

Seminar Announcement

Date & Time:

August 29, 2012, 3:00-4:30

Location:

Science and Engineering South (SES) Building, Room 138, 845 West Taylor Street, Chicago, IL 60607

Title:

Electro-osmotic Consolidation of Peat and Organic Soils of Sarawak, Malaysia

Speaker:

Kaniraj Shenbaga, Professor, Department of Civil Engineering, Faculty of Engineering, Universiti Malaysia Sarawak, Malaysia

Synopsis:

Malaysia is comprised of non-contiguous land masses. The Peninsular Malaysia on the west and the two states of Sarawak and Sabah on the Borneo Island in the east are separated by more than 600 km by the South China Sea. The problems of soft alluvial and marine soil deposits are, however, common to both parts of Malaysia. Peat swamps too are a problematic ground condition in East and West Malaysia. There are about 2.7 million hectares of peat swamp in Malaysia. Of this, about 63% or about 1.7 million hectares are in the Sarawak state. The soft alluvial, marine, and peat deposits pose problems of stability and settlement of structures built on such deposits. Preloading with prefabricated vertical drains is the common method of ground improvement employed in Sarawak. This requires importing of preload material to the site and removing the same after the treatment. Long time periods are also required for ground treatment by preloading. Electro-osmotic consolidation is an effective ground improvement technique in fine grained soils. Electro-osmosis is one of the several electrokinetic reactions that take place when a direct current voltage is applied across the electrodes inserted into a saturated soil. The ions in the pore water, which are attracted to the oppositely charged electrodes, drag the surrounding free water molecules along with them. The net water movement is towards the cathode. If there is drainage available at the cathode, then consolidation takes place. The electro-osmotic flow rate is not only more than hydraulic flow rate, it occurs without any need to apply external loading on the soil. Several successful field applications of electro-osmotic stabilization are quoted in literature. Researchers and engineers in South East Asia too have shown interest on the electro-osmosis technique recently. Development of new geosynthetic products namely electrokinetic geosynthetics and availability of inexpensive electricity could make electro-osmosis a viable option for improvement of soft ground in Malaysia. However, there are not many studies reported on the effectiveness of electro-osmotic consolidation in peat and organic soils. Laboratory experiments carried out on peat found in the North Sarawak region indicated good potential for electro-osmotic stabilization of peat. In this talk, first we will highlight the soft soil problems of Sarawak. Following this, we will look at the science of electro-osmotic consolidation briefly. Finally, we will discuss the details and results of the electro-osmotic consolidation studies carried out on peat and organic soils of Sarawak.

Speaker Bio:

Dr Kaniraj Shenbaga PhD., M.Tech, M.E., B.E., is currently a Professor in the Department of Civil Engineering, Faculty of Engineering, Universiti Malaysia Sarawak, Malaysia. He is an Affiliate Member of American Society of Civil Engineers, Member of the International Society of Soil Mechanics and Geotechnical Engineering, and Member of the Indian Geotechnical Society. Dr Kaniraj has more than 40 years of teaching and research experience in Malaysia, India, Canada, UK, and Iraq. He has published a book and more than 60 papers in international journals and conferences. His research interests include peat and soft soils engineering, geotechnical utilization of fly ash, reinforced embankments on soft soils, and pile foundations. He led a research project "Electro-osmosis and Electro-stabilization Experiments on Soft Soils of North Sarawak" with a research grant from Ministry of Science, Technology, and Innovation. His research at the Indian Institute of Technology, Delhi, where he worked for nearly 30 years, concerned the utilization of fly ash in road pavement applications, development of fibre reinforced fly ash, and reinforced embankments on soft soils. Dr Kaniraj Shenbaga has also held research appointments at the University of Oxford, U.K. and the University of Calgary, Canada.