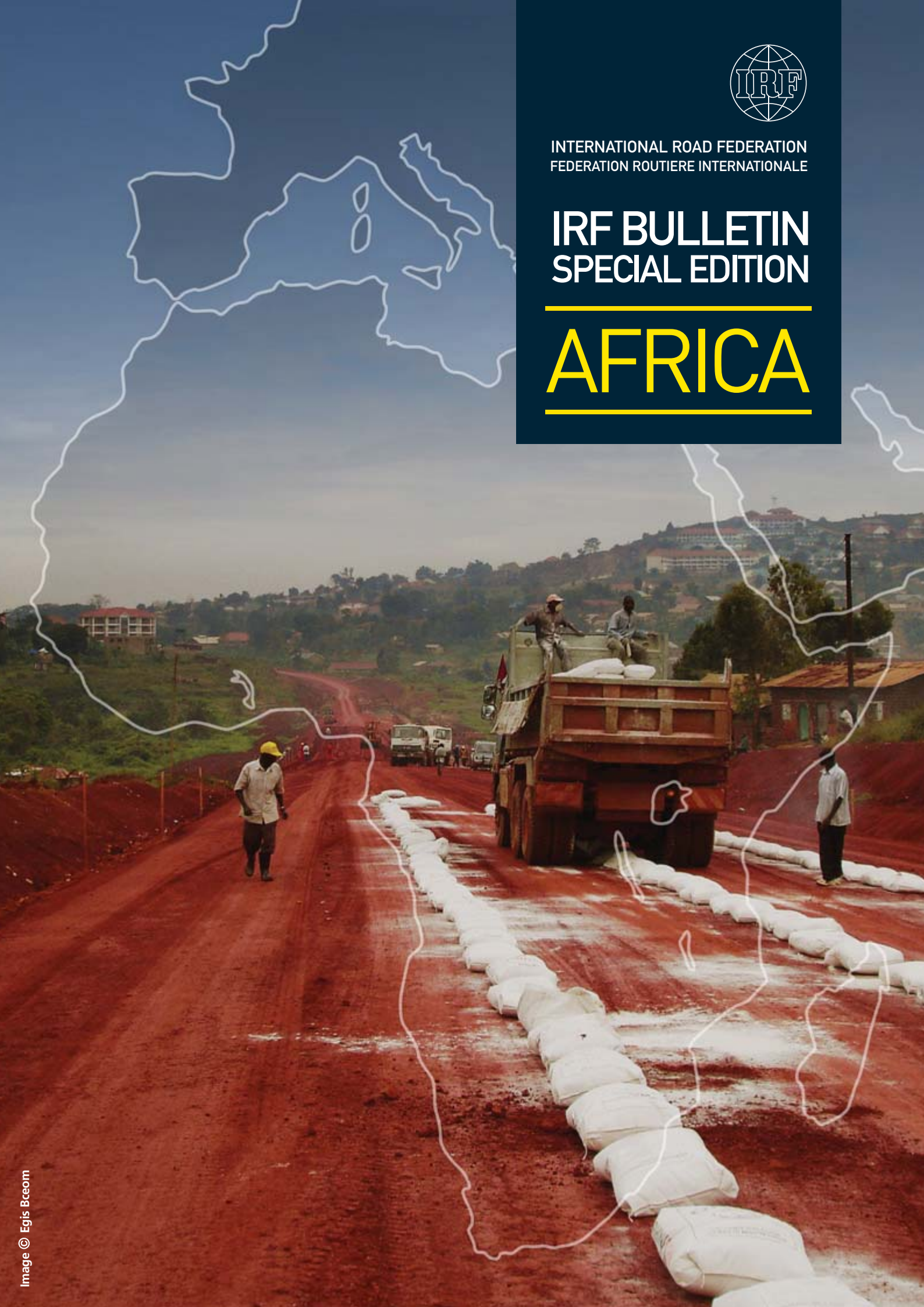
INTERNATIONAL ROAD FEDERATION
FEDERATION ROUTIERE INTERNATIONALE

IRF BULLETIN
SPECIAL EDITION

AFRICA



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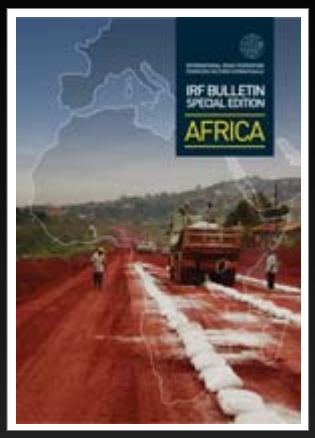

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Welcome to this IRF Bulletin focused on Africa.

The African continent is recently focusing on rehabilitation of Road Networks, as it is the most significant challenge confronting Africa. Road transport is the dominant mode in Africa, and it has been recognised internationally that roads deserve more attention.

Historically, the IRF has played a role in the development of the African road network by supporting the Trans African Network, by cooperating with relevant institutions in Africa for capacity building, in road statistics collection and organising events bringing together relevant road industry stakeholders.

I would say that it is good timing to have this IRF Bulletin dedicated to Africa. It displays a large diversity of problems and solutions in the road sector. It gives the reader a picture of the progress being made on the ambitious process of improving road infrastructure and making roads increasingly safe in Africa. It demonstrates the efforts made, and results reached, by individual IRF members. Because in the IRF we firmly believe that better roads make indeed a better world.

Samir Allam
Vice Chairman, IRF Geneva Programme Centre

CONTENTS

African Regional Highway Initiatives

Regional cooperation is a clear priority for the development of Africa's roads. And two examples from opposite ends of the continent suggest that, if large scale pan-African development schemes grabbed yesterday's headlines, the headlines of tomorrow are likely to stress partnerships between nations, for informed decision-making that will benefit all stakeholders.

Towards a Spatial Development Perspective for Southern Africa

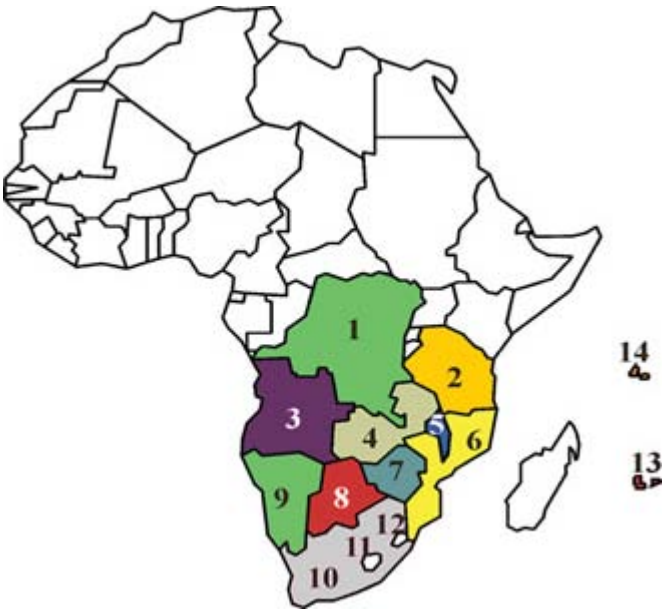
James Chakwizira
CSIR Built Environment, South Africa

To ensure equitable development in the Southern African Development Community (SADC) region, unravelling and understanding the role that physical space and spatial structures play in economic growth is of cardinal importance. In this regard, although ham-strung by the lack of readily packaged spatial economic growth and development data, a recent CSIR scoping study presents a first-cut spatial development perspective on southern Africa. The overwhelming evidence from the study points to the need for emphasising and coordinating spatial planning, including activities regarding human settlements and urbanisation for all 14 constituent member states of this regional economic bloc. Such planning activities would be located within and integrated with other SADC activities that seek to furnish prospective investors, policy makers and other stakeholders, with relevant spatial data for informed decision-making.

