

Editorial

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This issue of *Forensic Engineering* shows a good combination of forensic geotechnical and serviceability engineering. Among the five papers within this issue, there are three papers on forensic geotechnical engineering, and two papers on serviceability forensic engineering. Interestingly, the objects of forensic investigations presented in this issue are clear and prominent; moreover, the causes of the failure could be fundamental elements such as wind, water, soil, or complicated natural hazards and manmade machinery. The papers in this issue present the variety of forensic engineering and point out that forensic engineering could be anything, anywhere and probably anytime.

Collapsible soils of the loessial type are frequent causes to failures or malfunctions of shallow building foundation in areas such as south USA, Central to South America, Africa and the Middle East. Kalantari's (2013) paper has made a good effort to summarise previous research in the identification of collapsible soils and foundation design to avoid it. Extensive discussion on causes of collapse and prediction of failure consequences (settlement) are first presented based on the fundamental properties of such problematic soils. The foundation failures associated with such collapsible soils and proper foundation design in response, which could be applied to avoid such structural disability, are then described. In the conclusion, the author addresses the importance of field observation and laboratory tests in identifying the collapsible potential of such soils, as well as to inform proper foundation designs.

Tsukamoto *et al.*'s (2013) paper is the first in *Forensic Engineering* to report on the failure investigation following the 2011 Japan Tohoku Earthquake. We are truly grateful to the authors for this article contribution while they are still busy in their research and mitigation works since the devastating event. This paper presents a well-organized investigation process on structure failure during extreme hazard events. The progress of field observation, field testing and failure analysis are presented in detail. By analysing test data obtained by the Swedish Weight Sounding Penetration method, the authors were able to identify the possible causes of such a complicated embankment failure involving soil liquefaction and multi-slip plane slope instability. This study's progress not only documents a useful case study, but also provides a quick and direct investigation methodology for similar failures.

'A tale of twin cut slopes in Taiwan' (Liao *et al.*, 2013) describes a fatal failure in a very dramatic form. This paper

describes a serious landslide that slipped into a freeway and killed five people. The authors present the most important findings on major failure causes and make comparisons to an adjacent slope which was less reinforced yet unaffected by the landslide. Important design, construction and maintenance issues including the ground anchors, which would affect stability of a cut slope, are discussed in depth in this article. Valuable failure information obtained from the investigation would have deterministic effects on revisions of future design and maintenance codes. Another interesting finding is that a so-called 'minor construction adjustment' during the construction stage would possibly have had influential long-term effects on the stability of a cut slope located in a unique geological and groundwater environment. The engineering importance of long-term performance of manmade structures has been proved again in this case study. This paper provides engineers with a lot to consider when conducting design and construction works for similar slope engineering projects.

Forensic Engineering has covered many case studies of construction failure, however, fewer cases have been reported concerning serviceability issues, such as ground vibration during construction. Sivinkin (2013) makes great effort to summarise forensic engineering analysis of construction vibrations including an assessment of construction dynamic sources and their scale in energy level; wave propagation in soil and resulting soil deformation; and the disturbance effects to structures, machine operation and adjacent environments. Comprehensive illustrations on structural condition surveys, measurement of ground vibration and liability criteria regarding construction vibration controlled are also provided in this paper with a well-written case study. Awareness of the influences of ground vibration on construction quality is raised and discussed.

The last paper in this issue (Crump, 2013) reports on the best practice and case studies concerning indoor air quality investigation. This paper brings forensic engineering into human health and well-being. The nature of the problems caused by poor indoor air quality, the assessment building performance with respect to indoor air quality, the establishment of appropriate methods of measurement for the investigation of occupant complaints and a strategy optimised for the building or other internal environment are summarised in detail by the author. The author considers the international standards available for indoor air quality investigation. A

comprehensive case study is also included in this paper to illustrate best practice for investigating indoor air quality and a countermeasure proposal for improving the quality provided.

All five papers presented in this issue of *Forensic Engineering* cover various objects of forensic investigation. Investigation procedures for different objects may be different; but important elements such as field observation, field testing, laboratory testing and failure analysis are the keys to successful forensic investigation. Summaries of up-to-date methodologies are always appreciated and rewarded. Forensic investigation on devastating failures presented with a well-designed investigating workframe and very detailed failure analyses provide valuable engineering information and can act as general guidelines for similar investigations. Both the subjects of Tsukamoto *et al.*'s and Liao *et al.*'s papers were first seen on general news media and generated attention from the engineering society internationally. *Forensic Engineering* endeavours to report such investigations with insightful detail and from a forensic standpoint. Finally, the editorial panel would like to thank all the authors for their contributions to and support of *Forensic Engineering*.

REFERENCES

- Crump D (2013) Investigating indoor air quality problems: best practice and case studies. *Proceedings of the Institution of Civil Engineers – Forensic Engineering* **166(2)**: 94–103, <http://dx.doi.org/10.1680/feng.13.00001>.
- Kalantari B (2013) Foundation on collapsible soils: a review. *Proceedings of the Institution of Civil Engineers – Forensic Engineering* **166(2)**: 57–63, <http://dx.doi.org/10.1680/feng.12.00016>.
- Liao HJ, Lee WF and Want C-W (2013) A tale of twin cut slopes in Taiwan. *Proceedings of the Institution of Civil Engineers – Forensic Engineering* **166(2)**: 72–80, <http://dx.doi.org/10.1680/feng.12.00024>.
- Svinkin MR (2013) Forensic engineering of construction vibrations. *Proceedings of the Institution of Civil Engineers – Forensic Engineering* **166(2)**: 81–93, <http://dx.doi.org/10.1680/feng.12.00017>.
- Tsukamoto Y, Ishihara K, Kawabe S and Kanemitsu S (2013) Liquefaction-induced road embankment failures. *Proceedings of the Institution of Civil Engineers – Forensic Engineering* **166(2)**: 64–71, <http://dx.doi.org/10.1680/feng.12.00020>.