group comprising representatives from ODA, World Bank, European Commission, Commonwealth, NGOs, and Consultants. However, we also hope that letters to the editor of this newsletter will serve to inform ODA about the demand for new TDR work and the extent to which readers have used the results of work in hand or already completed.

C I Ellis
Divisional Engineering Adviser, ODA

Internet News

OneWorld Online

Set up in January 1995, *OneWorld Online* is the Internet arm of the OneWorld Broadcasting Trust. It publishes development information on the World Wide Web in an easily retrievable and user friendly way.

OneWorld Online operates as a partnership of over 50 of the largest human rights and development

NGO's in the UK like Amnesty, Oxfam and UNICEF. It has grown into the biggest independent site on the Internet dealing with sustainable human development.

It designs and runs autonomous Web sites for these partners, who can publish/broadcast their own materials. There is also a communal area which includes news, special reports, an events diary, media listings and a special section for schools.

Main sources of funding are the ODA, the organisation's partners and the OneWorld Broadcasting Trust.

**The OneWorld Online address is:
and the ODA homepage can be found at:**

**<http://www.oneworld.org/>
<http://www.oneworld.org/oda/index.html>**

Road safety work in Malaysia

CHRIS BAGULEY, one of TRL's road safety specialists, recently returned from a two year assignment with the Institut Kerja Raya Malaysia (IKRAM), which is in effect Malaysia's equivalent to TRL (but with responsibility limited to State and Federal roads only).



Centre-line road marking trial

A programme of research and technical assistance was undertaken which was funded mainly by ODA with support from the Ministry of Public Works, Malaysia.

TRL has had a long association with IKRAM, with previous teams working on pavement design and evaluation, and geotechnical research. Chris's main task was to set up a road safety research programme with the emphasis on improving the road accident database, and then use the information collected to tackle Malaysia's rapidly growing road accident problems. Another part of the programme was to evaluate the effectiveness of engineering improvements introduced at specific "high-accident" sites. These improvements were introduced at a cost of US\$35 million over a five-year period and were part-funded by the

World Bank. Preliminary investigations show that although modest savings on accidents were obtained, there was a need for more accurate identification of high accident sites and detailed investigation of the specific problems.

Research was initiated on the effectiveness of a range of more appropriate low cost measures. These included the application of "tactile" high reflective double white lines to serve as warnings to drivers on rural roads where overtaking was particularly hazardous.

Chris recognised the need for a comprehensive accident investigation guide for use by engineers and planners throughout Malaysia. As is the case in most countries throughout Asia and Africa, engineers receive little training in how to improve road safety. Chris spent considerable time developing a manual for use in Malaysia, but also with general applicability in many other countries. Two thousand copies of the manual have been printed and sent to all highway engineers in the country. The assignment culminated in a very successful safety seminar opened by the Minister of Public Works. Various strategies for improving safety based on the research findings were discussed, and a position paper is now being prepared for the Malaysian Parliament.

For further information contact Chris Baguley, Overseas Centre, TRL
Email: cbaguley@trl.co.uk
ODA Project Reference R5614
"Development & Evaluation of Road Safety Improvements - Engineering Measures"
Theme Objective T1



Building bridges with ODA in the Philippines

Following the visit to the UK in March 1995 by the President of the Philippines, a Presidential Task Force drew up a list of 232 bridges around the country in urgent need of replacement. During April-May 1995, a 2 man TRL team assisted ODA in appraising an Aid and Trade Provision (ATP) to replace worn or damaged bridges in the Philippines with British-manufactured steel panel bridges. The ODA/TRL team visited the representative provinces of Camarines Sur and Capiz to assess the construction costs and likely economic benefits, allowing for estimated traffic growth over the 20 year life of the bridges (which need little or no maintenance), and agreed on evaluation and assessment criteria with the Task Force, including environmental impact and river bank protection. Phase 1 of this ATP aims to provide some 8,000 lane-metres at sites giving the highest economic



Philippine transport is frequently overloaded, and some older steel bridges are showing signs of distortion and dangerous corrosion

return, with a total budget of around £30M, of which £25M would be direct or indirect aid, and £5M raised locally. The project has a high profile because of the high economic and social costs of damage to bridges caused by typhoons and the resulting floods, as well as occasional volcanic activity. Traffic growth rates in the Philippines are high, averaging around 8 per cent per annum, which is substantially greater than the annual growth of the Gross National Product.

The Philippine government foresees the need to build 40,000 metres of new bridging annually, so clearly the ATP project will assist them on this approach.

