

July 2018

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ACRI Rail Knowledge Bank Update.

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Bridge

2018-04

[Cold reinforcement and evaluation of steel bridges with fatigue cracks](#)

Wang, C et al

Cold reinforcement techniques refer to reinforcement methods that produce no or only low tensile residual stresses in structural details, avoiding new fatigue vulnerable details. To ensure the fatigue safety and extend the fatigue life of steel bridges, cold reinforcement techniques are proposed to stop the fatigue cracking of the critical details of orthotropic steel decks (OSDs) and web gap zones. Cold reinforcement techniques were evaluated by fatigue testing in the laboratory, in situ steel bridge case studies, and numerical fracture mechanics analysis using the extended FEM.

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2018-05

[Fatigue behavior evaluation of full-field hangers in a rigid tied arch high-speed railway bridge: case study](#)

Zhong, W et al

The steel truss arch is an important structural type for high-speed railway bridges with long spans. The fatigue assessment of rigid hangers under long-term train loads is an important concern. In this study, the Nanjing Dashengguan Bridge, a six-line railway steel arch bridge with three planes of truss arches and the largest span in the world, was taken as a case study.

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2018-06

[Jacked installation of underbridges](#)

Thomson, J; Robinson, A; Howe, C

This paper describes the development and use of jacked tunnel methods for installing underbridges below rail tracks and highways avoiding disruption to traffic movements. The developments of the jacked deck and arch methods based on preformed lining units being jacked in on a slide path, a hybrid of deck slide and tunnelling, have greatly increased the possible clear spans, installation lengths and structure configurations. The key development issues are illustrated by reference to completed projects.

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Construction

2018-02

Permeation grouting and excavation at Victoria station, London

Packer, M et al

Paid area link 6 (Pal6) underpass, a crucial tunnel connection of London Underground's Victoria station upgrade project, was engineered within notoriously difficult sub-artesian granular River Terrace Deposits (RTD) immediately below the Victorian-age District and Circle line masonry tunnel, a structure highly sensitive to ground displacements. Due to the proximity of the overlying operational railway, the consequences of ground movement were of very high risk. Historic tunnel construction in the heterogeneous RTD had limited success with permeation grouting, and face losses and instabilities occurred. For the case of Pal6, the railway tunnel overhead magnified the difficulties. Permeation grouting still remained the most feasible stabilising option, but only with significant improvements in both grouting technique and grout types. A low-risk tunnelled solution, using a bespoke and sophisticated construction approach, enabled safe continuous excavation within the severely restricted structural constraints.

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Freight

2017-05

Inquiry into national freight and supply chain priorities

Australia. Department of Infrastructure and Regional Development

In November 2016 the Australian Government committed to the preparation of a National Freight and Supply Chain Strategy in line with a recommendation made in Infrastructure Australia's 2016 Infrastructure Plan. To initiate work on the Strategy, which will eventually be developed with jurisdictions through the Council of Australian Governments (COAG) Transport and Infrastructure

Council, the Australian Government has initiated an Inquiry into freight and supply chain priorities. The Inquiry will be guided by an expert panel bringing industry expertise into the process and provide advice and evidence for the development of the Strategy, with clear short, medium and long term priorities for action, over a range of key reform areas.

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2018-05

Pricing overland freight transport to account for external costs

Austin, D

Sweden progressively opened up the market for rail maintenance services, starting in 2002. We study the cost impacts based on an unbalanced panel of contract areas between 1999 and 2011, using econometric techniques. We conclude that competitive tendering reduced costs by around 12%. This cost reduction was not associated with falling quality as measured by track quality class, track geometry or train derailments. We conclude that the gradual exposure of rail maintenance to competitive tendering in Sweden has been beneficial.

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High Speed Rail

2018-03

How do passengers use travel time? A case study of Shanghai–Nanjing high speed rail

Tang, J et al

Traditional travel behavior theory regards travel time as a waste. Recent studies suggest that it carries a positive utility, among other reasons for the benefit of the activities conducted while traveling. However, most studies of travel time use have focused on conventional trains in developed countries. Few have systematically examined the permeation of information and communication technology (ICT) into travel time use and the correlates of activity participation in developing countries, particularly on high speed rail (HSR). Using a survey conducted on the Shanghai–Nanjing corridor (N = 901), this study examines how HSR passengers use their travel time and explores the correlates of the different types of activities of business and non-business travelers, respectively, through multivariate probit models.

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Infrastructure

2018-05

Assessing benefits from the Regional Rail Link project

Victoria. Auditor-General

The Regional Rail Link (RRL) project was, at the time of its approval and delivery, one of the largest and most expensive rail projects ever built in Victoria, Australia, with an estimated final cost of \$3.65 billion. Since opening, the project has untangled regional and metropolitan train lines by providing a dedicated high-speed corridor for V/Line trains to access the inner areas of Melbourne. In this audit, we assessed whether the RRL project is realising expected benefits. To do this, we examined whether: 1. expected benefits and achievement measures from the project were clearly defined; 2. the project has achieved, or is on track to achieve, expected outcomes and benefits.

