國立成功大學 108 學年度碩士班招生考試試題

系　　所：土木工程學系

考試科目：基礎工程

考試日期：0223，節次：1

※ 考生請注意：本試題可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

Make rational assumptions if needed.

1、Answer the following questions briefly with texts and/or figures: (30 pts)

(1) List three applications of CPT in geotechnical engineering. (6 pts)

(2) Explain how to correct the local shear failure in Terzaghi's bearing capacity theory. (6 pts)

(3) State the stability requirements of conventional earth retaining walls. (6 pts)

(4) List the major failure modes for braced cut excavations in clay. (6 pts)

(5) Explain the "negative skin friction" of pile. (6 pts)

2、Answer the following questions related to lateral earth pressures. (25 pts)

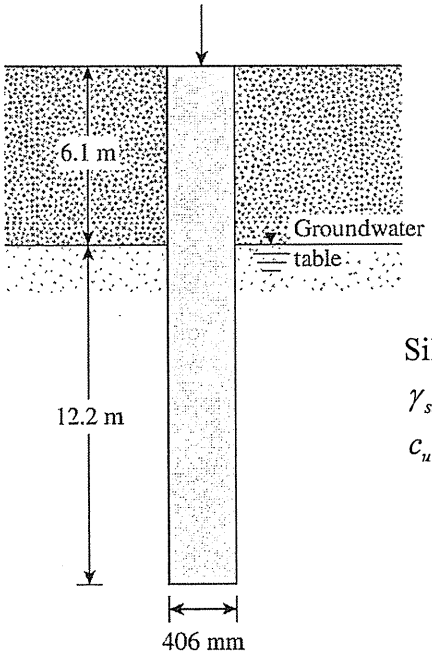
(1) Draw the Mohr circles of Rankine's active and passive failures in a same plot for a soil element under initial vertical effective stress of 100 kPa with strength parameters (c', ϕ')= (0, 30°) and calculate the active and passive lateral earth pressures. (15 pts)

(2) Compare the K_0 values of clay for the following cases: (a) NC clay vs. OC clay, (b) saturated clay under undrained vs. drained conditions, (c) High PI clays vs. Low PI clays. (10 pts)

3、Answer the following questions related to pile foundations. (20 pts)

(1) Describe the Davisson's method for determining the ultimate load of pile load tests. (10 pts)

(2) A circular concrete pile with diameter of 0.4 m is shown in Fig. 1. (a) Evaluate the ultimate point capacity with Meyerhof's method; (b) Estimate the ultimate skin friction resistance by the α-method with $\alpha = C(\frac{\bar{\sigma}_0'}{c_u})^{0.45}$ where C=2.5. (10 pts)



Silty clay
$\gamma_{sat} = 18.6$ kN/m^3
$c_u = 35$ kPa

Silty clay
$\gamma_{sat} = 19.0$ kN/m^3
$c_u = 80$ kPa

Fig. 1

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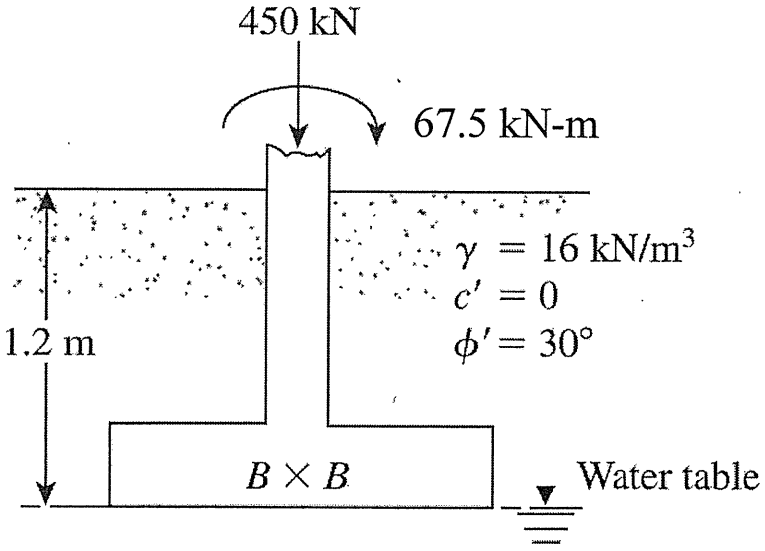
4、Given the square footing with B=2.0 m and subjected to one-way eccentric loading as shown in Fig. 2. (25 pts)

(1) Calculate the factor of safety against bearing capacity failure using the general bearing capacity formula by Meyerhof (1963). (15 pts)

(2) Calculate the maximum and minimum contact pressures and draw the distribution of pressure by the foundation on the soil. (10 pts)



$\gamma_{sat} = 19.0$ kN/m^3

$c_u = 75$ kPa

$\phi' = 0$

Fig. 2

General BC: $q_u = cN_cF_{cs}F_{cd}F_{ci} + qN_qF_{qs}F_{qd}F_{qi} + \frac{1}{2}\gamma BN_\gamma F_{\gamma s}F_{\gamma d}F_{\gamma i}$ (Meyerhof 1963)

Shape	Depth	Inclination
$F_{cs} = 1 + \frac{B \cdot N_q}{L \cdot N_c}$	$F_{cd} = 1 + 0.4\frac{D_f}{B}$	$F_{ci} = (1 - \frac{\beta^\circ}{90^\circ})^2$
$F_{qs} = 1 + \frac{B}{L}\tan\phi$	$F_{qd} = 1 + 2\tan\phi(1 - \sin\phi)^2\frac{D_f}{B}$	$F_{qi} = (1 - \frac{\beta^\circ}{90^\circ})^2$
$F_{\gamma s} = 1 - 0.4\frac{B}{L}$	$F_{\gamma d} = 1$	$F_{\gamma i} = (1 - \frac{\beta}{\phi})^2$