Cross-Canada Lecture Tour Presentation (CCLT)

Date: Tuesday, October 8, 2013
Time: Registration at 11:45
   12:00: Full Hot Buffet Luncheon
   12:45: Presentation
Location: Hellenic Meeting and Reception Centre, 1315 Prince of Wales Drive, Ottawa, Ontario
Presentation: Geo-Alchemy: Turning Sand into Sandstone and other Microbiological and Bio-Inspired Ground Improvement Technologies
Speaker: Edward Kavazanjian, Jr., Ph.D., P.E., NAE
Admission: $15 OGG members; $20 non-members; $10 students (cash or cheque only)
RSVP: oggtreasurer@hotmail.com by Noon October 4, 2013

Please note that it is only $20 to become a member of the OGG. You can sign up at this event!

Abstract

The application of microbiological and bio-inspired processes offers the potential for sustainable, cost effective, non-disruptive ground improvement for a variety of geotechnical problems. Potentially beneficial applications of bio and bio-inspired processes include increasing the stiffness and shear strength of soil to enhance foundation bearing capacity, stabilize slopes and excavations, and facilitate tunnelling in running and flowing sands, reducing the susceptibility of soil to earthquake-induced liquefaction, fugitive dust control, and reducing permeability for groundwater control. Microbiological and bio-inspired processes that can be potentially employed for these applications include mineral precipitation, gas generation, and growth of biofilms and biopolymers. Many of these processes are known to improve the engineering properties of soil on a geological time scale, and some of these processes are known to induce potentially beneficial effects in shorter time frames but in situations where the context renders these effects undesirable (e.g. clogging of well screens and treatment plant filters).
The engineering challenges in developing beneficial applications of these microbiological and bio-inspired ground improvement processes involve identifying and inducing the desired process over a time frame of engineering interest in the location of interest. Successful application of these processes depends on a variety of factors, including the goal of the process, soil type, the mechanism employed, depth below ground surface, interactions with microbes and chemicals present in the subsurface, pH, temperature, pressure, concentration of ions, and the availability of oxygen and other oxidants. Development of microbiological and bio-inspired ground improvement processes is an interdisciplinary endeavour that requires collaboration among microbiologists, chemists, geologists, and geotechnical engineers. Current research in biological and bio-inspired ground improvement includes induced carbonate precipitation in sands and silts to strengthen and stiffen soils, microbiological gas generation for mitigation of liquefaction potential, and carbonate precipitation and application of biopolymers for fugitive dust control.

Conceptual Microbiological and Bio-Inspired Ground Improvement (Dejong et al., 2012)

About the Speaker

Edward Kavazanjian, Jr., Ph.D., P.E., D.GE, NAE, is the Ira A. Fulton Professor of Geotechnical Engineering in the School of Sustainable Engineering and the Built Environment at Arizona State University in Tempe, Arizona, USA. He joined the faculty at Arizona State University in August 2004 after 20 years as a practicing geotechnical engineer. Prof. Kavazanjian has Bachelor and Master of Science degrees in Civil Engineering from M.I.T. and a Ph.D. in Geotechnical Engineering from the University of California at Berkeley.

Prof. Kavazanjian was elected to the US National Academy of Engineering in February 2013 in recognition of his work on design and construction of landfills and waste containment systems and on geotechnical earthquake engineering. Prof. Kavazanjian currently serves on the Board of Earth Sciences and Resources (BESR) of the National Research Council (NRC) of the National Academies of Science and Engineering as chair of the Committee on Geotechnical and Geological Engineering. He is a Past-President of the Board of Governors of the Geo-Institute of the American Society of Civil Engineers (ASCE). He is recipient from ASCE of the 2009 Ralph B. Peck Award for his published case history contributions to landfill engineering, the 2010 Thomas A. Middlebrooks Award for his paper on Shear Strength of Municipal Solid Waste, and the 2011 Karl Terzaghi Award for his ASCE publications on the analysis, design and construction of waste containment systems.
He has delivered keynote addresses and state of the art papers on waste containment systems and landfill engineering at several international conferences and is co-author of the U.S. Environmental Protection Agency guidance document of *RCRA Subtitle D (40CFR258) Seismic Design Guidance for Municipal Solid Waste Landfill Facilities*. Prof. Kavazanjian is also recognized for his work on geotechnical seismic design of transportation systems. He is lead author of the FHWA guidance document of *LRFD Seismic Analysis and Design of Transportation Geotechnical Features and Structural Foundations*. He is a registered Professional Engineer in Arizona, California, and Washington and has served as Engineer of Record on numerous landfill and waste containment projects.

Map to Hellenic Meeting and Reception Centre

1315 Prince of Wales Drive
Ottawa, Ontario
K2C 1N2
Sponsors for Cross Canada Lecture Tour, Fall 2013

Organization:

The Canadian Geotechnical Society
La Société canadienne de géotechnique

Founding:

The Canadian Foundation for Geotechnique
La Fondation canadienne de géotechnique