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May 2011

Reports Published – May 2011

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PPR482 A pilot-scale trial of reservoir pavements for drainage attenuation by B Chaddock and M Nunn
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PPR533 Safer aerodynamic frontal structures for trucks: final report by B J Robinson, I Knight, T Robinson, T Barlow and I McCrae
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PPR535 Assessment of asphalt durability tests: Part 1, Widening the applicability of the SATS test by J R A Grenfall, G D Airey, A C Collop, R C Elliott and J C Nicholls
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PPR536 Assessment of asphalt durability tests: Part 2, Comparison of wheel tracking tests using European standards by J C Nicholls, J P Harper, K L Green, J M Prime, R C Elliott and J Grenfall
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Summary **May 2011**

Insight Report INS010

Implications of the widespread use of electric vehicles

D Naberezhnykh, W Gillan, C Visvikis, J Cooper and M Jones

Pages: 46, ISBN: 978-1-84608-949-7

Electrification of personal transport is anticipated to be a natural progression in the process of the decarbonisation of transport. This Insight Report aims to evaluate possible scenarios that already exist, in order determine the most likely scenario for the introduction and adoption of electric vehicles in the UK by 2030. A number of scenarios have been assessed based on a selection of key factors that could influence a possible 2030 scenario. Based on assumptions of how key factors, such as oil price and government policy, are likely to develop in the years leading up to 2030, the most probable scenario is selected for the composition of UK vehicle fleet by that time.

This Insight Report was written as part of an internal reinvestment project for the TRL Academy. The implication of the widespread use of electric vehicles for TRL. Its main purpose is to identify the most probable scenario for the composition of the UK vehicle fleet by 2030, in order to gain an understanding of how widely electric vehicles will be adopted. Based on that scenario, an examination of the possible characteristics of electric vehicles in the UK vehicle fleet by 2030 is described and the implications that this may have on traffic, transportation and safety are discussed.

Summary **May 2011**

Published Project Report PPR482

A pilot-scale trial of reservoir pavements for drainage attenuation

B Chaddock and M Nunn

Pages: 93, ISBN: 978-1-84806-952-1

Infrastructure developments with hard paved areas prevent the natural dissipation of rainwater. Their adverse effects are cumulative and can lead to long-term problems of disposing of water that can result in flooding. The Highways Agency aims to maintain rainwater runoff rates from their roads at current levels, despite road widening and the increase in rainfall predicted by climate change. Sustainable Drainage Systems (SuDS), which deal with runoff at source by mimicking the natural processes of redistributing rainwater to the air and the ground, reduce the severity of these problems. One such system is a reservoir pavement that can either eliminate or reduce runoff, or just temporarily store water and reduce run-off flows. There are several configurations of these pavements to cope with different site specific issues. Reservoir pavements, however, have been used mainly for lightly trafficked applications. This report describes a pilot-scale trial of flexible pavements with porous concrete bases that have the potential to extend the technology to more demanding traffic levels. An assessment is made of the hydraulic and structural behaviours of a variety of reservoir pavement types that indicates the potential of these pavements. This research, sponsored by the Highways Agency, was undertaken by TRL with industry collaboration.

Summary **May 2011**

Published Project Report PPR533

Safer aerodynamic frontal structures for trucks: final report

B J Robinson, I Knight, T Robinson, T Barlow and I McCrae

Pages: 68, ISBN: 978-1-84608-955-8

Approximately 1% of all GB road vehicles are HGVs but they account for approximately 6% of all motor vehicle traffic and are involved in accidents resulting in approximately 15% of all road traffic fatalities. In 2000, freight trucks were responsible for approximately 23% of global transport CO_2 emissions, which in turn represented 14% of ALL global CO_2 emissions. Thus, freight trucks were responsible for approximately 3% of ALL global CO_2 emissions.

