

UNIVERSITY OF
BIRMINGHAM

Midland Geotechnical Society Meeting Notice

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Contact Us

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Meeting Venue

Lectures start 7pm

University of Birmingham B15 2TT

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Refreshments are available prior to
the meeting in the Shell lounge,
Department of Mechanical and Civil
Engineering, from 6:15 onwards.

Monday 3rd April 2017

John Mitchell Lecture 2017

Monitoring the performance of clay slopes

Dr Andrew Ridley

Geotechnical Observations Limited



Synopsis

Infrastructure embankments and cuttings are used to afford the passage of roads, railways, rivers and canals with a minimal need for changes in vertical alignment. In the cases of canals and railways in particular many of these earth structures were constructed before the development of modern soil mechanics. The change in condition of the materials used to construct them and their progressive deformation has a critical effect on their long-term serviceability and stability.

Finite element analyses show that the long-term stability of cuttings formed of plastic clays is influenced by gradual and slow swelling promoted by increasing pore water pressures that are initially decreased to negative values during excavation to form the slopes. Analyses also indicate that seasonal cyclic stress changes brought on by fluctuating pore water pressures cause plastic strains that can eventually lead to instability in embankments formed of plastic clays. If analyses such as these are to be used to assess the serviceability and stability of clay slopes (old and new) it is essential that they be fed with good data on pore water pressures and deformations, obtained from reliable field and laboratory measurements. This lecture will present field measurements gathered during the last 20 years and describe how they were made. Comparisons will be drawn with the predicted behaviours of clay slopes.

About Our Speaker

Andrew is the Managing Director of Geotechnical Observations Ltd and was a founding Director of the company. In his current role he has overseen the continued development and growth of the company and is responsible for all aspects of managing the company.

After graduating from Nottingham University in 1984 with an Honours Degree in Civil Engineering, Andrew joined Fugro Limited as a Junior Geotechnical Engineer. He was involved in offshore and land based site investigations using state of the art technology for sampling and in situ testing. During this time he also gained extensive experience in the interpretation of laboratory and in situ tests and the engineering behaviour of offshore piles. In January 1986 he joined W.S. Atkins and Partners. As a member of their Oil and Gas Division he worked as a Geotechnical Engineer with responsibilities for the foundation design of a variety of offshore oil production facilities. He was also involved in the conceptual design of a new generation of lightweight liftable steel jacket structures and a monopod platform. In 1987 Andrew was Assistant Resident Engineer during the installation of three catalytic cracker vessels (450 - 700 Tons) for upgrading the Shell UK Stanlow oil refinery.

In 1988 Andrew completed a Masters Degree in Soil Mechanics at Imperial College and was subsequently invited to do research with Professor John Burland. His first research project was to investigate the volume changes in clay soils subjected to isothermal and temperature induced drying. The results of this study were used to advise about possible design features which might reduce the amount of shrinkage beneath hot oil storage tanks. In 1993 he was awarded a doctorate and the prestigious Unwin Prize (best PhD in Engineering) for his work on the measurement of soil suction. The principal outcome of his research was the development of a new high range tensiometer ("The Suction Probe") capable of, for the first time, directly measuring suctions in excess of 100kPa. This has since led to a large number of new research streams.

Following a short period of post doctoral research, Andrew joined the permanent staff of the Department of Civil and Environmental Engineering at Imperial College in January 1996 as a Principal Research Fellow. In this role he directed the college's research activities in the area of partly saturated soils. He was invited to deliver the state-of-the-art address on suction measurement to the 1st International Conference on Unsaturated Soils in Paris in 1995. He has published widely on this subject, convened two short courses at Imperial College and has spoken at numerous Learned Society Meetings and Conferences. In September 2015 he delivered a Keynote Address on the subject of Soil Suctions – what they are and how to measure them, to the 9th International Symposium on Field Monitoring In Geomechanics held in Sydney Australia. During his time as a Research Fellow Andrew started working with Professor Peter Vaughan on the London Underground Knowledge and Planning Programme aimed at establishing a new Engineering Standard for London Underground's earth structures. It was during this time that Andrew developed a flushable piezometer for the in situ measurement of soil suctions. This tool has been used to study slope stability throughout the world and was the driver behind the establishment of Geotechnical Observations in April 2000.

At the same time as forming Geotechnical Observations Andrew was appointed as a part-time lecturer in the Department of Civil and Environmental Engineering at Imperial College, where he taught MSc Soil Mechanics (Laboratory & Field Techniques and Partly Saturated Soil Mechanics) and MSc Engineering Geology (Basic Soil Mechanics). He left Imperial College in March 2004 to concentrate on the development of Geotechnical Observations, but remains in contact with this and other Universities on academic matters. In recent years Andrew has turned his attentions to the wider subject of instrumentation and the application of new monitoring techniques to the study of ground and structural behaviour. He is particularly interested in the use of remote logging and rapid logging to enable near "real-time" monitoring. He continues to bring to the industry the same enthusiasm and drive that he always has and strives to provide the best possible service. Andrew has sat on the Steering Committees for various industry and research projects including the CIRIA 550 Infrastructure Embankments – Condition Appraisal and Remedial Treatment and was a member of the sub-committee to the Advisory Panel of Géotechnique for the 2011 Symposium in Print on Partial Saturation in Compacted Soils. He is currently a member of ISO/TC182/WG2 Monitoring in Geotechnical Engineering, which is drafting new International Standards for Instrumentation and Monitoring (e.g. inclinometers, extensometers and piezometers). He is also currently a member of the BSI National Committees for Site Investigation and Ground Testing (B/526/03) and the Revision Group (B/526/03/04) responsible for redrafting BS5930 Code of Practice for Ground Investigations.:

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