



ACRI Rail Knowledge Bank Update.



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Access

February 2017

The benefits of improving access to the United Kingdom rail network via the Access for All programme

Duckenfield, T

“Access for All” is a United Kingdom government funded programme to make stations more accessible for people with disabilities by providing step free access along with complementary measures such as improved wayfinding information. Steer Davies Gleave was commissioned to evaluate the programme in a manner consistent with official guidance (“WebTAG”), and to quantify the benefits to rail passengers and train operators. This paper describes what data was collected, how it was collected, how it was analysed and what the results were. It also identifies some important lessons for improving the implementation of the programme, which may have wider applicability.

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Bridge

December 2016

FHWA LTPP guidelines for measuring bridge approach transitions using inertial profilers

Henderson, B; Dickes, J; Cimini, G; Olmedo, C

This document presents guidelines to measure bridge approach transitions using inertial profilers. The guidelines were developed by the Long-Term Pavement Performance (LTPP) Program and the Office of Infrastructure Research and Development Bridge and Foundation Engineering Team. The bump at the end of the bridge has long been studied for highways and railways, yet experts from across the transportation industry continue to

identify it as one of the most prevalent substructure factors affecting bridge performance.

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Design

January 2017

[Responding to the challenges of designing high passenger capacity metropolitan rail carriages](#)

Coxon, S; Napper, R

Metropolitan railways around the world are experiencing a significant increase in patronage. This paper collates research undertaken at the Monash University Mobility Design Lab that analyses the design and structural issues confronting the carriage layout of a high capacity metro service. The user experience of the carriage interior is an essential part of the overall environment. The outcome of this research is intended as an enabler for the creation of strategies to design and build the next generation metropolitan trains.

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Emissions

December 2016

[Highway vehicle emissions avoided by diesel passenger rail service based on real-world data](#)

Graver, B; Frey, H

Avoided emissions attributable to the reduction in personal automobile trips for passenger rail riders are quantified based on real-world measurements. The North Carolina Department of Transportation (NCDOT) sponsors the Piedmont passenger rail service between Raleigh and Charlotte, NC. The use of real world data representative of actual train operations provides an accurate basis for comparing rail and personal vehicle energy use and emissions and for identifying key factors affecting variability in the comparison.

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Railway

2016

Fast estimation of the derailment risk of a braking train in curves and turnouts

Burgelman, N; Li, Z; Dollevoet, R

When a train runs through a turnout or a sharp curve, high lateral forces occur between the wheels and rails. These lateral forces increase when the couplers between the wagons are loaded in compression i.e. a rear locomotive pushing a train or front locomotive braking a train. This study quantifies these effects for a train that begins braking when steadily curving and for a train that brakes upon entering a turnout.

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2015

Plastic deformation of behaviour of high strength rail steels in heavy haul railway systems

Pun, CLJ

Plastic ratcheting plays a key role in causing rolling contact failure of rails. Due to demanding conditions imposed by rail transport of mineral products, the main aim of this research is to quantify cyclic plasticity for investigating the plastic deformation behaviour of high strength rail steels currently used in heavy haul railways in Australia.

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February 2002

Stabilising railway embankments using an integrated tied back-to-back strengthening system

Esmaeili, M; Arbabi, B

This study investigates the role of an integrated tied back-to-back strengthening system in increasing the failure load and decreasing the crest settlement of railway embankments. The results revealed that the unstrengthened embankments failed under an average stress level of 123 kN/m² with an average crest settlement of 38.5 mm. The strengthened embankments failed under an average stress level of 186.67 kN/m² with a crest settlement of 29.0 mm, representing a 51% increase in failure stress and a 25% decrease in crest settlement.

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Safety

February 2017

Can rail pedestrian violations be deterred? An investigation into the threat of legal and non-legal sanctions

Freeman, J; Rakotonirainy, A

Collisions between trains and pedestrians continue to be the most likely accident to result in severe injuries and fatalities on the rail network. While a range of countermeasures have been utilized in an attempt to reduce the incidence of risky behaviors at level crossings, limited focus has been directed towards deterrence-based approaches to improve crossing safety. As a result, this study explored pedestrians' perceptions of legal and non-legal sanctions at level crossings, with particular emphasis directed towards identifying factors that maximize perceptual deterrence and reduce the occurrence of rule violations.

