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TRL RESEARCH ALERT

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Reducing congestion from road works: Overview summary document

This is an overview report summarising the findings of the research into Road Plating, Temporary Backfill, Rapid Cure Concrete and Other Techniques that could help to reduce the congestion caused by road and street works. This report provides a summary of the work undertaken and the outcomes in each of these areas and provides a toolkit of options for reducing congestion to be considered by road authorities, utility companies and contractors when planning roadworks. It also references the four detailed reports and the guidance notes ('QWIRC Notes') produced under the project.

Author	I Carswell and B Collis	Pages	23
Date	19/04/2013	Reference	PPR658
ISSN	0968-4093		

Reducing congestion from road works: Part 1 Use of road plates

It has been shown that congestion caused by road and street works can be reduced by using road plates over trenches and openings to allow carriageways to be opened to traffic during the works period. Wheel loading and trafficking tests were carried out on six types of road plate - two for large transverse trenches, two for linear trenches and two for large rectangular openings. The tests investigated the speed and ease of installation, removal and replacement of the plates, the effect of their height relative to the road surface on the speed at which they could be trafficked, and the effect of wheel loading on their performance. The findings from the tests, site investigations and a literature review were used to develop guidance on when and how road plates can be used to reduce congestion. The factors covered in the guidance include the size, weight and handling of plates, the effect of surface mounting or recessing plates on vehicle speed and fixing, wheel loading requirements and deflection criteria, skid resistance requirements, shoring excavations, the effect of road profile and the need for bedding materials, pedal and motor cyclist and pedestrian considerations, the size of handling devices in plates and gaps between plates, winter service considerations, signing, lighting and markings, noise and environmental factors, and inspection and maintenance. The report also examines the cost benefits to be gained.

Author	RW Jordan, N Anderson, C Sadat-Shafae, B Meitei	Pages	263
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Reducing congestion on the road network: Part 2 Use of temporary backfill

The use of temporary backfill in road or street works as an 'immediate reinstatement' could provide benefits in terms of enabling the road to be opened during peak periods and actual works confined to off peak periods such as weekends. Trials using commonly available granular materials (Type 1, Sharp Sand and Pea Shingle) with a thin asphalt surface course were undertaken in a large 2m by 2m opening and trafficked under accelerating loading conditions using the TRL Pavement Test Facility. The results demonstrated that several options could provide a temporary running surface that could be trafficked for several days. This is an option that should be considered at the planning stage of any works. The use of temporary backfill in an opening immediately adjacent to

the carriageway to maximise the number of running lanes is also considered. The report also examines the cost benefits to be gained.

Author	I Carswell, RW Jordan, C Sadat-Shafae	Pages 45
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Reducing congestion on the road network: Part 3 Early strength gain (rapid cure) concrete for reinstatements

The use of rapid-cure concrete should help to speed up road and street works and, hence, reduce the traffic congestion from those works. A laboratory investigation shows that the strength gain of various cementitious mixtures can be accelerated so as to provide early age strengths without an excessive final strength. However, the extent of any accelerated strength gain and of the final increase varied considerably, showing that the performance depends on many things. Nevertheless, the use of rapid-cure concrete needs to be quantitatively defined before its full benefits can be utilised for the benefit of all parties. Proposals for a system of classifications and the means to gain them are discussed as well as the need for better definition of when reinstatement materials should be allowed to be overlaid and/or trafficked. The report also examines the cost benefits to be gained.

Author	JC Nicholls and JM Prime	Pages 57
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Reducing congestion from roadworks: Part 4 Other techniques

There are many techniques which can be used that should reduce the congestion caused by street and road works, some having a greater influence than others. However, each technique is appropriate for different situations. A series of such ideas, covering organisational issues (co-ordination, extended working hours, permits and lane rental, traffic easing and public information), surveys (survey methods and locating tags), minimising excavation (no dig technologies, keyhole maintenance, vacuum extraction, "Core & Vac" and micro-trenching), alternative materials (hydraulically bound materials, high-strength resin foam, natural cement with lightweight aggregate, warm and semi-warm asphalt and manhole repairs) and common utility ducts have been reviewed and are offered for consideration by those planning road or street works.

