



Vancouver Geotechnical Society

A Local Section of the Canadian Geotechnical Society

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NOTICE OF UPCOMING DINNER PRESENTATION

TUESDAY, JANUARY 17, 2012

SUBJECT:

Wick Drains and Piling for Cai Mep Container Port, Vietnam

SPEAKER:

Bengt Fellenius, Dr. Tech, P.Eng.

Dr. Bengt H. Fellenius is a professional engineer specializing in foundation design and studies by participation in project teams, special investigations, instrumented field tests, etc. Services are also provided in regard to construction problems, claims, and litigation in collaboration with Consultants and Contractors, as well as Owners. Dr. Fellenius, Professor of Civil Engineering at the University of Ottawa from 1979 through 1996, is an internationally recognized authority in the field of soil mechanics and foundation engineering, and, in particular, in deep foundations. He has gained a wealth of practical experience during more than 40 years of work at home and overseas through a variety of assignments that encompass foundation, embankment, and soil improvement design for water and sewage treatment plants, industrial plants, as well as bridges, highway, and airport projects, and marine structures and urban area development projects; some of which he has written up in 300 technical journal and conference papers, articles, books, and book chapters.

CONTENT:

Vietnam is integrating into the world economy at an increasing rate, causing a rapid growth in the urban population with significant rural to urban migration. The development has brought enormous challenges to the society not least in creating the infrastructure to meet the increased transportation and trade demands. The Vietnam geology is characterized by vast areas with thick deposits of soft, deltaic soil, numerous rivers and streams, and frequent floods, where new highways, bridges, and ports are now being constructed. In early 2009, construction started for the Cai Mep Port, a new container terminal in the Mekong delta approximately 80 km southeast of Ho Chi Minh City. The site comprises about 35 m of very soft clay over sand. The mean water table lies at the ground surface, but it will seasonally be well above the ground. Construction requires raising the area by several meters and placing all structures on piled foundations.

The site of the new container facility extends over an 800 m by 600 m area along the Thi Vai River. The low-lying land required the area be raised well above the highest water level expected at the site, which requires raising the ground surface by 2 m to avoid flooding and to create a suitable foundation surface. Because of the thick very compressible clay and silt layer, the fill will cause significant settlement, which would continue for a very long time. To shorten that time, vertical drains (wick drains) were installed through the soft deposits and into the sand across the site. Moreover, a temporary surcharge was added to the fill raising the surface an additional 2.5 m to 4.5 m. It was expected that if the surcharge was removed when 80 % to 90 % of the consolidation settlements had developed, the long-term settlement for the finished facility would be small and acceptable.

Settlements were measured at numerous surface bench marks. In a few locations, settlements and pore pressure distributions were also measured. In December 2009, approximately six months after placing the fill, the observations indicated that the desired

degree of consolidation had been achieved. The original ground surface had then settled about 3 m. The temporary surcharge was removed and piles were driven to support the foundations of the structures to be built at the site. The piles, driven precast piles, were designed as shaft bearing (floating) in the soft clay and were only 18 m and 28 m long. Working loads were small, 380 and 260 KN, respectively.

It was soon noticed that the area continued to settle even after the temporary surcharge had been removed. Moreover, survey of the pile head elevations showed them to settle also and at the same rate as the ground surface. This raised considerable concerns for the project.

The lecture will present the soil conditions, the original design of the wick drain site improvement, the measurements, aspects of the piling including results of static and dynamic tests, back-analysis of the observations, propose explanation of why the settlements continue, predict the magnitude of future settlement to occur at the site, and present the remedial measures undertaken.

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 7:30 pm

Dinner: 7:45pm (\$10 will be charged for dinner to cover a small portion of the cost.)

RSVP: Dinner reservation to ali.amini@shaw.ca by Friday, January 13, 2012