CSIR recommends that the Development Bank of Southern Africa (DBSA) urgently discusses the possibility of hosting the interim spatial planning office with the SADC secretariat and its development partners, with a view to eventually informing policy relating to the formal acceptance and establishment of a permanent platform.

The DBSA contracted the CSIR to undertake the research, which took the form of intensive desktop analyses, particularly with reference to Lesotho, South Africa, Zimbabwe as well as other SADC states where data were available, interviews with key role players and internal project workshops.

The study scanned levels of poverty and inequality, infrastructure provision, regional integration and development impact. Researchers investigated and subsequently enumerated key elements needed to ensure southern African responds creatively and sustainably to socio-economic development stimuli.



Southern African Development Community

Key

1. Democratic Republic of Congo
2. Tanzania
3. Angola
4. Zambia
5. Malawi
6. Mozambique
7. Zimbabwe
8. Botswana
9. Namibia
10. South Africa
11. Lesotho
12. Swaziland
13. Mauritius
14. Seychelles

The study also confirmed what is intuitively already in the public domain, namely that development benefits and impacts are not uniform throughout the SADC region. Accessible and high-economic opportunity areas such as cities, rich agricultural areas, mining corridors, fisheries and the wildlife industry are better developed compared

to remote, resource-poor rural and peri-urban areas. Thus, starting with existing corridors, member states could cascade socio-economic development endeavours to adjacent areas to ensure direct benefits and spin-offs are shared. In this regard, the need for substantial infrastructure investment, for example in transport (roads, rail and ports) and information and communications technologies cannot be over-emphasised.

Rural development policies in SADC differ in tenor and intensity from one country to the next. Given the realisation that outside of South Africa, more than 70% of SADC comprises predominantly rural dwellers, a major finding of the study is that a strategy for encouraging rural development in all the SADC member countries is a prerequisite for socio-economic advancement.

In addition, given the synergies that exist between urban and rural areas, the CSIR recommends that the DBSA supports infrastructure development in existing urban and rural nodes with development potential, as these promote efficiency, for example, in labour and resource utilisation, spatial distribution and differentiation in the SADC space economy.

CSIR hopes to undertake a much more detailed, on-the-ground study of the region, to generate spatial data profiles and packages with a view to better informing decision-making and development.

Trans-Africa & National Highways - The View from Libya

Professor Ayad Gallal and Eng. Abdo Allatif Attier
Saba Consulting Office, Libya

There are four routes from North Africa to sub-Saharan Africa. Three of them are: Egypt-Sudan, Algeria-Mali, Morocco-Mauritania, with a bridge to Spain as a future prospect. Libya connects no less than six countries and any road through Libya can connect to the middle of Africa.

Libya has served as a transit country, connecting North, South, East and West Africa, since the era of camel caravans. Its geographical location still gives it importance as a connecting country for North Africa, through the Trans-Maghreb highway project, and between the Mediterranean coasts and sub-Saharan Africa, through the Libyan-African highway.

Libya is firmly on the map of African progress. The African Union and North Africa headquarters of the Mediterranean Union are in Libya. It has a huge USD 2 billion programme allocated for highways and other roads. The problem is to spend it wisely; a lack of management and other personnel to administer the engineering and construction contracts is an important factor limiting the application of funds.

Libya is well known as a major oil exporting country. It is now trying to diversify its economy by building a large infrastructure to support tourist areas on the coast. According to the national economic strategy report, the current transport infrastructure of 24,984 kilometres cannot support greatly increased commercial and transit traffic, even if the more than 4,000 kilometres of river project roads, roads leading to the oilfields and other projects, are added in to the total.

The list of urgent road requirements is long. Libya needs to:

- Complete the maintenance of all existing highways and other roads.
- Convert most inter-city highways to double (divided) highways.
- Build a new coastal trans-Maghreb international highway - for which the design is underway.
- Build a new trans-Sahara international highway (the Ghddafi road) which will connect the Mediterranean ports with sub-Saharan Africa, via Niger. Upgraded ports are under construction.
- Build an eastern highway to Sudan.
- Increase the capacity of existing highways and other roads.
- Develop an asset management programme for the road department, to complement those of other transportation sectors.
- Develop local standards, quality control and inspection procedures.
- Protect the environment.
- Develop advanced design and construction technology.
- Develop the less traditional methods of financing and contracting procedures - such as Build Operate Transfer and Public Private Partnerships.
- Develop and attract qualified consultants and contractors.
- Develop a contract management procedure.

Building the Road

Effective roads for Africa must incorporate social awareness, in its widest sense, at the time they are conceived. Then, good design is required. Good design, in turn, comes from fundamental R&D, and takes into account local needs, geology, climate, materials and skills.

New Road Construction Specifications for Ghana

Dr. Phil Paige-Green
CSIR Built Environment, South Africa

The Ministry of Transportation in Ghana appointed the CSIR and Stewart Scott International in 2005 to review its *Standard Specifications for Road and Bridge Works* used on all construction projects in the country. The project formed part of the World Bank component of Ghana's Road Sector Development Programme.

During the following two years, a team of eight specialists in different fields undertook the task of revising and updating the specifications. The country's revised *Standard Specifications for Road and Bridge Works* was launched in Accra, in April 2007.

A much earlier specification document, dated 1991, had various inadequacies and included a number of outdated and obsolete procedures. As this document specifies the standards to which all road construction projects must adhere and to which contractors must conform, it is a highly significant and legally-binding document.

Developments in Ghana since 1991 and more recent experiences indicated that the document did not reflect current best practice in many cases. It was also important to make the document applicable to the different agencies operating within the Ministry. Areas covered in the updated document include traditional pavement, material and bridge engineering, concrete, road furniture, lighting and traffic signalisation, with a strong emphasis on environmental impact and awareness.

