Editorial

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Welcome to the August issue of the Institution of Civil Engineers (ICE) *Transport* journal. This issue includes an In Focus section, comprising two papers around the theme of ‘The Northern Powerhouse’, and three technical papers from diverse subject areas such as aircraft pavement data collection, a new approach to data collection for highway safety and the effects of weather on road safety in Iran.

The Northern Powerhouse is the UK government’s vision for a super-connected, globally competitive northern economy with a flourishing private sector, a highly skilled population and world-renowned civic and business leadership. It is important as the Northern Powerhouse forms part of the government’s industrial strategy which is building on the strong economy and helping businesses up and down the country maximise the opportunities presented by leaving the EU. The Northern Powerhouse geography covers all 11 northern Local Enterprise Partnership (LEP) areas as well as North Wales. The 11 northern LEPs are: Cheshire and Warrington, Cumbria, Greater Manchester, Humber, Lancashire, Leeds City Region, Liverpool City Region, North East, Sheffield City Region, Tees Valley, and York, North Yorkshire and East Riding. North Wales is defined as covering: Wrexham, Rhyl, Colwyn Bay, Llandudno and Bangor.

Published in the Chancellor of the Exchequer’s 2016 autumn statement, the Northern Powerhouse Strategy explains how the government will work with local stakeholders to address key barriers to productivity. The government will invest in transport infrastructure to improve connections between and within the North’s towns, cities and counties; work with local areas to raise education and skill levels across the North; ensure that it is an excellent place to start and grow a business; and ensure the Northern Powerhouse is recognised worldwide as an excellent opportunity for trade and investment.

In the 2018 budget, the UK government committed to publishing a new Northern Powerhouse Strategy within the next year. The strategy drives forward the ambitions for the Northern Powerhouse, recognising achievements since 2014, and looks to build on the strengths of the diverse communities, towns and cities across the region. The partner programme is an essential

part of creating the Northern Powerhouse. It is building a network of partners who all believe strongly in the economic potential of the North, and support the need for a combined effort by government and business to realise that potential. Building on this Northern Powerhouse theme, the first two papers illustrate that essential transport infrastructure is vital to achieving this goal.

The first paper, ‘Time series analysis of local authority policy interventions on highway works durations’ by Hussain *et al.* (2021), details a time series analysis to look for reductions in highways works duration. We are all aware that there is a compelling need to minimise highway works activities and their impacts in order to minimise disruption and inconvenience and maximise transportation movement above ground. The authors’ modelling results demonstrated that a highway works management permit scheme reduced utility works durations by 5.4% (727 work days annually). The key finding of this study is that chargeable permit schemes can create the impetus for change, as demonstrated by the utility industry. The study also identified that back-office policy changes such as business process improvements can have a key effect on improving on-site works execution.

The second paper, ‘Extending Cityringen – the challenges involved’ by Saltmarsh and Martini (2021), reviews the challenges involved and engineering solutions found in extending the city ring in Copenhagen’s new metro. In 2011 a contract was signed for the construction of Copenhagen’s new metro line, Cityringen, which connects 17 new underground stations in and around the centre of Copenhagen. To assist with the development of the city it was decided in 2012 and 2014 to add branches to Cityringen, connecting the city centre with the north and south harbour areas, respectively. This required the introduction of bifurcations to connect the branches to Cityringen tunnels (Figure 1). This paper outlines both engineering and logistical challenges introduced by these changes, from the construction of a 35 m deep shaft around existing stacked tunnels adjacent to an operational railway line to how the closing tunnels for the construction of the shaft impacted the tunnel installations and the overall time schedule, plus numerous other issues. The objective of all parties was

Figure 1. Photograph of tunnel break-through at the Øster Søgade shaft (reproduced by permission of Metroselskabet I/S)

expediently to define a solution to ensure the continued execution of the projects in accordance with the respective construction schedules. From collaborative discussions between the developer, the railway asset owner, CMT and Metroselskabet, a combined solution was determined. A true historical lesson from which the Northern Powerhouse team could perhaps learn.

The third paper, ‘Development of a non-linear PCI model for homogeneous zones of concrete airport pavements’ by Kwak *et al.* (2021), evaluates a new non-linear pavement condition index (PCI) model for airport pavements. Most previous PCI prediction models have considered only pavement age or traffic volume as a variable, without consideration of other factors that affect pavement distress. In this study, the authors take data from 12 airports using reports published from 1994 to 2013. The airport pavements were divided into homogeneous zones according to their function and structure. They then improved the management of concrete airport pavements through a non-linear PCI model; both homogeneous zones and tornado diagrams were used to analyse the sensitivity of the PCI according to the independent variables of the model. The authors conclude that the results showed that the developed model can predict the PCI of homogeneous zones of concrete airport pavements more reasonably by considering various factors that affect pavement distress.

The fourth paper, ‘Prioritising highway safety improvement projects: a robust data envelopment analysis approach’ by Dadashi and Mirbaha (2021), presents and evaluates an application of a robust data envelopment analysis (RDEA) multi-criteria model for prioritising safety improvement projects with limited budget and data uncertainty. The process of decision making about the selection of road safety improvement projects is a complex one as different issues can directly affect engineering decision making and implementation. One of the most important issues in road safety, requiring careful and

accurate investigation, is the prioritisation of hazard sites and their related allocated treatments based on their effectiveness or benefits. The authors used data from an existing case study to evaluate the performance of the model. One of the most important outcomes of the proposed methodology is that it helps decision makers by providing a useful tool for adjusting the level of robustness to consider the effects of unreliable data on safety project prioritisation.

The fifth paper, ‘The effect of weather on the severity of multi-vehicle crashes: a case study of Iran’ by Yazdani and Nassiri (2021), looks at the severity of multi-vehicle crashes under different weather conditions in Iran. Traffic crashes have become a social problem around the world. According to the statistics of the World Health Organization (WHO), 1.25 million people die as a result of traffic crashes in the world each year and 20 to 50 million people also get injured (WHO, 2015). Iran, with a population of nearly 77 million and 25 000 traffic-related deaths per year, is considered a high-risk crash-prone country. This paper assessed more accurate weather conditions than had been done previously, and reported findings which could help save lives in the future in Iran. The findings of the study could be used to provide quantitative support for road safety improvement, dynamic traffic management, highway facility improvements and speed limit management on highways in the north-west of Iran. Furthermore, with real-time traffic and weather data, severe crash occurrence probabilities can be monitored in real time.

It is clear that the papers presented in this issue contribute significantly to the field of transport infrastructure and safety and we hope that you will find these papers interesting and beneficial to your work. The mission of the journal is to attract high-quality papers that extend our reach internationally. Any comments on this issue’s articles are most welcome.

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