For further information contact Nick Taylor, TRL
Email: ntaylor@trl.co.uk



Sustainable transport:

A sector policy review

The World Bank has produced a draft policy review document on sustainable transport which summarises much of the Bank's experience in the transport sector since the last sector policy paper in 1972. It reviews transport policy options in the light of worldwide changes in economic and trade structures and in aspirations for improved quality of life in client countries.

The principal conclusion of the report is that social and environmental sustainability are inseparable from economic sustainability. In many countries, however, the financial and economic soundness of the transport sector has been jeopardized by excessive or misdirected government intervention. It is suggested that institutional and policy reform should concentrate on separating sector regulation from operations and developing more competitive and commercial supply structures. It also proposes that effective channels of finance must be established for the maintenance of transport infrastructure and equipment and that pricing should be used more actively to avoid environmentally unsustainable reliance on the private automobile. Efficient charging for road infrastructure will also help to secure the appropriate role for urban and inter-urban rail transport and avoid financially unsustainable dependence on publicly funded transport infrastructure and services. The review also outlines ways in which social and environmental sustainability can be enhanced by encouraging the role of local communities in policy design and implementation, and by better mobilizing the potential of non-motorized transport and the informal sector. The forthcoming review should be published by the World Bank by the end of 1995.

It is understood that a transport sector policy review is currently being carried out by the European Development Fund and ODA's own review is also nearing completion. Further details will be provided in future editions.



Reducing earthwork failure risk on roads

Many roads are blocked and traffic disrupted for long periods each year by earthwork and slope failure after periods of heavy rain. Not only does this cause considerable economic losses, but there are also social hardships on a significant scale, including thousands of recorded fatalities from such events.

Research indicates that many of the earthwork failures are predictable, and that these events are connected with construction on or above road slopes, deforestation, river scouring, and general erosion from uncontrolled surface water flow. Ideally, for any road where there is risk, these triggering effects should be identified in time. The problem has always been that inspecting roads and being able to recognize all of the indicators connected with potential failure is difficult because of the steep and densely vegetated nature of road slopes.

The TRL has developed an earthwork condition assessment technique which overcomes the difficul-



The aerial photograph can provide more information than a visit to the site.

ties of access to earthwork slopes. Detailed records of each site, collected at ground level and in the air, take only a couple of days to obtain for hundreds of kilometres of road, and cost less than \$(US)50 per kilometre of road. The subsequent analysis of these records by experienced earthwork engineers, allows hazard and risk maps, earthwork inventories and engineering appraisals to be produced.

Besides reports, the information is contained in a multi-media database which is particularly easy for

engineers to use, and assists with highway management decisions. It is a procedure, however, that should be repeated every two years for roads where a risk of earthwork failure exists, as it can make a significant contribution to saving lives, extending the life of roads and preserving infrastructure investment.

*For further information contact Warren Heath, Overseas Centre, TRL
Email: whealth@trl.co.uk*

*ODA Project Reference R6025 "Slope protection and maintenance"
Theme Objective G3*

The MART initiative

The Construction Enterprise Unit (CEU) of Loughborough University of Technology was awarded a 3 year research contract by the Overseas Development Administration (ODA) in April 1995. The programme is in one of ODA's priority engineering research areas, which is to "Reduce the costs of constructing, rehabilitating and maintaining road infrastructure and vehicle operations" in



Re-shaping of road profile using simple handtools

developing countries. The contract was awarded in partnership with specialist consultants in this field: Intech Associates and I. T. Transport. The 3 year timescale will permit the project to build working relationships with overseas associate organisations to develop international cooperation in this sector. Already active collaboration arrangements have been established with a number of organisations including the UN International Labour Office (ILO).

The purpose of the initial MART research programme is to develop guidelines for road authority engineers and managers, and project planners and implementers using labour and intermediate technology for road construction, rehabilitation and maintenance. It is possible that these techniques may be appropriate for the circumstances of about half the world's population. However, the cost effective application of these techniques has received insufficient attention in recent years.

Under the ODA funded research, the MART programme will draw together international experience in labour and tractor based technology and the



Towed grader in operation

development of small construction enterprises.

