Vancouver Geotechnical Society
A Local Section of the Canadian Geotechnical Society

Visit : www.v-g-s.ca

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NOTICE OF UPCOMING DINNER PRESENTATION

CANADIAN GEOTECHNICAL SOCIETY

2012 FALL CROSS CANADA LECTURE TOUR

MONDAY, OCTOBER 29, 2012

SUBJECT: **Flaws in the NCEER liquefaction assessment method and how to fix them**

SPEAKER: **Mr. Mike Jefferies**
Golder Associates

Mike is a civil engineer with 35 years of experience, mostly in consulting but ten years of that with "owner" companies. It was this ten years with owners, and in the Canadian Arctic with Gulf Canada Resources in particular, that provided an enormous opportunity to "push the envelope" and which led to the most significant of his contributions to engineering (or, more accurately, engineering science).

A keynote speaker at international conferences on Arctic offshore engineering, hydraulic fill construction, and liquefaction, Mike has published some seventy-five papers ranging across ice loading of offshore platforms through to rock fracture grouting. But he is generally most known for the state parameter approach to soil characterization – an approach that has become one of the most cited innovations of the past twenty-five years of geotechnical engineering..

The state parameter work led to an invitation to write a book on soil liquefaction, now sold-out with a second edition pending. As will be evident from a quick glance at the book, Mike is an exponent of the heresy that geotechnical engineering must be based on applied mechanics, not geology, and that the critical state is fundamental, readily measurable, unique, and something every geotechnical engineer should appreciate.

CONTENT: Soil liquefaction is conventionally evaluated through an empirical framework based on accumulated experience from case histories - the "NCEER Method". An incorrect view has developed that because the NCEER method is based on case histories, then it must be correct. The reality is that the NCEER framework contains inconsistent physics and characterizations that are unrelated to modern understanding of soil behavior – the NCEER method can mislead, and is particularly misleading in the case of post-liquefaction strength.

The underlying problem with the NCEER approach is that it is anchored to a geological view where soil behavior is characterized in terms of soil type. However, alternative mechanics-based views have been extensively funded by the US National Science Foundation over the past two decades, with many workers developing models to the extent that today, liquefaction can be viewed as "just another soil constitutive behavior".

This talk will present soil liquefaction (both cyclic mobility and static) within the context of a modern constitutive model, NorSand, to illustrate a proper approach to evaluating the effect of soil type ('fines content'), stress level and initial stress state on liquefaction. A

two-pronged approach is used with soil state in situ being inferred from the CPT, while the cyclic strength-state relationship is computed using measurable, standard, soil properties (compressibility, etc.). Computed liquefaction resistances are consistent with the case history record, but the approach now offers understanding as to how that case history experience should be extrapolated to other situations.

Contrary to what might be expected, the proposed approach turns out to be both straightforward and readily done in engineering practice - the calculations run in a spreadsheet. Of course, it now becomes necessary to measure soil compressibility and elastic shear modulus – but this is not a limitation since both are key inputs to the site assessment and are readily, and inexpensively, measured.

A PDF version of the talk will be available to attendees; the open-code *.xls will also be available for those interested in it.

DETAILS

Executive Inn, 4201 Lougheed Highway, Burnaby, BC V5C 3Y6 (Phone: 604-298-2010)
Social Hour: 5:30 to 6:30 pm (drinks available at the hotel bar)
Technical Presentation: 6:30 to 7:45 pm
Dinner: 8:00 pm ($30 will be charged for dinner)
RSVP: Dinner reservation to ali.amini@shaw.ca by Friday, October 26, 2012.

The VGS would like to thank the following companies (in alphabetical order) for financially sponsoring this Cross Canada Lecture Tour:

- ***BGC Engineering Inc.***
- ***EBA Engineering Consultants Ltd.***
- ***Golder Associates Ltd.***
- ***Thurber Engineering Ltd.***

The Cross Canada Lecture Tour is organized by the Canadian Geotechnical Society and its various local sections, and travel funds are provided by the Canadian Foundation for Geotechnique.