TC304/TC309 Student Contest on Data Analytics Applied to 304dB

(August 7-9 2020, Chongqing, China)

Question Description

A small structure is to be supported on one pile founded entirely in clayed soil, and the diameter and length of the pile are 0.4 m and 4.5 m, respectively. This pile is bored dry without casing, and concreted on the same day. The location of this pile is shown in Figure 1. For ease of the design of this pile foundation, a site investigation consisting of a set of cone penetration tests (CPT) is conducted at the site, and the locations of these soundings are illustrated in Figure 1. The collected CPT data are available in the attached file of **Sounding_Data.xls**. The data are extracted from the A-CPT/232/2500m^2 dataset (Jaksa 1995; Jaksa et al. 1999) in the 304dB webpage (http://140.112.12.21/issmge/tc304.htm?=6). The participants are required to select appropriate methods for interpreting the **tip resistance (q_c)** and **side friction (f_s)** at the pile location based upon the available CPT data, and then evaluate the ultimate bearing capacity of this pile foundation. An empirical approach is suggested here for evaluating the pile ultimate bearing capacity from the CPT data (Schmertmann 1978, Cai et al. 2009).

$$Q_u = Q_b + Q_s = q_p A_p + \sum_{i=1}^{n} f_{pi} A_{si} \tag{1}$$

where Q_u is the ultimate axial pile capacity, Q_b is the end-bearing capacity, Q_s is the shaft friction capacity, q_p is the unit end bearing, A_p is the pile end area, A_s is the surface area along the pile shaft, and f_p is the unit shaft friction. The equations for estimating q_p and f_p are given below (Schmertmann 1978).

$$q_p = (q_{c1} + q_{c2})/2 \le 15 \text{ MPa} \tag{2}$$

$$f_p = k_c f_s \le 120 \text{ kPa}, \; k_c = 0.2 - 1.25 \tag{3}$$

where q_{c1} is minimum of the average of q_c values of zones ranging from 0.7 to 4D below pile tip, D is pile diameter, and q_{c2} is average minimum q_c values 8D above the pile tip.

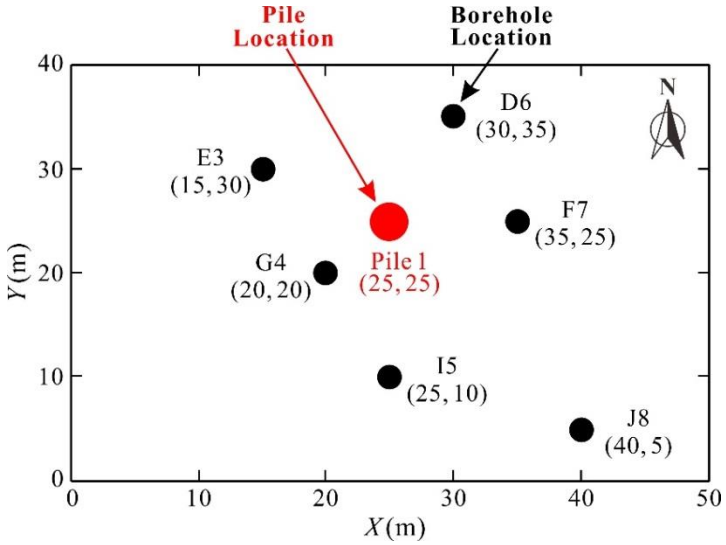

Figure 1. Locations of the pile and CPTs

Note that while this empirical approach is suggested, the participants are allowed to adopt some other models, but are required to provide some justifications. For example, the model uncertainty in some models can be explicitly included. The participants are also allowed to make essential assumptions or simplifications, but are required to provide some justifications. The possible materials that might be involved could be referred to **Potential References**.

Other Information

The participants in this TC304 Student Contest session are required to:

1) Submit a full length paper in English (which will not be formally published), the academic staffs cannot be listed as co-authors and might only be mentioned in the acknowledgments.

2) Present the design outcome and procedures in the TC304 Student Contest session (10 minutes presentation and 5 minutes Q&A).

A TC304 committee will review the papers and presentations, and select the winner(s) for the ISSMGE TC304 Student Contest Award. An award certificate will be given to the winner(s) during the conference. Depending on the number of participants, a number of encouragement awards may be also awarded.

Important Dates

Feb 15 2020: Submission of participation form (to Prof. Hai-Qing Yang yanghaiqing06@163.com)
June 30 2020: Submission of full length paper (to Prof. Hai-Qing Yang yanghaiqing06@163.com)
Aug 7-9 2020: Student Contest in Chongqing, China

If you have questions, please contact Prof. Hai-Qing Yang (yanghaiqing06@163.com)

Potential References

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