Through codifying experience and carrying out selected further research work, separate guidelines will be produced in the key areas of :-

- handtools
- intermediate equipment
- private sector development
- institution building

If you would like to find out more about the MART initiative, write to:

*Derek Miles, Director, Institute of Development Engineering,
Loughborough University of Technology.*

Fax: +44 (0)1509 211079

ODA Project Reference R6238

"Management of Appropriate Road Technology"

Theme Objective T2



The initial effects of introducing commuter bus services in Harare

IN AUGUST of 1993 the public urban transport sector in Zimbabwe was liberalised by the Government. This allowed the introduction of privately operated commuter omnibuses to compete with the existing state-run bus company, ZUPCO, which, hitherto, had held a monopoly in the capital, Harare.

A joint University of Zimbabwe and Transport Research Laboratory team studied the effects of the liberalisation process during 1993/94. The results suggest that a rapid growth in the commuter omnibus fleet and its passenger-carrying capacity has occurred, accompanied by improvements in service quality. Passenger waiting times have decreased and additional routes have been established, thereby enabling a greater network to be operated.

However, negative impacts are also evident. Fares have tended to rise, especially during the busiest times of the day, and on many routes ZUPCO have reduced services, leaving passengers increasingly dependant on commuter omnibus services. These operate on a "hail-and-ride" principle with no fixed boarding stations, and are the cause of increasing congestion in the city centre, adversely affecting other road users and the environment in general. Commuter omnibuses also increasingly appear to be the cause of, or involved in, road accidents in the city.

In general, it is clear that passengers have benefited from changes that have resulted from the governments' liberation of passenger services. In the long term, however, the continued increase of the commuter omnibus fleet, if allowed, is likely to erode ZUPCO's revenue and increase congestion and pollution of the urban environment. In the future, a balance will clearly be required between sustainable public transport service improvements and wider community costs.

For further information contact Dave Maunday, Overseas Centre, TRL
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ODA Project Reference R6014
"Public Transport Regulatory Policy"
Theme Objective U2



A typical central location in Harare where Omnibuses load passengers

The use of marginal quality aggregates for bitumen surfaced roads

Specifications for aggregate to surface bitumen sealed roads in Southern Africa are demanding. For durability reasons, they exclude the use of calcrete and silcrete duricrust materials that are prevalent in many parts of the region. However, to build new low traffic roads needed in the Kalahari desert, an alternative aggregate had to be found to reduce road construction costs.

Solutions to problems such as this formed the framework of an ODA TDR research project with the TRL, on the use of natural materials for road building. The objective of the project as a whole was to examine the materials used in road pavements, and propose cost effective alternative specifications where possible.



Measuring texture depth of trial panels by sand patch method

For this study, a collaborative research programme was established with the Ministry of Works in Botswana to investigate whether the current specifications could be reduced.

The mineral and engineering characteristics of the materials were examined using petrographic and mechanical test methods, which showed that the silcretes were much stronger than the calcrites but that both materials had potential. It was still essential, however, to prove their performance under traffic. To test the materials under accelerated trafficking, the materials were shipped to TRL and trials laid on a road nearby during regular resurfacing works. The trials were studied over 18 months using photographic techniques and physical tests (see photograph). The tests helped to determine whether the stone resisted polishing and kept its texture depth, which are important measures to ensure the safety of the road user. The field trials showed that the calcrete could breakdown and by the end of the trials the chippings had abraded and polished. In contrast, the silcretes showed only minor wear and tear.

A traffic-based specification has been proposed, which permits the use of calcrete aggregate on the lowest trafficked roads and the use of silcrete aggregate on any of Botswana's roads. The revised specifications apply to surfacings on new roads and to maintenance seals on existing roads. The study proposed that quality control testing could be implemented quickly and cheaply using the Aggregate Impact Test.

The results of the work promote the use of locally available road building materials which can lead to savings of between 10% and 30% of road construction costs. The savings accrue from cheaper processing and lower haulage costs. Using these materials can also help to reduce traffic pollution and fuel oil usage and can also preserve material resources.

The results have been documented and the knowledge gained is being disseminated to regional audiences through conference papers and published reports. This study is reported in ODA/TRL Project Report No. PR115.

For further information contact Mick O'Connell, Overseas Centre, TRL
Email: moconnell@trl.co.uk

ODA Project Reference R5603
"Naturally occurring materials"
Theme Objective G4



Time, tasks and trading

Women's transport needs in developing cities

Aid agencies are increasingly seeking to show the contribution investments in transport policy and infrastructure make towards their wider development objectives, such as promoting the status of women. There is, however, a lack of knowledge within the transport planning profession, of the transport needs of women and what policies may best achieve such an objective.