Most trucks are currently designed to maximise the load space that can be achieved within the legally permitted maximum dimensions. This usually means that the front of the truck approximates a flat vertical surface where the cab is positioned above the engine. This has disadvantages for aerodynamics, field of view and collisions with other road users. Re-designing the front of a truck to minimise these disadvantages could potentially offer significant benefits in terms of casualty and emission reduction.

The DfT decided that, in parallel with its research into the feasibility and likely effects of permitting longer semi-trailers, research should also be undertaken into the merits of allowing additional length, irrespective of load space, for the purposes of improved safety and environmental performance. This final report describes the study in full.

Summary **May 2011**

Published Project Report PPR535

Assessment of asphalt durability tests: Part 1, Widening the applicability of the SATS test

J R A Grenfall, G D Airey, A C Collop, R C Elliott and J C Nicholls

Pages: 64, ISBN: 978-1-84608-957-2

In order for a pavement to have long life, it must be durable. The term ‘durability’ includes several different phenomena which are interrelated and time dependant, but two of the primary mechanisms to which an asphalt pavement is subjected in service are ageing and water damage. The Saturation Ageing Tensile Stiffness (SATS) test is the first protocol of its kind to combine these two mechanisms in a single laboratory test. However, the procedure is aggressive, and for lower stiffness materials where there is a risk of irreversible damage in the standard SATS conditions, an alternative approach was required to widen the applicability of the procedure. Accordingly, parameters of pressure, temperature and duration were altered either one at a time or in combination to try to arrive at a suitable combination for testing less stiff (40/60 pen) material. The requirements were that the revised conditions should give a similar relative reduction in retained stiffness as the standard conditions give for 10/20 pen bitumen specimens, while still being harsh enough to distinguish a ‘poor’ aggregate in terms of moisture susceptibility. A suitable parameter combination for a SATS test for specimens made from 40/60 pen bitumen was found to be 85 °C temperature, 0.5 MPa pressure and 24 h duration.

Summary **May 2011**

Published Project Report PPR536

Assessment of asphalt durability tests: Part 2, Comparison of wheel tracking tests using European standards

J C Nicholls, J P Harper, K L Green, J M Prime, R C Elliott and J Grenfall

Pages: 39, ISBN: 978-1-84608-958-9

The tests that are used in the UK to assess deformation resistance of asphalt mixtures by simulation from wheel tracking have changed in recent years with the introduction of European standards. The new standard allows either a small or a large device to be used depending on the maximum axle load being designed for. Each test method measures the deformation resistance using slightly different parameters. Comparative studies have been undertaken using each of the new methods plus the old UK method with two laboratories and two methods of compaction: roller and vibratory. The results have been compared to assess the relationships between the parameters, the influence of the method of compaction and an indication of the precision of the tests. Unexpected outcomes of the results are the inability of the traditional design of the large size device to deal with mixtures having limited deformation resistance and the affect of air voids content on the deformation resistance of category 2 Enrobé à Module Élevé mixtures.

Summary **May 2011**

Published Project Report PPR537

Assessment of asphalt durability tests: Part 3, Review of SATS test to evaluate existing base layers

J C Nicholls, J P Harper, K Green and R C Elliott

Pages: 60, ISBN: 978-1-84608-959-6

There has been increasing interest in ensuring new asphalt materials are constructed so that they will be durable, and tests such as the Saturated Ageing Tensile Stiffness (SATS) test have been developed for that purpose. However, there is also often a need to assess the remaining service life of existing asphalt layers. To investigate this aspect, trials have been undertaken to see if the SATS test, or a modification thereof, could be used to obtain such information from cored samples. Tests using the current SATS protocol and two variants of it have been undertaken on cores from RAF runways and taxiways. The tests have shown that some discrimination may be possible, supported by results from other, simpler, tests also indicating that the material was suspect, at least for the particular layer that was known to be imperfect.