Developing Roads Whilst Preserving the Environment in Africa

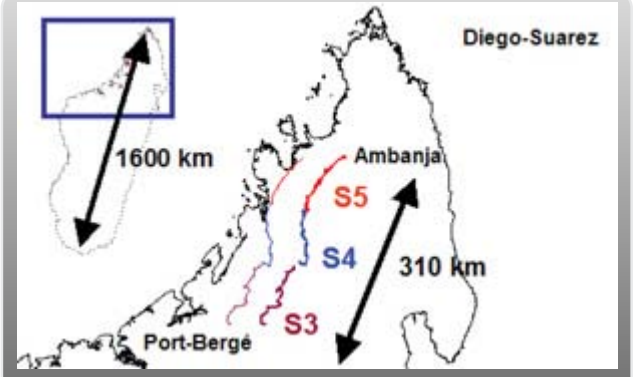
Xavier Guyot (Technical Road Manager, Colas Indian Ocean) and **Renaud Escande** (Health Safety and Environment Manager, Colas Madagascar)

The Sofia region of Madagascar is being opened up through the development of National Route 6. Local production of cotton, peanuts and cacao is gearing up to levels consistent with Madagascar's general economic development. But the rehabilitation of the roads is being done in such a way as to minimise all the negative impacts.

The project involves a 310-km section on National Route 6 (RN 6) between the towns of Port-Bergé and Ambanja in the north-east of Madagascar, the only link between the capital city Antananarivo and the main city in the north, Diego-Suarez. RN 6 is made up of 158 km of roadway that is currently paved or had once been paved, showing different degrees of damage, along with 152 km of dirt road that become impassable to traffic during the rainy season (5 months per year).

Estimated to last 44 months, the 100 million-euro project is financed by the European Development Fund and consists of earthworks, road building and some one thousand hydraulic structures in concrete. The project, exceptional for Madagascar, required the roll out of major resources, in terms of both people and equipment, along with a rigorous organization to prevent and limit the environmental and social impact.

According to the environmental impact assessment, the Port-Bergé - Antsohihy section of 109 km is home to 27 endangered species. The region between Antsohihy and Maromandia boasts three environmentally-sensitive



Key Figures

- Earthworks: 1,850,000 m3
- Crushing: 1,610,000 T
- Emulsions: 9000 T
- Asphalt mix: 60,000 T
- Concrete: 19,000 m3
- Structure: 1,050 units
- Grass planting 2 mill.sq. m.
- Tree planting: 25,000 units

zones: the Bora forest reserve, the Loza mangroves and the dense dry forest of Andolokova. An HSE cell was created to monitor these actions. With one expatriate French engineer, 3 Malagasy engineers, 3 doctors, 3 nurses and 3 technicians, it was designed to prepare for, and enforce, the series of protective measures regarding environment, hygiene, health and safety.

Environmental challenges are numerous. They include deforestation prevention, resource preservation and waste management. The high degree of biodiversity and many endemic types of flora and fauna make Madagascar one of the world's leading attractions for preserving natural resources. But its environmental equilibrium is very fragile.

Deforestation is a major challenge. The rapid destruction of forest zones has led to catastrophic erosion, and the disappearance of exceptional fauna and flora that are unique in the world. To help fight this, several actions have been taken as part of the project:

- Programme to favour the use of individual portable gas stoves as an energy substitute;
- Planting of nearly 16,000 trees of different types;
- Fire-fighting equipment available in machines, base camps, offices and industrial sites.

Wastes are treated in appropriate ways:

- Non-hazardous waste - banal industrial and household waste - is collected in dedicated trash cans and receptacles.
- For hazardous waste - special industrial waste - an agreement was signed with Total to recycle oil and lubricants that are recuperated after machine maintenance.
- Liquid effluents: the sanitary blocks, latrines and sinks on fixed installations are hooked up to septic tanks. Waste water from the tank flows off to a cesspool where it is filtered by materials before infiltration.

All liquid polluting agents are stored in retention tanks built in compliance with European standards to prevent any accidental pollution and washing zones are equipped with hydrocarbon separators.

The use of cuts, pits and quarries can have many negative impacts. Solutions include: orienting working faces, to remain invisible from the road; replacing stored topsoil; site selection to minimise slopes; reducing dust by locating quarries far from villages and on-site wearing of masks.

Protecting people - both locals and incomers - called for particular care. Half the project personnel was recruited locally and half from outside the region. To house all the away-from-home personnel near the project, three worker villages were built next to the company's main base camps. These villages have sufficient latrines, septic tanks and drinking water tanks to guarantee employees a level of hygiene that is compliant with legislation. In addition, three medical centres - each run by their own doctor and nurse - were built near the worker base camps: the medical service and chief medical officer of the company presented a number of awareness-raising sessions on the prevention of serious diseases such as sexually-transmitted infections, malaria and diarrhoea.

The high level of incomers could have proved to be an aggravating factor in the spread of HIV. So medical centres have free condom distributors; anonymous testing is available. To limit malaria, the company takes great care to avoid creating stagnant water sources near base camps or local villages; mosquito nets were provided for personnel in the villages; workers' drinking water is treated in water purifiers.

Towards Improved Road Design

Dr. James Maina
CSIR Built Environment, South Africa

A sound road network is an essential part of a country's socio-economic fabric. Once constructed or structurally rehabilitated, however, any road will gradually deteriorate through the effects of traffic loading and environmental forces (e.g. rainfall, ultraviolet radiation, temperature). Maintaining a high standard road network in the face of increasing traffic demands will need an improved system for modelling and designing of road pavements.

Pavement engineers at the CSIR have developed a software tool, soon to be released to industry, that simulates actual road pavement behaviour. The CSIR has played a key role in the South African pavement design method (SAPDM) for road pavements. It is the backbone of design methods used in South Africa and can compete with the best in the world. New traffic realities have, however, rendered important parts of the method obsolete and in dire need of serious revision.

A process was initiated at the South African Road Pavement Forum meeting in 2005, after which a framework identifying research and development (R&D) topics and needs for reviewing the SAPDM was tabled. Based on this framework, more than 20 project proposals were submitted to the South African National Roads Agency Ltd (SANRAL). The proposed projects are aimed at improving the South African method for road pavement design and it is anticipated that the project outputs will be adopted nationwide as primary tools for road pavement design.

R&D areas identified in the framework include performance-based information systems, demand analysis, material-resilient response models, pavement-resilient response models, damage models calibrated for the effects of field variables and stress regimes, and probabilistic and recursive implementation schemes. SANRAL has already identified project teams, led by team leaders who are all regarded as specialists in their respective fields.

New pavement design method: the key to proper design of road pavements and subsequent maintenance is the ability to understand the macroscopic behaviour of materials when subjected to traffic loading under varying environmental conditions. The core part of the new SAPDM will involve numerical modelling and simulation of road pavement resilient responses.