The Overseas Centre of TRL has, since 1992, conducted ODA-funded research into how urban women use the transport system and what their particular needs are. So far, the research has been conducted, in collaboration with local researchers and Transport authorities, in Accra, Ghana and Medellin, Colombia.

Women, especially those with low incomes, perform multiple economic and social activities. TRL has found that women build-in time flexibility to allow them to overcome delays, unforeseen events and unreliable infrastructure, and still ensure vital tasks are implemented. They use children or elderly members of the household to provide this flexibility to their daily routine. Poor urban services such as transport, water and sanitation can place a significant workload onto these vulnerable members of low-income communities.



Women in Accra are also providers of urban transport supply

Women's considerable involvement in the informal retail sector in Accra provides trade for motorised and non-motorised vehicles. This diversity of supply allows small-scale enterprises to adapt their transport costs and stock-buying to closely reflect their working capital. Policies that seek a more uniform motorised transport supply and which also fail to include the needs of non-motorised modes, may impose inflexible transport costs on traders. This may be detrimental to their economic survival and to those who depend on the trader's income.

Women also provide transport services. In Accra, they act as commercial head porters in the densely built-up city centre market areas. The position of

women carrying out this physically-demanding work may be improved by increased availability of credit for hand-pulled trucks and better business education opportunities.

Future work will focus on the transport needs of women in an Asian city. Several conference papers and journal articles have already been produced. A TRL Report and a book are due to be published in early 1996.

For further information contact: Dave Maunders, Overseas Centre, TRL
Email: dmaunders@trl.co.uk

ODA Project Reference R6019
"Planning for Women and Transport"
Theme Objective T3



Short Courses in the UK

A NUMBER of short courses are held each year in the UK for highway engineers and planners working in overseas countries. Several of these are run by TRL, who also provide support to other courses run by the Crown Agents and the British Council.

In July, TRL Overseas Centre, supported by ODA, held its annual course on the Centre's research work, involving over 20 of its specialists. Run for 30 years as a one week course entitled Tropical Roads Course, it was organised for the first time over two weeks with the new name of Roads and Transport in Developing Countries. This gave the opportunity to add new topics, and more practicals and demonstrations, a format which will be retained for 1996.

Also, for the 3rd year, TRL held a successful one week course on Appropriate Technology Roadworks for Developing Countries in June with Intech Associates. Both these courses will

be held in 1996 at a venue close to the TRL. Crown Agents/Scott Wilson Kirkpatrick, supported by TRL, held a course on Road Management for Senior Engineers in June at the Crown Agents Training Centre in Sussex, with 16 participants from 8 countries. The course will be held again in June 1996.

In September, the 3rd International Road Safety and Accident Prevention seminar was held. Organised every two years by the British Council in conjunction with TRL and Newcastle University, the participants (from 12 countries) spent four days at TRL, before travelling to Newcastle, where the remainder of the two week seminar was held.

Course leaflets containing information / application details for some of the following courses are enclosed with this newsletter. For further information contact the relevant organisation.

1996 courses

UK

17-28 June 1996

Road Management for Senior Engineers.

Worthing, Sussex, UK.

Contact: Chris Folwell, Training Manager, Crown Agents.

24-28 June 1996

Appropriate Technology Roadworks for Developing Countries.

Wokingham, Berkshire, UK.

Contact: Linda Parsley, Overseas Centre, TRL.

1-12 July 1996

Roads and Transport in Developing Countries.

Wokingham, Berkshire, UK.

Contact: Linda Parsley, Overseas Centre, TRL.

Overseas

26 February-22 March 1996

Road Rehabilitation & Maintenance.

Mananga, Swaziland.

Contact: Chris Folwell, Training Manager, Crown Agents.

Design of dense bituminous surfacings for climbing lanes

Asphaltic concrete wearing courses, designed by the Marshall method, are often not appropriate for climbing lanes, particularly in tropical climates. Examples of premature rutting in such materials have been observed in regions as widespread as East Africa, the Middle-East, the Indian sub-continent and the Far-East.

The density and aggregate orientation obtained during the Marshall test does not represent the ultimate condition and density in the road pavement after compaction by slow moving heavy vehicles. This is because at high temperatures and at long loading times conventional bitumen behaves in a viscous manner, allowing considerable secondary compaction of the mix under traffic. The subsequent reduction in air voids can cause the matrix of fine aggregates and bitumen to reduce the mechanical interlock between the coarse aggregates which eventually results in structural instability and the surfacing shears under further trafficking.

