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UNIVERSITY OF BIRMINGHAM

Midland Geotechnical Society Meeting Notice

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Contact Us

Honorary Secretary: Scott O'Neill

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Meeting Venue

Lectures start 7pm
University of Birmingham B15 2TT

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

Talk kindly sponsored by:

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Monday 6th November 2017

New Mexico City International Airport (NAICM): some challenges of building on virgin Lake Texcoco clays

Dr Nick O'Riordan, Arup

Synopsis

The site of NAICM covers a hitherto undeveloped 10 km square area immediately to the east of Mexico City, a conurbation with a population in excess of 20M. The airport is located on the former Lake Texcoco, to the east of the Aztec dam that separated the 'freshwater' lake, upon which Tenochtitlan was founded and where much of the city later developed, from the 'salt water' lake deposits. Lake Texcoco deposits comprise up to 500m of soft clays that become progressively stiffer below about 30m depth, and are interbedded with silts and sands of variable mineralogy, diatom content, density, stiffness and permeability. Groundwater is extracted for the public water supply from wells below 120m depth. Since 1930 there has been regional surface subsidence of about 8 to 10m, with current settlement rates being about 20 cm/year in the vicinity of the site. The softest soils have a void ratio of about 6, a water content around 250%, a plasticity index of about 200% and an effective stress friction angle of over 40° in compression. Engineering properties of the soil in this area of continuing consolidation and subsidence present something of a moving target.

The presentation describes the complex depositional and drainage history of the site, ground investigations, the use of compensated foundation design principles for the 1.6 km x 0.5m passenger terminal building, and the shallow piled mat foundation for the 89m high air traffic control tower. Newly developed soil properties together with back-analyses of some case histories of instrumented excavations bridges and structures enable predictions of foundation behaviour during large magnitude earthquakes to be made. Operational strengths for excavation and pile design in these materials is somewhat challenging and some results from a full scale testing program will be presented. The Mw=7.1 Puebla-Moreles earthquake of 19 September 2017, 105 km away from the site, had little or no effect upon the construction works, and some aspects of this event in relation to the affected areas of Mexico City, on stiffer ground 10km SW of the site, will be presented.

About our speaker

Nick is an Arup Fellow and has been the Global Geotechnics Skill leader for Arup since 2009. He has over thirty years' experience of ground-related risk management associated with contaminated and derelict land, earthquake and storm hazards and collapses of underground excavations. He is experienced in the aggregation of technical, financial and program risks associated with all aspects of ground engineering. He has acted as an expert witness on matters relating to geotechnical analysis and ground contamination and has been cross-examined in both English and US

jurisdictions.

Nick has worked on many aspects of soil/structure interaction ranging from offshore and high speed railway structures to the construction of embankments on very soft clays and the performance of piles in very stiff clays. Several of his projects have pioneered the use of embodied energy calculations and carbon footprinting of construction. He was the Ground Engineer Manager during the detailed design and construction of High Speed 1. Significant recent projects include the foundations for Salesforce Tower (at 326 m, the tallest building in San Francisco), the nearby Transbay Transit Center substructure and the base-grouted piling for the new Gerald Desmond Bridge, Port of Long Beach, CA.

This seasons lectures are as follows:

Date	Location	Speaker Name & Company	Title	Sponsor
6th November	University of Birmingham	ARUP, Dr Nick O'Riordan	New Mexico City International Airport: Some challenges of building on virgin Lake Texcoco clays	Huesker
4th December	University of Birmingham	Shezad Hafiz, Aecom	BTYM Joint Meeting Inner Doha Resewerage Implementation Strategy; tunnelling in the Middle East	AECOM
8th January	*University of Birmingham*	*Nick Sartain*	*Geotechnical aspects of HS2*	Arcadis
5th February	*University of Birmingham*	*TBC*	IGS joint meeting (provisional) Talk title TBC	*WSP*
5th March	University of Birmingham	Mike Streetly, ESI	Hydrogeological Interpretation @ Stonehenge	Applied Geology
9th April	*University of Birmingham*	*TBC*	*John Mitchell Lecture 2018*	*Geotechnics*
14th May	*University of Birmingham*	*Ben De Waal, The Fiscal Incentives Group*	*Environmental lecture: Land remediation tax relief on brownfield/derelict sites*	*DTS-Raeburn*

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