Development of analytical methods for resilient response of pavements can be traced back to the early 1940s. But a great problem has been the gap between model assumptions and reality. Since the early 1990s the CSIR has invested in advanced measuring systems to capture rolling tyre/road interface data to gain improved understanding of this complex mechanism. This technology, referred to as stress-in-motion (SIM), supplies information on the main characteristics of tyre/road interaction, and roads practitioners are now in a position to use this information better in the design, rehabilitation and maintenance of roads.

For this to be realised, new modelling and simulation techniques based on FEM are urgently needed to improve and enhance the structural road pavement design, based on the non-uniform 3D tyre road stress inputs from the SIM technology. Researchers at the CSIR are developing a finite element method for pavement analysis (FEMPA) to improve accuracy of pavement structural analysis by taking into consideration:

- Characteristics of real-life pavement loadings,
- Geometry of pavement systems,
- Mechanical properties and behaviour of pavement materials, and
- Responses of pavement systems to vehicular loading.

To ensure that results obtained from FEMPA are reliable, output was compared against results from a range of available software packages worldwide. Preliminary results from FEMPA have shown a high degree of accuracy and efficiency for analysis of static loading cases. It is expected that successful development of this software will provide pavement engineers with a tool that closely simulates actual pavement behaviour.

Through this tool, proper road pavement design using a range of available materials (conventional and non-conventional), performance evaluation as well as timely identification of potential failures in the pavement systems may be performed. FEMPA is capable of analysing 2D (plane strain, plane stress, axi-symmetric) as well as 3D element shapes and will soon be released to the industry for adoption and use.

Sustainable Roads

Better roads provide the only scope for better access - to markets, education, health care and social development - for the vast majority of Africans. But the lamentable state of many African roads points up the need for sustainability. Solutions do not, necessarily, have to be hi-tech. But they must be for local communities, involve those communities and serve them.

The African Community Access Programme (AFCAP) - A Response to The Access Constraints in Meeting The UN Millennium Development Goals

Jeff Turner, Programme Manager, AFCAP
Department for International Development (DfID), United Kingdom

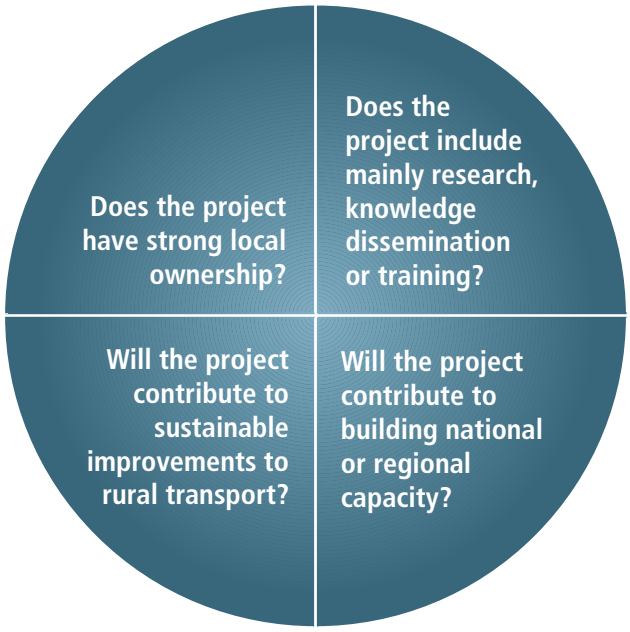
Reliable access is essential for rural communities, particularly in Africa, for basic services and economic and social opportunities of every kind. Unreliable and difficult access reduces growth opportunities and negates the benefits from investments in other sectors designed to improve the livelihoods of poor communities. In order to meet the United Nations Millennium Development Goals on such things as maternal and child health, education, growth and poverty reduction, improved rural access is crucial. But governments across Africa face a range of challenges in maintaining and improving rural and community access; sustainable solutions are needed, as is more effective dissemination of existing knowledge, proven solutions and good practice, and better professional capacity to deliver improved service levels.

To help meet these challenges, the UK Department for International Development (DfID) has established a new research initiative called the African Community Access Programme (AFCAP). AFCAP supports African governments and other stakeholders tasked with providing access for poor rural communities. It is based around a portfolio of research, demonstration and training projects designed to promote and facilitate the delivery of safe and sustainable access. The outputs from these projects will feed directly into regional and national rural transport policies and practice and wider strategies for poverty reduction. The mainstreaming of knowledge in practice is thus a key focus of the programme.

AFCAP started in June 2008. It is intended that the programme of research and other related activities will continue for five years and will have GBP 7.5 million in funds. These funds are being used to support both programme administrative costs and AFCAP projects. Contributions to the programme are anticipated from other development partners as the programme develops, and in-kind contributions from the participating countries. AFCAP activities are overseen by a steering group of eminent rural transport practitioners, most of them based in Africa. DFID has appointed Crown Agents to provide management services for the programme. Crown Agents also managed the related DfID research initiative in South East Asia, the South-East Asian Community Access Programme (SECAP - www.seacap-info.org).

Local steering groups are being established in each of the countries and a local coordinator nominated. The steering groups will oversee all AFCAP activities in their countries and participate in regional knowledge-sharing. The steering groups will engage with community leaders, government officials, private sector and other stakeholders, to identify projects that could be supported by AFCAP. The steering groups will also approve terms of reference for AFCAP service providers, including consultants, researchers and trainers. The steering groups will approve the selection of these service providers and will monitor their work. Strong buy-in from local stakeholders is essential to ensure that the outputs from AFCAP activities are mainstreamed and result in sustainable improvements to national policies and practice.

AFCAP is still developing its project selection criteria but as part of that we have developed our own "Four Way Test" to appraise projects for inclusion in the programme (see diagram). Projects accepted for inclusion in the programme must meet all four criteria.



AFCAP Four-Way Test

The main beneficiaries of AFCAP will be rural communities in Africa. Social and economic benefits will result from easier access to markets and employment opportunities, and to health and education facilities. It is recognised that there are numerous components that make up sustainable rural access and AFCAP will seek to support a multi-disciplinary, integrated range of perspectives. These could include:

- Technical engineering solutions and development of appropriate standards,
- Economic appraisal approaches,
- Social Impact and integration with social development and community participation,
- Rural Road Safety,
- Intermediate Means of Transport (IMT),
- Development of Rural Transport Services.

Economic and social benefits are expected through improved road safety and gender-sensitive transport initiatives. The programme will support advice activities related to labour intensive road construction and maintenance technologies that generate employment in rural areas.