There are a growing number of bitumen additives available that increase the viscosity of a binder and improve its temperature susceptibility, which should make the modified surfacings more resistant to secondary compaction at high temperatures. During 1989-1990 the Public Works Institute of Malaysia (IKRAM), in cooperation with the Overseas Centre of TRL, constructed two full scale trials on a climbing lane on the Kuala Lumpur - Karak Highway in order to evaluate the relative performance of five modified binders used in asphaltic concrete designed by the Marshall procedure. Also included in the trials was an asphaltic concrete using a modified version of the BS Refusal Density test and experimental control sections.



Early surfacing failure

Results from the studies have indicated that, under severe loading conditions, shear failures are likely to occur when the air voids in the compacted wearing course drop below 3 per cent irrespective of binder type. The performance of the modified surfacings was extremely variable. Three of the additives significantly improved the deformation resistance of the wearing course material but the other two only marginally increased the life of the surfacing compared to the control section. The study also showed that it is possible to design surfacing material which is resistant to secondary compaction and hence shear failures, under severe loading, without recourse to modified binders. Details of these design procedures can be found in the 4th Edition of Overseas Road Note 31 published by the Overseas Centre of TRL.

For further information contact Colin Jones, Overseas Centre, TRL

Email: cjones@trl.co.uk

ODA Project Reference R6023

"The design & construction of bituminous strengthening layers (overlays) for existing roads"

Theme Objective G4



PIARC Congress

PIARC, World Road Association, the oldest international organisation whose area of interest is roads and road technology, held its XXth quadrennial World Road Congress in Montreal in September 1995. This important event attracted a significant number of delegates from developing countries and countries in transition; PIARC membership now includes 81 governments and some 2100 members in 100 countries.

The committee on Technological Exchanges and Development (C3) reported on its activities since 1991. These included the publication of the *International Road Maintenance Handbooks*, the English version of which has been funded by the ODA and is distributed by the TRL Overseas Centre (see Overseas Newsletter no. 13), and the *PIARC Catalogue of Training Courses for Developing Countries and Those with Economies in Transition*.

Committee C3 also organised a joint seminar on the HDM-IV model, with the World Bank and committee C6, and a session on *The Role of Secondary Road Networks in Developing Countries*, to which ODA contributed a paper. In addition there was a special session organised by the World Bank on *Management and Financing of Road Maintenance: Progress in Africa* and a special session on *Latin American countries, New Investment Policies of the Public and Private Sectors*.

The XXth World Road Congress also saw the formal launching of INTERCHANGE, a worldwide network of information and contacts being established with the needs of the developing countries and the countries in transition uppermost in mind. TRL is the UK node on the INTERCHANGE network.

Mechanisms for Improved Energy Efficiency in Transport

An assessment of the wide range of energy efficiency measures in the transport sector has been carried out by ETSU to provide authoritative data on the options available for stimulating improved transport energy efficiency in developing countries as part of bilateral and multi-lateral programmes.

There are four main reasons why improved energy efficiency in transport will benefit a developing country:-

- the total costs of importing petroleum products can be reduced
- individual operating costs can be reduced
- accessibility of transport can be increased
- environmental burdens are reduced

Energy efficiency measures for developing countries must be appropriate to the institutional, economic and practical constraints which exist. The priority should be to concentrate on low cost and low technology solutions. These include:

- improved fleet management and operating procedures for public and freight transport systems
- promotion and encouragement of non-motorised transport
- expansion and development of existing public transport systems
- land-use planning

Although many appropriate and cost effective energy efficiency measures exist, information, institutional, technological and financial/economic barriers may

prevent them being implemented.

Donors may assist by:

- helping governments formulate transport and energy policies
- demonstrating energy efficient measures and the transfer of experience from developed countries
- improving awareness and expertise through information dissemination and training programmes

For further information contact David Martin, ETSU.

Email: david.j.martin@aeat.co.uk

ODA Project Reference R6144

"Mechanisms for Improved Energy Efficiency in Transport"

Theme Objective E3



Recent publications

Reports

ORN10

Transport Research Laboratory, **Costing Road Accidents in Developing Countries**, *Overseas Road Note 10, ORN10*. (TRL)

PR115

WOODBIDGE, M E and C W SLATER, (1995). **Development of a reduced specification for surfacing aggregate on low traffic roads in Botswana**. *Project Report 115*. TRL, 1995.

THE WORLD BANK (1995). **Sustainable transport: A sector policy review**. (Transportation, Water and Urban Development Department, World Bank)

INTERNATIONAL ROAD MAINTENANCE HANDBOOK (volumes 1-4), Transport Research Laboratory, 1994. Produced in association with PIARC.

