Workshop on "Soil Parameters - Interpretation for Design"

by Mr. Richard Ong Tian Hwa Grad. IEM

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The one-day workshop on "Soil Parameters - Interpretation for Design" was organized by Geotechnical Engineering Technical Division (GETD) on 21 August 2013 at the Auditorium Tan Sri Prof. Chin Fung Kee, Wisma IEM with the aim of providing exposure to participants on the assessment of data from soil investigation works.

Mr. Mike Dobie, who conducted the workshop, had more than 30 years of working experience. He used a lot of real world examples as course materials for discussion. The workshop was divided into four parts.

In the first part, Mr. Mike Dobie started with two illustrations of soil behaviour, using the beach sand and the bottle to introduce a number of important geotechnical concepts: drained and undrained behaviours, soil shear strength and dilation, permeability and flow in soils. This was followed by a relatively quick "revision" about soil index properties. Index property values are generally plentiful in geotechnical site investigation reports, so are vital as a means of checking both consistency of the data and the results of other tests, such as soil shear strength. The speaker highlighted the importance to create useful summaries of data, which will go a long way towards identifying any anomalies when assessing the soil index properties.

In the second part, Mr. Mike Dobie discussed on soil shear strength. This session covered the principle of effective stress, appropriate strength to use (i.e., drained or undrained), procedure for measuring shear strength of fill (i.e., shear box test and triaxial test), and assessing shear strength from index properties. The speaker emphasised on the importance of using the appropriate shear strength in the design to prevent failures, especially for embankment construction. The common issue of measuring "high c low ϕ" from shear box test for fine grained soil is also discussed. It is shown via a reinforced soil wall design that using "high c low ϕ" values will result in unrealistic layout of reinforcement in the structures (see Fig. 1).

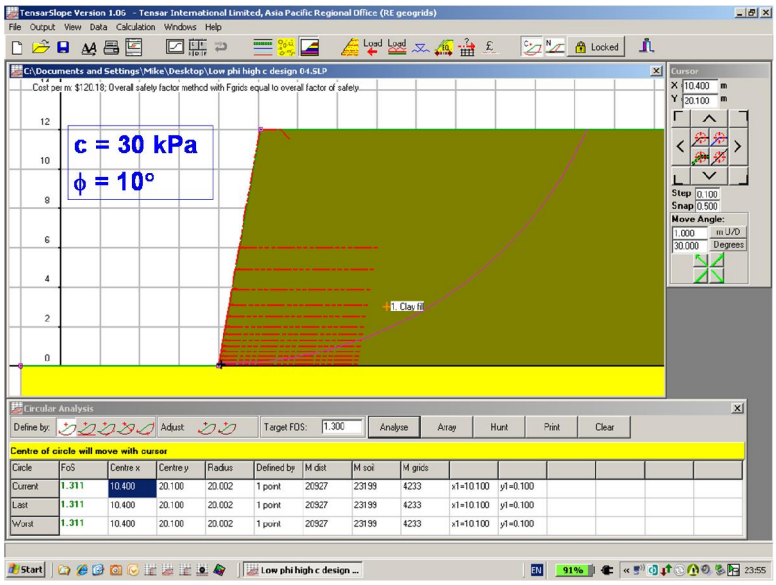

Fig. 1: Using "high c low ϕ" values provide unrealistic reinforcement layout for reinforced soil wall

In the third part, Mr. Mike Dobie discussed about measuring soil compressibility in the oedometer test, one dimensional consolidation theory and determining consolidation properties. A special attention was given by the speaker on the determination of preconsolidation pressure (p_c'). He reckoned some people would say the preconsolidation pressure is the most important parameter to be determined accurately when investigating soft alluvial soils as it affects the consolidation settlement calculation significantly. Using the Juru Trial Embankment as an example, it was shown that slight variation of preconsolidation pressure by 10 kPa, the calculated settlement can vary by more than 25% (see Table 1).

Table 1: Effect of preconsolidation pressure (p_c') in settlement calculation

Condition	ΔH_{OC}	ΔH_{NC}	ΔH_C
Original calculation	288	1,439	1,726
p_c' 10 kPa higher	372	1,030	1,402
p_c' 10 kPa lower	202	1,977	2,179
p_c' 10 kPa higher	518	514	1,032

In the fourth part, Mr. Mike Dobie discussed about the application of the soil parameters and concepts presented earlier to specific design situations, including ground improvement by consolidation and the arguments for drained versus undrained analysis.

The workshop ended at 5 pm after the question and discussion session. Ir. Liew Shaw Shong presented Mr. Mike Dobie with the certificate of appreciation and brought the workshop to a close.


dense soil element
Certificate of Appreciation