For more information about AFCAP contact Jeff Turner, Programme Manager: ***jeffreymturner@hotmail.com*** *or Rob Geddes, Technical Manager:* ***rgeddes@africaonline.co.zw***

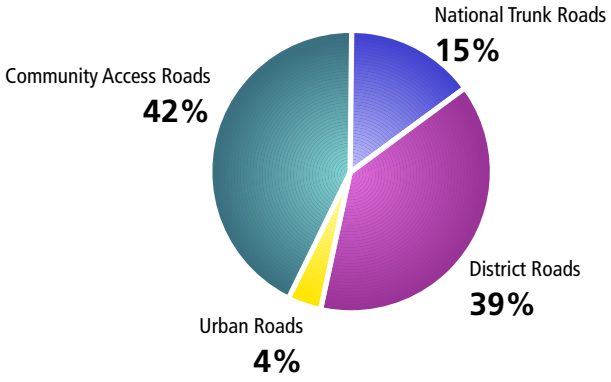
Sound Environment Management in Labour Intensive Road Works in Uganda

Monicah Elizabeth Seruma
Ministry of Works and Transport, Uganda

In a country where natural resources form the economic base and the majority of people derive their livelihood from the countryside, sound environmental management in road rehabilitation and construction projects is of vital importance. This is the case in Uganda, where the Ministry of Works and Transport, with the aid of the Danish International Development Agency (Danida), prioritised the incorporation of environmental measures in all its programmes, plans and activities. This includes labour intensive road works, promoted in the transport sector since 1999 under the Road Sector Programme Support I and II.

Labour intensive technology had been strengthened in fifteen districts in the eastern and northern parts of Uganda by June 2007, though the practice is to be promoted in other parts. The district roads fall within the jurisdiction of district councils, but the ministry has played a vital role in the promotion of labour intensive technology and sound environmental management through setting standards and implementation guidelines. Several policy reforms have in addition contributed towards the achievement of sound environment management in the transport sector in Uganda. One such policy is that for Sustainable Maintenance of District, Urban and Community Access Roads (DUCAR) of 2003.

Composition of Ugandan Road Network (Total length: 70,800km)



The Strategy provided tangible aims to be achieved within a period of five years. The goals included, among others, to have 60% of all planned works concerning rehabilitation, spot improvement and periodic maintenance of district roads using labour-based methods. Furthermore, the Strategy committed the government to prioritise environment and other cross cutting issues in the sector. For this purpose, several policy statements and guidelines were drawn up:

- Environmental Impact Assessment Guidelines, requiring that for every road project environmental impacts are fully identified, mitigation measures are designed and an Environment Management Plan is developed.

- Policy statements for addressing other social concerns in the road sector, including gender issues, HIV/AIDS, occupational health and safety and issues of People With Disabilities (PWDs) and the elderly, were also developed.

Complementary action was taken in several areas. Institutional reforms included setting up an Environment Liaison Unit within the ministry, responsible for prioritising environmental and other issues in the road sector. Capacity building initiatives were undertaken to enhance the use of labour intensive technology in road works.

Monitoring and reporting formats were adapted to better determine the effects of labour based technology - especially its contribution to the incomes of the host communities.

A Geographical Information system (GIS) is used to determine the impacts created by road projects on the environment over a given period of time on specified parameters, such as water quality. Furthermore, a communication strategy has been implemented to improve awareness on labour availability in the road sector, aiming at informing legislators, technocrats, road users, host communities, special interest groups and contractors. And the entire procurement process is designed to be environmentally and gender sensitive.

The numerous benefits of the labour-based approach can clearly be seen. It has increased community participation and ownership of road rehabilitation and maintenance programmes. Both men and women have equal employment opportunities in the road sub-sector. Labour is less destructive to the environment and conserves the natural heritage. Promotion of labour intensive technology results into integrated and better coordinated planning at the local government level and the approach keeps contractors on their toes to comply with legal and policy provisions.

Challenges remain - the biggest one is to maintain human and financial capacity at the ministry to properly monitor the activities of local governments. The type of training that most engineers received did not include environmental and other social issues. These two factors could limit policy implementation. Other more basic challenges lie within the host communities. Sometimes people's involvement in road works leads to focus on daily income instead of longer term income. Farmlands are sometimes neglected - leading families to spend their money earned in the road project on food supplies. And it can be a challenge to adapt to the usual way of life once the project has ended.

Abstract from a paper presented at the 12th Regional Seminar for Labour Intensive Construction in Durban, South Africa, October 2007.

Seeking Sustainable Road Transport in Africa

Robert Petts
Rural Transport Theme Champion
Global Transport Knowledge Partnership (gTKP), United Kingdom

Better roads for Africa are essential. The World Bank's recently published Transport Sector Business Strategy (www.worldbank.org) includes the sobering information that more than 85% of Sub-Saharan roads are still unpaved. Despite considerable past investments, problems of excessive or unmanageable road maintenance burdens and rough or periodically impassable roads remain. This means that many rural Africans suffer from poor access to markets, health and schooling, high transport costs, and the failure to provide timely inputs for crops and extraction of any harvest surpluses. There is a pressing need to tackle the enormous challenges in providing an effective and efficient road transport system in Africa; this is made more urgent by the current concerns over food prices and shortages, high energy costs and substantial unmet social and health needs.

It is timely to take a fresh look at the road transport sector and seek new ways to improve the road infrastructure and transport services in Africa. Fortunately, initiatives such as the Global Transport Knowledge Partnership (www.gtkp.com) are making recent successful developments and new approaches accessible on the internet. This allows practitioners and decision makers to be informed of and consider new ways of solving the road sector challenges. It also acts as a forum for exchange of knowledge and discussion of road transport issues.

Low cost, intermediate vehicles; gTKP has recently web-posted reports on the contribution of such vehicles to the availability of low cost rural transport in China and Vietnam. These vehicles, capable of local assembly and sale at prices from about US$1,000 equivalent, and low cost motorcycles and bicycles have the potential to bring more affordable transport to rural areas.

Road surfaces are coming under scrutiny. In the quest for sustainable road provision and manageable maintenance, an improved balance between initial road investment and realistic assessment of maintenance capacity should lead to a better deployment of available resources. It is likely that widespread use of problematic and high-maintenance gravel surfaces will be replaced by restricted use of gravel as a surface, and more intelligent use of engineered natural surfaces (ENS) on routes where the soil conditions, climate and traffic allow. This should be coupled with judicious use of spot improvements or extensive upgrading using more durable surface options for problem sectors with characteristics such as; weak in situ soils, steep gradients, high rainfall and high traffic, or through settlements where dust generation is a nuisance.

A wide range of proven surface options include hand-packed stone, cobble stones, burnt clay brick paving. Cement-based and bitumen seals offer relatively low-cost, whole-life solutions using local resources. These can be adopted by small local contracting enterprises using labour-intensive and low-capital, simple equipment methods. The wider use of masonry and burnt clay bricks in drainage structures would allow these proven but widely neglected building sector techniques and skills to be utilised for low cost, durable structures to the benefit of the road sector and local employment.

