

Editorial

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We believe that forensic study exists in every discipline in civil engineering. From malfunctions to total failures of structures, forensic investigation has been widely deployed in geotechnical engineering and used to develop design methods since 1857, when Rankine developed the earth pressure theory for excavation stability. Forensic engineering techniques such as failure analysis and back-calculation have become major elements in most popular geotechnical engineering topics including landslide mitigation, retaining structures, excavation, tunneling and so on.

In the following two issues of *Forensic Engineering*, there are six papers related to forensic geotechnical engineering. These papers were solicited from researchers and scholars who had presented their studies at the 16th European Conference on Soil Mechanics and Geotechnical Engineering, and the 15th Asian Regional Conference on Soil Mechanics and Geotechnical Engineering. These papers cover a wide range of forensic investigation, techniques, trends and even definitions applied for geotechnical structures.

In this issue of *Forensic Engineering*, Quigley and colleagues first examine the importance and adequacy of geotechnical investigation within recent building and infrastructure projects in Ireland (Quigley *et al.*, 2016). Quality assurance of ground investigation and the importance of laboratory tests are emphasised by the authors. The risk management and economic aspects of ground investigation in relation to the entire project are discussed in detail as well.

A well-written textbook case study on rock anchorage failure is presented. Graham *et al.* (2016) report forensic investigation on a rock anchorage failure case. The presented study points out some critical issues on assembly inspection, material handling, component integrity and maintenance. Forensic geotechnical engineering requires knowledge not only in geotechnical engineering, but also in construction techniques, material science and maintenance operation.

Rather than investigating a system breakdown, Vandanapu and colleagues report a study focusing on specific geotechnical material (Vandanapu *et al.*, 2016). They present a comprehensive study on foundation problems caused by the specific collapsible soil. The presented study explores problems from fundamental characteristics of problematic soil and provides mitigation recommendations by engineering particular properties of soil.

Another interesting aspect of forensic geotechnical investigation is that most completed geotechnical structures are buried in or covered with soils. For most of the time, it is not easy to assess the condition or performance of geotechnical structures by way of a

visual inspection. A variety of advanced inspection methodologies have been developed to assist condition assessment for geotechnical structures in service. Two innovative and inspiring case studies on applications of physical inspection methods in forensic geotechnical engineering are presented in this series. Warren and her co-workers utilised thermal imaging technology to assess condition and possible defects of drystone walls (Warren *et al.*, 2016). Gunn *et al.* (2016) adapted the surface wave image profiling method to evaluate the condition and integrity of embankments. Both proposed inspection technologies are approved to be promising and reliable for evaluating the condition of targeted structures.

Professor Babu, who is the present chair of the technical committee on forensic geotechnical engineering of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE) ends this series of papers nicely by introducing the missions, working structure and technical contents of the ISSMGE forensic geotechnical engineering technical committee (Sivakumar Babu, 2016). Professor Babu describes the important elements of geotechnical forensic investigation in detail with state-of-the-art insights.

Forensic engineering is recognised as one of the highly cross-principle applied sciences in civil engineering. The Institution of Civil Engineers' *Forensic Engineering* journal is looking forward to engaging different engineering groups to present research progress, engineering practices and lessons learnt on engineering structure failures. This series of papers on forensic geotechnical engineering is just the first, yet important, step for us to reach out to major fields of civil engineering. There will be more series of papers on climate change, structural engineering, bridge engineering, hydraulic engineering, lifeline engineering, transportation engineering and so on to be presented in *Forensic Engineering* in the future. In addition, we are also making efforts to explore regional issues of forensic engineering to address the importance of local adaption or limitations when conducting forensic investigation and analysis in different countries and regions.

Members of editorial panel of *Forensic Engineering* would like to thank Professor Costas Georgopoulos for his great leadership and devotion to the journal in his term as the panel chair. We appreciate Professor Georgopoulos' tremendous efforts to make this journal become one of the most innovative and educational engineering journals in publication. His achievement and his role in *Forensic Engineering* are irreplaceable and greatly admired.

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