Advanced Geotechnical Engineering Ⅰ (457.603)

Final Exam (2008. 6. 11)

(10) 1. What are the physical meaning of the pile's infinite length (L_α) and the relative stiffness factor (T) in non-cohesive soils?

(10) 2. What is the pile impedance, and what is the significance of it in pile driving?

(20) 3. Summarize

1) the method for determining the axial bearing capacity of a drilled shaft with rock socket suggested in AASHTO LRFD(2004)

2) and the reason why computation of the bearing capacity is dependent on the pile settlement.

(10) 4, Calculate the driven pile's capacity using modified Gates formula (FHWA, 1997).

Steel pipe pile :

Outer diameter : 504.2 mm

Thickness : 12 mm

Length : 18 m

Elastic modulus : 2097.7 $tonf/cm^2$

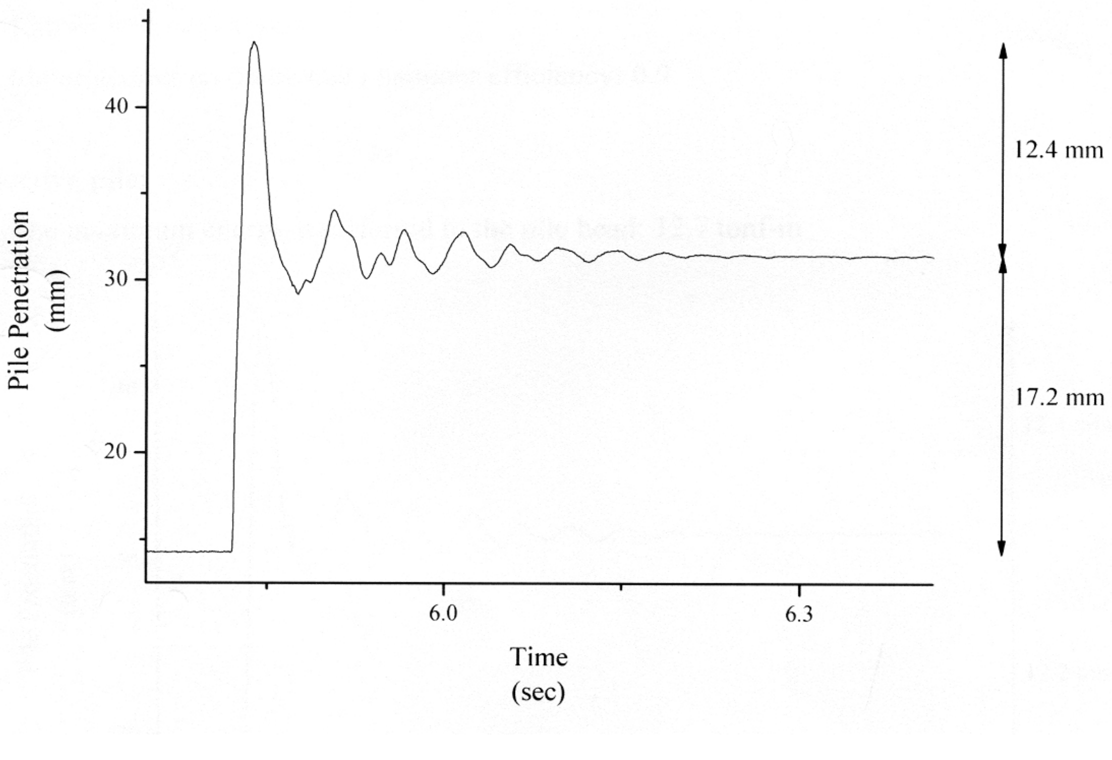
Weight per unit length : 95.7 kgf/m

Driving system :

10 tonf hydraulic hammer

Manufacturer recommended hammer efficiency : 0.85

Drop height : 1.2 m



(10) 5. Dirlled shaft will be used for the foundation of a new bridge to connect a island to a land. Plan to assure quality of the drilled shaft as a field engineer. If you are to conduct integrity test, describe its advantages and disadvantages.

(20) 6. Plot a τ_{az}/τ_{amax} vs ρ curve using the load transfer function described below. (d=10 inches, ϵ = 5%)

Reese et al.(1969) carried out load tests to study the load transfer along bored piles in clay. On the basis of a curve-fitting analysis of these test results, the following relationship between load transfer (adhesion) and pile movement was developed :

$$\tau_{az} = \tau_{amax}\left[2.0\sqrt{\frac{\rho}{s_0}} - \left(\frac{\rho}{s_0}\right)\right]$$

where,

τ_{az} = adhesion at depth z (tons/ft^2)

$\tau_{\max}$ = maximum adhesion that can occur at any depth (tons/ft^2)

ρ = downward movement of pile at depth z (in.)

s_0 = $2d\epsilon$ (in.)

ϵ = average failure strain, in percent, obtained from stress-strain curves for unconfined compression tests run on soil samples near the pile tip

(20) 7. Resolve Ex 16.1 (after modified) using the computer program you had coded for the assignment of this course. Submit the output printed in this room.

EXAMPLE 16.1 Design a combined footing for the loading conditions shown in Fig. E1.1. Use ACI 318–71, strength design (USD), and conventional design procedures.* Note that procedures to obtain loads and soil pressures have been considered in this chapter, Chapter 15, and elsewhere; however, this example uses a value of recommended allowable

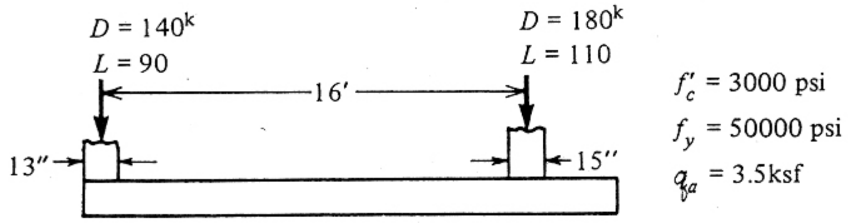


Fig. E1.1

soil pressure as the structural designer usually gets in a report from the soil engineer. It is assumed the structural designer would somehow be able to obtain column loads to apply to the footing as shown. This example does not consider the rigidity effect of superstructure on the foundation.