Maintenance capacity and arrangements should be an integral part of the road design process. Stakeholders such as road users and, for tertiary roads the communities themselves, should be involved in developing more cooperative and sustainable arrangements. In many areas the synergies of the agricultural and road sectors mean that there is potential to develop small tractor-owning enterprises to provide a range of services to the road and agricultural sector including routine maintenance grading, at a fraction of the cost of motor grading.

Governments alone cannot solve the problems of providing universal rural access. Engagement of communities themselves and other stakeholders can allow affordable and sustainable basic access to be achieved. Basic access can be provided at a fraction of the cost of conventional road infrastructure. That is, if the essential technical and materials support can be provided by benefactors to complement the community of group efforts, where the route is primarily used by those stakeholders. Initiatives such as the brochure ***My Farm Road*** by the Kenya Roads Board and the ***Organic Farmer*** are making basic knowledge for self-help initiatives more widely available. Better application of the considerable available existing transport knowledge will help to improve rural access and reduce poverty.

gTKP distributes a monthly Newsletter which is obtainable through ***info@gtkp.com****. Talk to Robert Petts on* ***rob@intech-consult.demon.co.uk***

Road Safety

Road safety in Africa presents a major challenge. Meeting the challenge requires a change in the awareness of all road users. In the meantime, reducing the toll of accidents involves both prevention and cure. Answers to the problem involve better ability to render first-aid, better visibility, better training. And local communities must take ownership of all initiatives.

Carry!FAb: Africa's New Hope of Minimising Road Deaths and Injuries

PATVORA
Nigeria

Road traffic injuries worldwide are the leading cause of death among 10-24 year olds. In Africa, this road traffic mortality rate is higher than in much of the world by a quantum factor. Credible African research on its various communities has shown that 50% of deaths at the scene of road accidents are not caused by major trauma, but by minor injuries such as airways blockage, other breathing difficulties or circulation problems. These are readily addressed through first aid (FA) - through carrying FA boxes in vehicles, knowing how to use them and knowing a few other simple FA techniques. As the National Road Safety Strategy 2006-2010 by the Ghana National Road Safety Commission observed, "It is sad that many accident victims survive the accident in the first instance but pass away due to late emergence response and wrongful handling at the spot or on the way to hospital. Basic First Aid skills and fast emergency can save lives".

From such and similar insights, the **Carry First Aid Box Campaign - Carry!FAb** - has offered in recent years a new paradigm for dealing with road safety in African countries. It is a fresh approach to enhance community involvement in rescue operations for crash victims on African roads. The Carry!FAb initiative supports the endorsement of African road safety experts that FA training should be a fundamental priority for road users, and an FA box should be standard equipment in all vehicles.

Carry!FAb intends to build local capacities to respond rapidly to road crashes in African countries every year, thereby reducing the number of road fatalities and injuries. Its approach is to build partnerships with stakeholder organisations for the implementation of commercial and charity First Aid training. The overall aim of the campaign is to train 80 million road users throughout the African continent on First Aid over the next five years. To reach this aim, the Carry!FAb campaign works through several channels. It recruits volunteers to act as trainers, develops and disseminates instruction videos and DVDs as well as on-line instruction materials, issues thought-provoking advertising campaigns and advocates the interest with stakeholders. In Nigeria, where the initiative has been launched, the approach already led to accomplishing 60% of its target to independently engage 50,000 Nigerians in the campaign.

Primarily, the significant benefits of pursuing FA national programmes consist of their effectiveness in promoting road safety measures - especially, consistent high quality care for accident victims. Apart from reducing deaths and injuries and releasing pressure on medical facilities, campaigns produce savings that can be spent on other aspects of health care, or invested to deliver better public services by the government.

FA national programmes strengthen the capacity of national road safety agencies, communities and individuals to respond to, and reduce, the impact of accident emergencies. They contribute to a sense of solidarity among fellow citizens, through enhanced team spirit. This applies both to vehicle owners and society at large. And, once FA boxes are in place, the benefits come at no cost. The support of national governments for such campaigns enlarges the sense of solidarity. Citizens become convinced that the authorities do actually care about them. There is a mutually beneficial change of mindsets.

There are other benefits. FA national programmes develop greater first aid knowledge amongst the general population which are applicable in any context, not just

on the roads. FA national programmes provide a necessary catalyst and channel for corporate organisations in Africa to meet their social responsibilities in road safety. Entities such as oil companies, banks, soft drink manufacturers, breweries, car component manufacturers, marketing companies, government institutions and individuals, already contributing financially to the global fight against killer diseases like AIDS and malaria, are encouraged to give similar attention to the fight for better road safety.

FA national programmes help develop effective training, education and information dissemination on other road safety interventions. They complement the financial responsibilities of national road safety agencies, through the gains accrued from the issue of first aid proficiency certificates. Finally, FA national programmes help in coordinated accident data collection, analysis and processing; they enhance the monitoring and evaluation of all road accidents; and, they help national road safety agencies with their research on rescue-related programmes.

One organisation with remarkable involvement in FA specifically for road crash victims is Prompt Assistance To Victims Of Road Accidents - **PATVORA**. It was set up in 2001 in Nigeria with a focus on the huge neglected accident victims' group. PATVORA is the initiator of the continental First Aid campaign to create awareness and has assisted many national road safety agencies to solve road safety issues. It continues to advance FA related issues for road users in Africa and has a dedicated page on first aid training on **www.patvora.org**. Furthermore, the website is linked to the websites of important road safety organisations like the UN ECE Transport Division, Global Road Safety Partnership (GRSP), International Road Federation (IRF), World Bank Transport Division, Global Transport Knowledge Partnership (GTKP), and Drive and Stay Alive.

"See & Be Seen": A Visible Way to Improved Road Safety

Rik Nuyttens
Traffic Safety Systems, 3M Europe, Belgium

Recent Road Safety Conferences organized by the United Nations Economic Council for Africa and the World Health Organisation confirmed that the road accident death toll has exceeded a critical level and is still rising. It is currently 2.5 times higher than in Western Europe but still expected to increase by 80% by 2020. If no serious actions are taken by the various governments, road accidents will move from being the 7th to the 4th leading cause of death.

The Ghana Road Safety Conference (February 2007) concluded that improved visibility is one of the quick wins to reduce accidents; some countries experience up to 60% of their road casualties during the night. Rural infrastructure improvements are particularly vital for both vulnerable users and vehicle drivers. Adherence to international conventions and standards is critical.

Improved night time visibility is a low cost safety measure with a proven record. For many years, 3M has contributed to a range of solutions based on retro-reflective technology:

- School wear for children and professional work wear;
- Attached or incorporated components for bicycles and motorcycles;
- Retro-reflective license plates;
- Conspicuity markings for vehicles;
- Delineation of road infrastructure;
- Road markings with optics performing during rainy weather;
- Road signs with improved brightness, for all vehicles and age groups.