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January 2017

[Exploring the safety performance of tram roundabouts](#)

Currie, G et al

Previous research has identified that roundabouts are a major risk factor in French light rail systems. While there are currently few tram roundabout in the USA their numbers are likely to increase in the future. To better inform international light rail practices this paper explores the road safety performance of Melbourne's 18 tram roundabouts using observational studies, conflict point analysis, and crash analysis.

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February 2017

[Fixating on the size-speed illusion of approaching railway trains: what we can learn from our eye movements](#)

Clark, H et al

Railway level crossing collisions have recently been linked to a size-speed illusion where larger objects such as trains appear to move slower than smaller objects such as cars. An explanation for this illusion has centred on observer eye movements – particularly in relation to the larger, longer train. This study isolated fixation eye movements by requiring participants to view computer animated sequences in a laboratory setting, where a static fixation square was placed in the foreground at one of two locations on a train (front and centroid). Results showed that even with the square placed around the front location of a vehicle, participants still underestimated the speed of the train relative to the car and underestimation was greater when the square was placed around the visual centroid of the train. The authors' results verify that manipulation of eye movement behaviour can be effective in reducing the magnitude of the size-speed illusion and propose that interventions based on this manipulation should be designed and tested for effectiveness.

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April 2017

[Serious unintentional injury involving a railway train or tram, Australia, 2009-10 to 2013-14](#)

Australian Institute of Health and Welfare (AIHW)

This report presents information on hospitalisations in Australia due to unintentional serious injury involving a train or tram for the 5-year period from 2009–10 to 2013–14. Over this 5-year period, there were 812 cases of serious injury involving a train (178 due to a level crossing collision), an average of 162 per year. Over the same period, there were 397 cases of serious injury involving a tram.

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Train

March 2017

[Electronic ticketing systems as a mechanism for travel behaviour change? Evidence from Sydney's Opal card](#)

Ellison, RB

Smartcard and other forms of electronic ticketing have become integral to modern public transport systems. The current paper presents analysis from a naturalistic travel behaviour study of inner-city Sydney residents that coincided with the phased introduction of the Opal smartcard system. Using a differences-in-differences methodology, results indicate significant reductions in car use of around 10 min/day with commensurate increases in train use and incidental walking. This trend holds across income groups and is more pronounced for older residents. Results add further weight to the merits of simplifying ticket purchasing as part of a package of policy measures designed to increase public transport usage.

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January 2017

[New methods and perspectives in bus bridging theory and practice](#)

Pender, B et al

In a time of increasing road congestion, passenger rail networks provide superior performance to commuters in terms of capacity and speed. Although their technical complexity greatly assists in delivering these improved service levels, it also makes them vulnerable when unplanned disruptions occur. This paper presents a synthesis of findings from a research program seeking to improve responses to unplanned passenger rail disruptions. Component parts of the research described, seek to understand current international practices, explore the significance of track crossovers to bus bridging, explore

ways to optimise bus bridging depot location and the economic viability of a bus bridging reserve.

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January 2017

[Optimizing train operational plan in an urban rail corridor based on the maximum headway function](#)

Shi, F

The train operational plan (TOP) plays a crucial role in the efficient and effective operation of an urban rail system. The authors optimize the train operational plan in a special network layout, an urban rail corridor with one terminal yard, by decomposing it into two sub-problems, i.e., the train departure profile optimization and the rolling stock circulation optimization.

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December 2012

[Survey on driverless train operation for urban rail transit systems](#)

Wang, Y et al

The length of metro lines with driverless train operation (DTO) systems is increasing globally and is predicted to triple in the next 10 years. This paper gives the history and future trend of the DTO systems. The opportunities provided by the DTO systems, such as lower operation costs, increased capacity, and energy efficiency, are explained and the relevant research are reviewed. Furthermore, the challenges faced by the DTO systems are analyzed, such as safety issues, train control technology, and emergency situations.

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Vertical Integration

March 2017

[Vertical integration, separation in the rail industry: a survey of empirical studies on efficiency](#)

Abbott, M; Cohen, B

Whether vertical separation of the rail industry creates demonstrable performance and efficiency gains is an issue of ongoing economic analysis and public policy debate. To assist in consideration of the merits and disbenefits of vertical separation this paper provides a summary of the different studies that have been undertaken to gauge the effects of vertical separation on the rail industry, and analyses and codifies the main

findings of this research.

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[National Interest Services supporting an informed land transport community](#)

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