

# SUMMARY

ERR 16  
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## EDITORIAL

Sharing the road  
Jamal Saghir and Marc H. Juhel

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## Road Safety and Security

### The EU directive on road infrastructure safety management Research at the national and European levels 4

In November 2008 the European Parliament and the Council have adopted the Directive 2008/96/EC aiming at the improvement of road infrastructures safety management in the Trans-European Road Network, by setting up appropriate procedures which can be extended to national networks, namely through the application of guidelines by the Member States. Research and dissemination of research results play an important part in this process. At the Transportation Department of the National Laboratory for Civil Engineering (LNEC), in Portugal, a special attention has been given, over the time, to road infrastructure safety issues, either in the scope of European projects in this area or through studies within collaboration agreements with road and traffic administrations. Based upon this experience, in this article a concise description is made of the main aspects of the EU Directive and on related research studies.

António Lomonde De Macedo, João Lourenço Cardoso

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### Evaluation procedures of motorcyclist protection devices 11

Since 1998, *Laboratoire d'essais Inrets Equipements de la route (LIER)* is using a specific test protocol in order to assess the protection level offered by systems adapted to road restraint systems. This protocol concerns motorcyclists sliding on the ground then hitting the barrier and is presented in the article. This protocol was used and modified in 2005 and 2008 for the Spanish UNE 135900 standard which is also summarized. In July 2008, CEN Technical Committee on Road Equipment (TC226) agreed on a resolution to develop a European standard EN 1317 standard will be updated with the introduction of a new Part (EN 1316 – Part 8). The main content of the Part 8 draft is presented.

Martin Page, Jean Bloch

## Sustainable Roads

### Development and application of Solar Heat-blocking Pavement 17

In order to tackle environment issues from a paving perspective, NIPPO developed solar heat-blocking pavement (SHP) technology to achieve the following benefits: a reduction in surface temperature and extended pavement longevity. This article describes the environmental and practical effects of the technology through experiments and case studies, with the following conclusions being drawn from this study. With regard to the temperature, field results indicate that the reduction in surface temperature through use of the SHP is approximately 16°C. With respect to pavement longevity, its application at airport taxiways reveals that this technology effectively curtails rutting, since the rut depth is reduced to about half, compared to dense-grade asphalt surfaces.

Masahiko Iwama, Tamotsu Yoshinaka, Shinobu Omoto, Nobuyuki Nemoto

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Rest area (Yoga parking area on Metropolitan Expressway)



### Full Depth Reclamation (FDR) of Asphalt pavements using Coal combustion byproducts 23

This study demonstrates the use of US Class F coal fly ash in combination with lime or lime kiln dust (LKD) in the full depth reclamation (FDR) of failing asphalt pavements. Test sections of two structurally deficient asphalt pavements were reclaimed using Class F fly ash in combination with lime and lime kiln dust. In addition, control sections were constructed using cement, cement with emulsion, LKD with emulsion, and simple recompaction (mill and fill). The service performance and structural behavior of the FDR pavement test sections were monitored to determine how the fly ash sections compared with other more traditional pavement rehabilitation techniques. Service performance and structural behavior were determined through a program of Falling Weight Deflectometer (FWD) tests and embedded sensors installed at the time of construction.

Dr. William E. Wolfe, Chris Anspaugh, Dr. Tarunjit S. Butalia

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**Greenroads: A Sustainability Performance Metric for Roadways** 28

Greenroads is a performance metric for quantifying sustainable practices associated with roadway design and construction. This quantification can be used to:

- (1) Define what project attributes contribute to roadway sustainability.
- (2) Provide a sustainability accounting tool for roadway projects.
- (3) Communicate sustainable project attributes to stakeholders.
- (4) Manage and improve roadway sustainability, and
- (5) Grant "certification" based on achieving a minimum number of points.

Greenroads Version 1.0 contains 11 Project Requirements that must be met, and 37 Voluntary Credits that may be pursued at a roadway project's discretion.

**Stephen T. Muench, Jeralee Anderson, Tim Bevan**

**Performance assessment of cold recycling in place** 33

Cold in-place recycling is indisputably one of the most promising roadwork technique when considering the increasing need to protect the environment, conserve natural resources and save energy. Within Eurovia, Spanish subsidiary Probisa has been recycling bituminous surfacing *in-situ* with bitumen emulsion for ten years now, and the technique has been steadily gaining ground in France since 2005 under the name Recyclovia. It has been supported by extensive research such as the SCORE project and further research actions. This article shows the results of an on-going investigation on the evolution of stiffness with time of *in-situ* recycled materials as compared to laboratory made and cured samples.