Safe Road Infrastructure investments have proven to provide an immediate return on that investment. And traditional road infrastructure will continue to play a dominant role. Mr. Niemann, US Federal Highway administrator, said during a recent congressional hearing: "If we cannot always physically protect the motorist from hazards, we must give him enough information to protect himself."

Effective signs and road markings continue to play both a remedial and preventive role. 3M has continued to perform research in this domain. Due to the severity of night time accidents, road infrastructure - especially signs and markings, should be visible 24 hours a day and during all weather conditions. Dr. Rune Elvik, a road safety specialist of the Norwegian Institute of Transport Economics, affirms that an effective road sign should not only be "visible" but also attract the attention of the driver by being conspicuous. Fluorescent colours add this necessary conspicuity to a sign. It is then necessary that the message should be simple and understandable by all drivers, including foreigners.

Many factors will determine the sign brightness. But the critical factor is whether the light from vehicle headlights effectively returns to the eyes of the driver(1). This implies

1) For an expanded treatment of this subject, please refer to Rik Nuyttens' interview with the IRF, published in the May 2008 issue of "World Highways" on www.irfnet.org and correspond with the author at ***rrnuyttens@mmm.com***

Traffic Sign: Cone of reflectivity: efficient return and distribution of light emitted by vehicles.

that we do not want perfect retro-reflection. Light must be reflected back to a driver's eyes at a different angle to the angle at which the light entered the sign (see diagram) and the cone of reflected light must be visible for the maximum possible time. For this, choice of sign materials is critical. Third generation prismatic sheeting returns up to 58% of the light received - a quantum improvement.

Truck Conspicuity has particular importance. Nearly 5% of severe truck accidents can be traced back to poor conspicuity of the truck or its trailer at night. Car drivers often fail to recognise trucks driving ahead of them. In most cases trucks are in slow motion and/or entering or leaving the road. Trucks can be rendered much more conspicuous by marking their sides and rear using retro-reflective marking tape. UN Economic Commission for Europe (UNECE) Regulation 104 sets out an international specification for retro reflective marking tape. Another UNECE regulation (R48) sets out the requirements for the installation of lighting and light signalling devices on vehicles. This regulation currently mandates the installation of conspicuity markings for new type approvals and will later expand to all new registrations.

1) Vehicle Conspicuity Markings in S. Africa: do you see the second truck? 2) Recommended signage (night vision) 3) Special fluorescent colours and driver feedback signs

Many countries, such as South Africa, Italy, Romania and the US, already mandate these markings for *all* trucks and accidents have reduced more than 20% since implementation of these regulations on large trucks in the 80's. South Africa has special programmes for mining sites - involving both high-performance road signs and greater conspicuity of large vehicles.

Rail Road Crossings are accident black spots in several countries. Collisions at such crossings are invariably fatal to the road user and may result in hazardous materials spills if there is a derailment - endangering whole communities. One answer is special, often fluorescent, signs to announce these intersections. Some countries such as South Africa have implemented special regulations to make trains and wagons more visible.

Johannesburg Set to Improve Road Safety

Dr. Hubrecht Ribbens & Kobus Labuschagne
CSIR Built Environment, South Africa

The City of Johannesburg and the CSIR have signed an agreement for the development of a ward-based community road safety initiative. The purpose of the project is to develop a programme to facilitate ward road safety performance benchmarking, monitoring and intervention with the aim of ultimately reducing the high number of road crashes and road casualties in the city.

At least two people die and 45 are injured in the more than 300 road crashes that occur in Johannesburg on a daily basis. The cost of these accidents exceed R 8.5 billion per year (2005 figures). One of the CSIR's key research projects, NyendaWeb, will form the backbone of the project, the purpose of which is to empower ward councillors, together with their communities, with the appropriate use of information and communications technology, to take charge of the road safety situation in each ward. Ward councillors will then submit their proposals and recommendations for road safety interventions, based on community consultation processes, to the Johannesburg Roads Agency.

The CSIR has developed a community consultation tool kit for the training of ward councillors. The tool kit covers the community consultation process, road safety issues and practical solutions. A councillor training session was held in the Johannesburg Civic Centre early in 2008.

Traffic Management, ITS & Operations

As African development proceeds, modern road traffic management techniques feature more prominently. But the traffic mix remains a fundamental concern.

Limpopo Traffic Control Centre Project is A Model for Africa

Vuyiso Msipa
SSI Engineers and Environmental Consultants, South Africa

The construction of a multi-million contract awarded by the South African National Roads Agency Limited (SANRAL) for design and supervision of three hi-tech traffic control centres in Limpopo Province has been completed. The scope of the R170-million project included two traffic control centres, weighbridges and holding areas serving both directions of the Limpopo N1 and R101 and a satellite traffic control centre without a holding bay on the intersection of the N11 and R101.

The facilities use weigh-in-motion technology beneath the surface of the road to alert road officials to possible payload infringements. By weighing the force of each axle, officials can determine whether the vehicle is within statutory limits, which impose a total vehicle weight, a maximum weight within an axle span limit and an individual axle limit. The former two limits ensure the safety of bridges, while the latter protects the road surface.

As a vehicle approaches the N1 and R101 traffic control centres, its registration plate is scanned and a digital image of the vehicle is captured. After driving over the weigh-in-motion sensors in a screener lane, its weight is captured and added to the record. If payload violation is indicated, the automated system manipulates traffic lights and booms, directing the truck to the static scale area, where it is weighed again and its registration and image are again captured and married to the existing record. If there is indeed a weight infringement, the system routes the vehicle to a holding area where its load can be repacked for better load distribution over all the axles and the vehicle released back onto the highway, or until the transport operator sends another vehicle to carry the excess goods and its payload returns to legal limits.

If the payload is in violation of the legal limit, the vehicle will also be obliged to undergo a roadworthy test to determine whether it is roadworthy in its overloaded state. Depending on the severity of the findings, the vehicle may not be allowed back onto the road until it is repaired on site or towed to a repair facility. Both the overloading and roadworthy transgressions are logged onto the system and must be corrected by the truck operator before the vehicle can be released.

The satellite traffic control centre on the N11 employs weigh-in-motion sensors to identify potentially overloaded vehicles. These vehicles are fitted with electronic tracking tags and directed to the N1 facility for static weighing.

The electronics systems used are among a new generation, for traffic control centres. All components of the system - surveillance, tracking, weigh-in-motion, access control, roadworthy testing, static scales and vehicle identification and vehicle control (booms and traffic lights) - are fully integrated and automated, keeping operator involvement to a minimum and eliminating the possibility of any interference with the data.

All incoming data is captured on a central processing system that collates information from the various sub-systems. This creates a comprehensive database of vehicle loading (and overloading) information for the authority and even allows remote access to the information. The ability to access and analyse information and statistics from such facilities, spread across a broad geographical spectrum, allows the authority to observe and control

overloading on its road network, while helping to develop a regional control strategy.