(English version available from Overseas Centre, TRL. For other language versions contact PIARC)

Catalogue of Training Courses in Transport Management and Road Engineering for Developing Countries and Those with Economies in Transition. (PIARC)

Papers

BAGULEY, C J (1995). **Progress toward the national road casualty reduction target since 1991**. *Seminar on road safety: the engineering contribution towards the national reduction target*. Ministry of Works, Kuala Lumpur. January 1995. (TRL)

BAGULEY, C J (1995). **Improving safety by road engineering: proposals for getting back on track**. *Seminar on road safety: the engineering contribution towards the national reduction target*. Ministry of Works, Kuala Lumpur. January 1995. (TRL)

CUNDILL, M A, and S J WITHNALL. (1995). **Road transport investment model RTIM3**. *Sixth International Conference on Low Volume Roads, Minneapolis, Minnesota 25-20 June, 1995*. (TRL)

GRIECO, M, J TURNER and E A KWAKYE (1995). **Informal public transport and the woman trader in Accra, Ghana**. *The seventh World Conference on Transport Research, Sydney, 16-21 July 1995*. (TRL)

GRIECO, M, J TURNER and E A KWAKYE (1995). **Subverting sustainability? - infrastructural and cultural barriers to cycle use in Accra**. *The seventh World Conference on Transport Research, Sydney, 16-21 July 1995*. (TRL)

HARUN, M H and G MOROSIUK (1995). **A study on the performance of various bituminous surfacings for use on climbing lanes**. *Eighth REAAA Conference, Taipei, 17-21 April, 1995*. (TRL)

HEATH, W, G HEARN, and B MCKINNON (1995). **Comparison between aerial and ground-based assessments of road earthworks failures in Nepal**. *Eighth REAAA Conference, Taipei, 17-21 April, 1995*. (TRL)

HILLS, B L and C J BAGULEY (1995). **Accident data collection and analysis: Progress in the use of the Microcomputer Package MAAP in the Asian Region**. *Eighth REAAA Conference, Taipei, 17-21 April 1995*. (TRL)

JACOBS, G (1995). **Costing road accidents in developing countries**. *Eighth REAAA Conference, Taipei, 17-21 April, 1995*. (TRL)

MAUNDER, D A C and T C MBARA (1995). **"Sudden Impact": Assessment of the initial effects of introducing commuter omnibus services in Harare, Zimbabwe**. *The Chartered Institute of Transport in the UK. Autumn 1995*. (TRL)

TURNER, J and P FOURACRE (1995). **Women and Transport in Developing Countries**. *Transport Reviews, 1995, Vol. 15, No. 1, 77-96*. (TRL)

UMAR, R S, G M MACKAY and B L HILLS (1995). **Preliminary analysis of motorcycle accidents: Short-term impacts of the running headlights campaign and regulation in Malaysia**. *Journal of Traffic Medicine. (1995) Vol 23, No.1*. (TRL)

WOODBIDGE, M E, B OBIKA, R FREERHEWISH and D NEWILL (1994). **Prevention of salt damage to thin bituminous surfacings: design guidelines**. *Sixth International Conference on Low Volume Roads, Minneapolis, Minnesota 25-20 June, 1995*. (TRL)

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

Costing road accidents in developing countries



If accidents are not costed there will inevitably be an under-investment in road safety. However, costing road accidents, whether in the UK, the USA or elsewhere, is acknowledged by experts in this field to be a difficult and contentious subject. Of the many different methods that can be used, no single method is ideal.

TRL recently produced **Overseas Road Note 10**, which outlines a suitable costing method for developing countries. This uses the *gross output* or *human capital* approach which, although not as complex as the *value of risk change* approach (currently used in the UK), still requires the collection of a considerable amount of data.

Overseas Road Note 10 sets out the arguments for costing road accidents, outlines the various methods that can be used, discusses the preferred method in detail and presents a case study of its use in practice. It also shows the results of including accident savings in highway cost-benefit analyses, which show that accident costs have a marked effect on both the ranking of projects and on the magnitude of net benefits.

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Crown Agents - St Nicholas House, St Nicholas Road, Sutton, Surrey, SM1 1EL, UK.

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ETSU - Harwell, Didcot, Oxfordshire OX11 0RA, UK.

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

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Prepared for the ODA TDR
Research by Overseas Centre,
Transport Research Laboratory.