**Bernard Eckmann, Samir Soliman, Emmanuel Chevalier**

**Road Finances and Management**

**Finland's new research on ownership & governance models for the technical networks of Municipalities** 39

Finland is engaged in a cooperative research effort between three research institutions to evaluate alternatives to traditional ownership and governance for the technical networks of municipalities in Finland. Aalto University, Oulu University and VTT (the Technical Research Centre of Finland) are performing an intensive research project funded by the Finnish Funding Agency for Technology and Innovation (Tekes). The main objective is to evaluate different ownership models of technical networks such as waterworks, ports, energy, and especially roads, in order to evaluate the advantages and disadvantages of the different ownership models. This article will focus mainly on the road network.

**Pekka Pakkala, Professor Antti Talvitie**

**Asset Management Policy for major PFI projects** 43

With the increasing number of Brownfield projects, ageing of infrastructures is becoming a major concern among the asset owners. On major PFI (Project Finance Initiative) projects, aggressive asset management strategies driven by heightened competition need to be challenged and documented to ensure the project is robust and bankable.

Over the concession period, repairing/renewing such infrastructure represents significant investments and is the major outstanding risk, all the more important as the strategy had been aggressive at the bid stage.

To best address these challenges, Egis is developing an efficient asset management system supporting a strategy that embed innovation and risk mitigation to identify the optimal programme of renewal work, including tailor-made solutions in the areas of: design for maintenance, works planning and scheduling, value management of asset renewal schemes, procurement, new trends that impact asset management: sustainable development, adaptation to climatic changes, stealth works and road-space booking.

**Alain Poliakoff, Jean Pohu**

**Techniques and Innovations**

**Maintenance of mountains roads in Switzerland: When green rating improves the technical approach** 51

Switzerland is a well-known alpine country for the pleasures of ski riding and mountain walking. However, the access roads to these zones in altitude are very strongly solicited infrastructures. Within the framework of various mandates for the road administration of Swiss alpine counties, we were brought as an adviser and a road laboratory to consider alternatives of maintenance methods for sections of minor mountain roads. For more than 15 years, the county road administration already decides, as far as possible, to applied mainly *in-situ* recycling with hydraulic binder. Different technical problems related to the applied methods have conducted to a new approach of all affordable maintenance possibilities. The sustainability and the green rating of the considered alternatives have taken a central place in the actual new concept.

**Gérald Cuennet, Alain Jacot**

**New developments in predicting rutting of asphalt mixtures from binder rheological characteristics** 56

Rutting is one of the main damages of a pavement particularly in view of the increase in traffic intensity and loadings, where the asphalt mix design of the surface layer plays a very important role. However the bituminous binder is also of prime importance. Following the trend from the US SHRP program in the 90's, several rheological parameters have been proposed as predictors of binder rutting potential, all assessed in the linear range. However rutting is the plastic deformation of an asphalt mix caused by heavy traffic loads under low speed at high service temperature. This high strain pavement failure leads to a non-linear response. Latest US developments consider the multiple stress creep recovery test (MSCRT) to describe binder properties in the non-linear range. This article compares binder characteristics expected to relate to rutting and the actual rutting resistance of mixtures made out of various binders. It confirms the MSCRT potential to correlate with wheel-tracking tests and the benefit of special or modified binders, crosslinked ones in particular, against rutting.

**Jean-Pascal Planche, Sylvia Dreessen**

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Rii's GPR van surveying bridges for the Ohio Department of Transportation



**Use of GPR survey data to enhance network level life expectancy analysis and rehabilitation design** 62

Pavement Management Systems (PMS), such as MicroPAVER® and Cartègraph, provide a network level assessment of surface conditions and determine maintenance needs and the type of rehabilitation required for each roadway segment based on distress type, as well as the severity and extent of these distresses. The new methodology developed by Resource International, Inc. (Rii) utilizes the information gathered by Ground Penetrating Radar (GPR) and pavement condition survey on the entire network to arrive at an *in-situ* Structural Number (SN), remaining life expectancy and rehabilitation needs. This method utilizes the AASHTO-based pavement design methodology to calculate the SN for various traffic and soil conditions for flexible pavements and slab thickness for rigid pavements. The program also provides default SN input values for 20- or 30-year --service life.

**Kamran Majidzadeh, Cherif Amer-Yahia, Chhote Saraf**

**ERR 15**

- In the ERR 15 article "Toll motorway projects in Greece" (page 17), the author informs you that photos are property of Nikos Daniilidis
- Erratum: the cover photo caption is Greece instead of France