Author	JC Nicholls	Pages 40
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Detection of changes in pavement texture condition using high resolution 3D surface measurements Research into pavement surface disintegration: Phase 2 - Task 2

Surface disintegration is a term used to describe defects such as fretting or ravelling in which aggregate is removed from the pavement surface. Left untreated this can result in the removal of localised areas of pavement surface, forming potholes and allowing water into the lower pavement layers. Algorithms have been developed to make use of data collected within routine network

surveys (TRACS) to detect and report signs of surface disintegration. These use profile data to characterise the pavement surface, identifying localised areas where fretting may be present. The data available to this approach is not detailed enough to pick up the early signs of the onset of surface disintegration. A need has therefore been identified for research into methods which could provide an earlier warning of surface disintegration, which would provide a longer window of opportunity to maintain the pavement before it failed. The research presented in this report describes the development of a mobile data collection platform for high-resolution 3-D profile, and discusses the use of the system to collect data on a number of surfaces. The visual identification of differences in surface condition is presented and discussed, as is a range of parameters to quantify the changes in surface condition. Recommendations are made to investigate the use of such measurements in controlled conditions. This will develop our understanding of the measurement sensitivities required to detect the early signs of deterioration, and be invaluable in defining minimum requirements for data collection systems suitable for inclusion in future TRACS contracts.

Author	S McRobbie (TRL), J Iaquina (TRL), J Kennedy (Jacobs), A Wright (TRL)	Pages 46
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Assessing the resilience of transport networks to climate change: Data collection

Two progress reports were produced by TRL relating to the Engineering and Physical Science Research Council (EPSRC) funded project FUTURENET- Future resilient transport networks. TRL was a partner in FUTURENET together with the University of Birmingham, who led the project, the Universities of Loughborough and Nottingham, HR Wallingford and the British Geological Survey. The project, which ran from June 2009 to March 2013, developed methods of quantitatively assessing the resilience of transport networks to climate change impacts. The first report describes the identification of a suitable transport corridor to be utilised in the development of the models and methodologies, this second report is on the collection of information on the corridor. The transport corridor from London to Glasgow along the west coast including road, rail and air travel was selected as a suitable corridor on which to base the development of the assessment methodology. The aim was not to assess the resilience of this corridor, but develop a methodology that would enable any part of the transport network to be assessed. Data and information on the use and infrastructure within this corridor was collected to use in the development and validation of the models. This report describes the data and information acquired and its source, and discusses some of the issues encountered when using data collected for the purpose of managing and maintaining the network for assessing climate change resilience.

Author	S Reeves, K Avery, N Paulley, P Sivell	Pages 17
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Assessing the resilience of transport networks to climate change: Selecting a study corridor

Two progress reports were produced by TRL relating to the Engineering and Physical Science Research Council (EPSRC) funded project FUTURENET- Future resilient transport networks. TRL was a partner in FUTURENET together with the

University of Birmingham, who led the project, the Universities of Loughborough and Nottingham, HR Wallingford and the British Geological Survey. The project which ran from June 2009 to March 2013, developed methods of quantitatively assessing the resilience of transport networks to climate change impacts. This report describes the identification of a suitable transport corridor to be utilised in the development of the models and methodologies, the second progress report is on the collection of information on the corridor. A number of criteria for selecting a transport corridor were identified namely: significant passenger and freight usage for road, rail and air travel; a range in climate and projected changes in climate; a variety of topographical and geological characteristics; and limited modelling complexity. A short list of potential corridors was drawn up and information about each was gathered to assess if they met these criteria. The results of this assessment and discussions with the project partners and stakeholders were used to select the final corridor. London to Glasgow along the west coast was chosen as this best met the criteria, with high usage and a range of climatic, geological and topographical across its length.

Author	S Reeves, K Avery, N Paulley, P Sivell	Pages 27
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Enabling the use of hydraulically bound quarry by-products in road foundations

Quarrying and crushing of rock to produce aggregate for civil engineering and other purposes generate quarry fines as a by-product. The aim of this research is to develop procedures for their use in road foundations. Initially, laboratory tests were carried out to characterise a wide range of quarry fines from four UK aggregate suppliers. Selected materials were then used as aggregates in hydraulically bound mixtures (HBMs) in a full-scale road trial. Performance foundation designs to the HA document IAN 73 specific for the trial site were formulated for these materials and the foundations were constructed at a quarry by one of the collaborating suppliers. The foundations satisfied in situ requirements of the Performance Related Specification of IAN 73 with little non-compliance and often with a wide safety margin. The study demonstrated that the hydraulically bound, quarry by-products can be mixed and constructed with normal full-scale equipment and can provide the two highest foundation classes of the four classes permitted in IAN 73. The potential of the materials from other aggregate suppliers that were not tested at full-scale was favourably implied by comparison of their laboratory mechanical properties with those of the materials tested in the road trial.

Author	B C J Chaddock (TRL) and R Elliott (Scott Wilson)	Pages 90
Date	15/04/2013	Reference PPR545

Hydraulically bound mixtures - a technique to reduce congestion

QWIRC Note 9: Hydraulically bound mixtures - a technique to reduce congestion. Please note, this report is only available as a pdf download.

Author	TRL	Pages 3
Date	18/04/2013	Reference QWIRC9