Summary **May 2011**

Published Project Report PPR537

Updated post-2010 casualty forecasts

J Broughton

Pages: 44, ISBN: 978-1-84608-917-6

This report describes the methods that have been used to forecast in some detail the number of fatal and serious casualties on British roads in 2020 and 2030. These forecasts will help to provide the numerical context when the Government prepares the next road safety strategy. Statistical models are fitted to past casualty and exposure data, taking account as far as possible of road safety measures that have been introduced.

The models demonstrate sufficient consistency to be used to forecast casualty rates, which are then combined with predictions about the distances travelled in future to produce casualty forecasts. These forecasts assume that the current road safety programme will continue to develop in coming years, but that no major new measures will be introduced. The forecasts take account of the implications of the major reduction in road accident fatalities that occurred in 2009.

The improvement of car secondary safety over the past 15 years has probably been the development that has had the most significant effect on the national casualty total. A statistical model is used to quantify this effect by analysis of accident data. The results of the most recent analyses are presented, and used to estimate the future benefits.

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Summary **May 2011**

Published Project Report PPR562

A track trial research study on allowing motorcycles use of Advanced Stop Lines

S D Ball, J Hopkin, D Webster and O Anjum (TRL)

Pages: 118, ISBN: 978-1-84608-960-2

In the UK, Advanced Stop Lines (ASLs) are an area in front of the main traffic stop line at signal-controlled junctions that can currently only be used by cyclists. This area provides cyclists with the opportunity to wait in-front of traffic, giving them a number of benefits, including priority. This report summarises the results of a track trial in which motorcyclists were also permitted to use ASLs at signal-controlled junctions. The study's objectives were to identify the effects on safety and behaviour, assess the opinions of cyclists and motorcyclists and assist the DfT in establishing whether further work on the concept was appropriate. A four-day trial was carried out on TRL's test track with 30 participants on each day. A statistically robust design was used to ensure that different junction layouts could be compared with varying traffic flows and patterns of movement. Key results included that the turning movement mainly determined the chosen point of entry, with many of the participants positioning themselves for their planned turn before entering the ASL. The scheme did not delay cyclists getting into the ASL, nor did it reduce the ability of cyclists to reach the ASL. However, the scheme did restrict the ability of some cyclists to stop in the lateral position within the ASL that was considered to be the most appropriate for their planned turn. Observed difficulties were more prevalent when there were large numbers of participants using the ASL, but such situations would only be expected to occur rarely on-street where there are high flows. The scheme did not delay cyclists in leaving the ASL after the start of the Green Phase, but it did reduce the proportion of cyclists who cleared the junction ahead of motorcyclists. Both cyclists (69%) and motorcyclists (92%) were in favour of the scheme. Some of the cyclists expressed difficulties, but these tended to be a minority.

Current Topics in Transport Alert

Current Topics Published – May 2011

CT47.5 Pedestrian accident studies – update (2007–2010)

This issue of Current Topics includes over 45 abstracts of reports, conference papers, books and journal articles which focus on pedestrian accidents, their analysis and reconstruction, vulnerable pedestrian groups including the elderly and children, and pedestrian behaviours. Accident prevention measures, including traffic speed control, vehicle redesign, pedestrian detection systems, risk assessment, highway design, and prediction of injuries are also covered.

Price £30

CT50.3 Transport: pollution and health – update (2005–2010)

This issue of Current Topics includes over 40 abstracts of reports, conference papers, books and journal articles which focus on assessing, monitoring, modelling and controlling the harmful health effects of transport related pollutants. Many abstracts are concerned with the rise in respiratory diseases caused by air pollution from vehicle emissions while others address questions of policy and standards for air quality, while others provide case studies from many parts of the world, illustrating these problems and challenges. A few abstracts consider the health benefits of active transport to the participants, along with the resultant reduction in vehicle emissions.

Price £30

Current Topics titles are published in four main themes: Transport Planning & Environment; Electronics & Communications in Transport; Civil Engineering, and Transport Safety. Each title includes abstracts of reports, conference papers, standards, books and journal articles, selected from TRL's Library Database during the years shown. Much of the English language literature from the UK, USA, Australia and Europe is included.

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