These characteristics allow SANRAL to manage its infrastructure more efficiently. The vehicle testing facility also improves the sustainability of the system by tackling the issue of road safety through the testing and enforcement of vehicle roadworthiness.

Saving Energy with Modern Traffic Signals

SWARCO

Austria

What do African cities like Accra, Rabat, Cape Town, Bloemfontein and Johannesburg have in common with European cities like Brussels, Stockholm, Vienna, Belgrade and Dublin? They all count on SWARCO's latest energy-saving LED technology for their traffic signals.

South Africa has become a focal point of interest, for reasons beyond the FIFA World Cup in 2010. Infrastructures need upgrading to cope with the increasing volumes of road traffic and energy demands. The country faces repeated temporary power outages as the existing electricity network is not always able to respond to increasing power demands. Therefore the country welcomes initiatives that help reduce energy consumption. The national energy utility Eskom even co-finances conversions to new technologies and sustainable energy concepts. In this, modern LED traffic lights can play a significant role.

Since 2006, SWARCO FUTURIT, the world's leading producer of LED-based traffic signals, has been taking a closer look at the South African market. After studying the market and the technical specifications for LED-based traffic lights, SWARCO FUTURIT developed its own product range that meets all aspects of the customer's needs. The products obtained SABS 1459 approval at the first attempt. In parallel SWARCO FUTURIT found a first-class partner in Cape Town's Syntell (Pty) Ltd., one of the major suppliers of traffic management solutions in southern Africa.

Customers turned out to be very excited about SWARCO FUTURIT's cutting-edge central light source technology, which provides a very uniform signal appearance and avoids any dark spots on the surface of the signal aspect. Another advantage is the low power consumption of the LED signals, which help relieve the burden on local energy networks. Latest LED traffic signals operate with only a 10th of the power consumption of conventional incandescent light sources, thus saving CO2 emissions from power generation and reducing municipal energy expenses.

Recent studies in Europe underscore the reliability of LED signals. Dublin decided to convert its signal heads from halogen lamps to light emitting diodes. Some 4,000 LED traffic lights, representing a total of approx. 12,000 LED optics, have been in place since November 2005. Since then only 11 LED optics failed (0.09%). Equally impressive were the consequences for Dublin's environmental balance sheet. Power consumption and CO2 emissions related to traffic signal operation were cut by 80%. Thus, Dublin's annual carbon dioxide footprint has been reduced by 586 tons. This CO2 reduction is equivalent to the emissions of a modern passenger car travelling 3.66 million kilometres; that is, 91 journeys around the globe at an assumed 160g of CO2 per km.

SWARCO FUTURIT LED traffic signal heads at Cape Town's Waterfront

South Africa is now moving on the same green path, with LED traffic signals still a young feature of the traffic management of its cities. The first orders were placed shortly after SWARCO FUTURIT's products were introduced. The big steps forward followed in 2007, when SYNTELL and SWARCO FUTURIT won the LED signal tenders for Cape Town and later Johannesburg.

Austria's Trade Commissioner in Johannesburg, Dr. Stefan Pistauer, congratulated SWARCO FUTURIT on its successful entry into the South African market, saying, "For me this is once again proof of how companies with the right quality products and a strategic plan can do good business in South Africa. The local engineers are enthusiastic about the technology, and finance departments are convinced of the new signals' economic efficiency." - ***www.swarco.com***

The reality of "Mixed Traffic"

Gavin Bennett
Automobile Association Kenya

What would happen on the motorways, autobahns, autoroutes and autostrade of Europe - and the interstate highways of the US - if everything else remained exactly the same, but one morning they acquired a few really deep and unmarked potholes? Or if half the heavy trucks started to belch black exhaust smoke and had a top speed of 50 kph on the flat and 15 kph up hills? What if the slip roads, on and off the highways, were used as bus stops? What if all the signposts and markings were removed, or if more than 50 per cent of the drivers had never seen good road conduct, never been taught the proper rules or skills, and had never been tested?

Those are just a very few examples of third world reality. Imagine if all those aspects, and more, were wrong simultaneously. Now, add two other factors; pedestrians and congestion.

In the third world, 80% of the population travels only on foot. Everywhere. Outside the central business district of major towns there are no pavements or even hard shoulders. Except in the most remote desert areas, there are always pedestrians, often hundreds of them, on every stretch of road, even on inter-city highways. And there are hand-carts and goats and donkeys, even on what by local standards is a motorway.

What of the second special factor - congestion? Much of Europe, the US and many developed parts of Asia, for all their advantages of structure and resources and peerless administrative experience, are struggling with congestion in the face of a few more percentage points of traffic growth. But with none of the infrastructure advantages of Europe and elsewhere, many countries in the third world have doubled their vehicle volumes in less than a decade, with virtually no increase in road carrying capacity. Those volumes will double again in the next decade. In Kenya, vehicle volumes have increased 300% since 1990; over the same period, road capacity has increased 3%. So "mixed traffic," only seen in Europe on country lanes where the traffic is one vehicle every 20 minutes, is being applied in third world cities and on highways where the flow is 20 vehicles per lane per minute.

The reality check for international advisors or local administrators trying to solve third world traffic problems is that congestion is the largest, fastest-growing and most economically damaging problem. Third world road accident statistics are already horrendous - between 50 and 100 times more deaths per vehicle than in most of Europe. But in cold-blooded economic terms even this is now a distant second in national cost to the cost of congestion - by a factor 10.

While striving to move towards a first world ideal, third world countries must, for some time, find ways to make better use of what they've got and identify *priority measures that will have the greatest effect at the lowest cost in the shortest time.*

There is an obvious list:

- The worst third world accidents occur on relatively good roads well within the speed limit. The prime culprit is slow or stationary vehicles which obstruct the flow, causing swerving and an inordinate number of overtaking manoeuvres.
- In pursuit of the long-term principle of "unmixing" the traffic and achieving the smoothest and safest same-speed, same-direction conveyor-belt flow, the first step is to create uninterrupted flows, where stopping in a road lane is absolutely prohibited: in one word, a "clearway". This one measure could be achieved instantly and at minimal cost, with profound benefits.
- And the immediate next steps are all ways to make clearway more effective: public education campaigns on the principle; draconian enforcement of just that one rule; parallel promotion of lane discipline; and priority road structure investment - first on bus stops and lay-byes, and then on clearway ring roads.
- Action on vehicle age, type, condition and loading needs to be targeted primarily at ensuring vehicles are able to maintain a reasonable ambient speed, even uphill, and are less likely to break down on the road.

There is no golden bullet that will solve all the third world's traffic problems, but there is this one instant, affordable measure that will do more than any other to at least set the system on the road to remedy.

NEW DATES - NEW DATES

16th
International Road Federation
World Road Meeting 2010
25-28 May 2010

More information on
www.irfnet.org

Better Roads, Better World.