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Level Crossing

2018-06

Developing a highway rail grade crossing accident probability prediction model: a North Dakota case study

Khan, I; Lee, E; Khan, MA

Safety at highway rail grade crossings (HRCs) continues to be a serious concern despite improved safety practices. Accident frequencies remain high despite increasing emphasis on HRCs safety. Consequently, there is a need to re-examine both the design practices and the safety evaluation methods at HRCs. Previous studies developed accident prediction models by incorporating highway, crossing inventory, rail, and vehicle traffic characteristics, but none of these factors considered population in the vicinity of HRCs. This study developed a binary logit regression model to predict accident likelihood at HRCs by incorporating various contributory factors in addition to population (based on census blocks 2010) within five miles of crossings.

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Light Rail

2018-04

From bus to tramway: is there an economic impact of substituting a rapid mass transit system? An empirical investigation accounting for anticipation effect

Dubé, J; Legros, D; Devaux, N

This paper focuses on the impact of substituting bus rapid transit (BRT) for light rail transit (LRT) services, taking into account temporal and spatial decomposition of the effect of new urban

infrastructures using a spatial difference-in-differences (SDID) estimator based on a repeated sales approach. An empirical investigation is conducted for the case of the implementation of the tramway in Dijon (France) between 2008 and 2012 using apartment transactions occurring between 2001 and 2014. The results indicate that the impact of substituting LRT to BRT is partly anticipated at the construction phase, while the cumulative impact returns a complex pattern where the positive effect is mainly concentrated around stations located in the center of the city.

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Maintenance

2018-04

[Scheduling of maintenance work of a large-scale tramway network](#)

Kiefer, A; Schilde, M; Doerner, KF

For a public transport network preventive maintenance tasks have to be performed periodically to ensure a functioning system. The tasks include costly ones like replacing rails but also cheaper and more frequent ones like grinding. This paper deals with the strategic scheduling of these tasks for a large-scale network and a planning horizon of up to three decades.

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Public Transport

2018-04

[Developing a national measure for predictable public transport: bus, rail and ferry](#)

Rashidi, S et al

The ability to reliably predict PT journey times is critical for network operators and transport authorities to measure, monitor and target improvements to the PT network, with flow-on effects for customers. Research conducted in New Zealand between August 2016 and August 2017 aimed to identify and develop an optimal measure for PT predictability. This involved undertaking a local and international review of predictability/reliability measures used for PT or private vehicle travel, and included evaluation of measures.

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2018-04

[Managing rail transit peak-hour congestion with a fare-reward scheme](#)

Yang, H; Tang, Y

This paper describes a new fare-reward scheme for managing a commuter's departure time choice in a rail transit bottleneck, which aims to incentivize a shift in departure time to the shoulder periods of the peak hours to relieve queuing congestion at transit stations.

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2018-07

Public transport: one mode or several?

Varela, JML; Borjesson, M; Daly, A

For a public transport network preventive maintenance tasks have to be performed periodically to ensure a functioning system. The tasks include costly ones like replacing rails but also cheaper and more frequent ones like grinding. This paper deals with the strategic scheduling of these tasks for a large-scale network and a planning horizon of up to three decades.

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2018-05

Transport accessibility for wheelchair users: a qualitative analysis of inclusion and health

Velho, R

Using the case of wheelchair users who choose to use public transport in London, this paper highlights the experiences of a marginalized group within infrastructure to investigate how transport impacts their lives and well-being.

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Rail

2017-12

Should Australia expand rail health assessments?

National Transport Commission

This report summarises findings from the consultation on the rail worker health assessment discussion paper.

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Safety

2018-04

Conditional value-at-risk (CVaR) methodology to optimal train configuration and routing of rail hazmat shipments

Hosseini, S; Verma, M

Hazardous materials (hazmat) incidents are rare though the consequences could be catastrophic. The low probability–high consequence nature of such events mandate that a risk-averse plan be implemented for routing hazmat shipments. The authors propose a conditional value-at-risk (CVaR) methodology for routing rail hazmat shipments, using the best train configuration, over a given railroad network using the pre-defined train services such that the transport risk as measured by CVaR is minimized.

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Station

2018

Comparative analysis of environmental graphic design for wayfinding on the exit patterns of mass transit stations

Puttipakorn, P; Upala, P

The quality of transit services has long been recognized as a significant factor affecting passenger behavior and station quality. The objective of this paper was to compare the environmental graphic designs for passengers' decision to choose walking ways in subway stations of Bangkok Metropolis, Thailand.

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Timetable

2018-04

Service-oriented train timetabling with collaborative passenger flow control on an oversaturated metro line: an integer linear optimization approach

Shi, J et al

With the drastic increase of travel demands in urban areas, more and more metro lines are nowadays suffering from oversaturated situations, leading to the accumulation of passengers on platforms with potential accident risks. To further improve the service quality and reduce accident risks, this paper proposes an effective method for collaboratively optimizing the train timetable and accurate passenger flow control strategies on an oversaturated metro line.

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Train

2018-03

Multidimensional visualization of transit smartcard data using space–time plots and data cubes

Song, Y et al

Given the wide application of automatic fare collection systems in transit systems across the globe, smartcard data with on- and/or off-boarding information has become a new source of data to understand passenger flow patterns. This paper uses Nanjing, China as a case study and examines the possibility of using the data cube technique in data mining to understand space–time travel patterns of Nanjing rail transit users.

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