Editorial

Citation for published version:
Beckett, C 2022, 'Editorial', *Proceedings of the Institution of Civil Engineers - Engineering History and Heritage*, vol. 175, no. 4, pp. 107-108. https://doi.org/10.1680/jenhh.2022.175.4.107

Digital Object Identifier (DOI):
10.1680/jenhh.2022.175.4.107

Link:
Link to publication record in Edinburgh Research Explorer

Document Version:
Peer reviewed version

Published In:
Proceedings of the Institution of Civil Engineers - Engineering History and Heritage

EHH Editorial

04/11/2022

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Our November issue coincides with the UN Climate Change Conference. Last year's COP26 identified several key objectives to curtail average global temperature rises and to maintain progress towards achieving a low (or zero) carbon future: mitigation; adaptation; finance; and collaboration, enshrined within the Glasgow Climate Pact (UN, 2022). This forward-looking, or at least forward-hoping, document provides guidance for government planning for the coming decades and places responsibility for that planning squarely on the shoulders of engineers. However, it is important that, in our rush to design that future, we do not forget how we came to be where we are and upon whose shoulders we already stand.

A critical fact restated at COP26 is that road transport accounts for over 10% of global greenhouse gas emissions and around half of the world's oil consumption. Transitioning from a reliance on oil will require an almost complete overhaul of our transport infrastructure, not only in terms of the physical assets, but also the mentality with which we approach it. A key part of any new strategy must be effective, efficient, reliable, and rapid transport to transfer millions of commuters away from roads. These changes must occur in every country in the world; we cannot afford to consider any one country 'above' a need to change. How that change will appear and how it will manifest, though, is uncertain, however we have already seen its beginning in numerous national infrastructure projects for transport: High Speed 2; Crossrail; and the oft hoped for Northern Powerhouse rail project. Further afield, the Rail Baltica project will connect the Baltic States with the European rail network, offering greater opportunities for movement, trade, and unity than ever before.

This issue of Engineering History and Heritage focuses on geotechnical engineering. This revelation may seem an odd extension to the ideas expressed above. However, just as recognising a problem is the first stage in its remedy, geotechnical engineering is the first stage in constructing an infrastructure solution. A key aspect of geotechnical operations is addressing uncertainty. With a nod to the editorial for our February 2022 issue, the nature of how we address uncertainty evolves with time. However, uncertainty itself will always be with us and understanding how our forebears encountered and dealt with uncertainty in their projects will arm us well to face our own uncertain infrastructural future.

The first and second paper in this issue examine uncertainty through the lens of Stephenson's Kilsby tunnel, which, in 1833, formed part of the first intercity rail line running into London from Birmingham. In the first paper, the authors explore how an adequate ground investigation nevertheless failed, by pure chance, to reveal a large deposit of glaciofluvial water-bearing sand and how, in response, Stephenson designed and constructed a unique and extensive groundwater lowering scheme to protect the workers and the project. In the second paper, the authors go on to explore the geotechnical significance of these ground conditions and how Stephenson, though observation and interpretation, was able to control those conditions decades before Darcy and Terzaghi were able to describe the mechanics of groundwater flow and effective stress respectively. It is humbling to have Stephenson as one of our alumni and perhaps a testament to the inspiring achievements of all engineers working at that time that our current editorial panel comprises three academics at The University of Edinburgh.

The third paper in this issue explores how the Dutch cone penetrometer was developed (notably one hundred years after Stephenson was working at Kilsby) to counter uncertainty in characterising soil distributions and ground conditions. The cone penetrometer is now ubiquitous and it would be unusual to encounter a modern geotechnical engineer who is not familiar with its use and interpretation. However, it is a poor operator who does not know the origin and development of the tools which they use. Just as a good modeller should know, to the greatest confidence possible, the answer to the modelled question before they start, an operator should know the limitations of and assumptions behind the tools which they use. It was humbling, once again, to have had the opportunity to work alongside academics developing the next iterations of the cone penetrometer – the “T-bar”, “ball”, and “blade” penetrometers – as well as improving on the methods we use to relate cone penetrometer data to foundation design.

For all of this issue’s articles, the authors have provided us with some excellent diagrams and figures to explain the various concepts and processes described in the articles. Our readers are encouraged to explore these articles Ahead of Print on our Virtual Library homepage.

References

UN, 2022. COP 26: The Glasgow Climate Pact, https://ukcop26.wpenginepowered.com/wp-content/uploads/2021/11/COP26-Presidency-Outcomes-The-Climate-Pact.pdf