May 6th, 12:00 AM

Forge hammer foundation on dilative soil

S.J. Yang

Follow this and additional works at: http://scholarsmine.mst.edu/icchge

Recommended Citation
http://scholarsmine.mst.edu/icchge/1icchge/1icchge-theme6/4

This Article - Conference proceedings is brought to you for free and open access by the Geosciences and Geological and Petroleum Engineering at Scholars' Mine. It has been accepted for inclusion in International Conference on Case Histories in Geotechnical Engineering by an authorized administrator of Scholars' Mine. For more information, please contact weaverjr@mst.edu.
Forge Hammer Foundation on Dilative Soil

S. J. Yang
Fourth Designing and Researching Institute of Ministry of Machine Industry, China

The property of dilative soil will further change when the dynamic force with different frequency acts on soil surface. So far, the physical process of this change remains unknown. However, it has been observed in the field test that dynamic force would increase the amount of the crevice of dilative soil and distory the soil by combining with the external water.

DYNAMIC PROPERTIES OF SOIL MEASURED IN THE FIELD TEST

1. Dynamics elastical module of the dilative soil in natural condition.

![Graph](image)

Fig. 1 shows the soil condition. In the model test $E_d = 590 \text{ kg/cm}^2$. Measuring for the foundation of the 3.15 ton forge hammer

$E_d = 338 \text{ kg/cm}^2$

Calculation formula:

$E_d = \beta \sigma \frac{F}{\pi} f^2$

where $\beta$—Coefficient $(S^2/m^2 \text{ t}%)$, $\sigma$—Soil stresses under foundation $\text{kg/cm}^2$, $F$—Bottom area of the foundation, $f$—Vertically excitation frequency.

2. Effect induced by explosion on soil.

A kilogram explosive was used in the field test. Expansive force of soil increased 65%. Dynamic elastical module $E_d$ increased 18%.

![Graph](image)

Fig. 2 shows the destruction of soil under footing. After the external water has been removed for about five years, the amplitude is

$A_x = 513 \mu \text{ (measured in July, 1983)}$

But the foundation has been tilted. Both the actual life of equipment and the quality of product are affected.
A SUCCESSFUL RECORD OF 5 TON HAMMER FOUNDATION

1. Stiffness of extending end pile (mould test).

\[ K = 10 \times 10^4 \ \text{T/M} \ (\text{test}). \]

\[ K = 9.35 \times 10^4 \ \text{T/M} \ (\text{calcul}). \]

2. Stiffness of Hammer Foundation (extending end pile groups).

\[ K = 60 \times 10^4 \sim 70 \times 10^4 \ \text{T/M} \ (\text{test}). \]

Calculation formula

\[ K = \frac{E_p F_p}{\bar{E}_w} \]

\[ K = 65.5 \times 10^4 \ \text{T/M} \ (\text{calcul}). \]

where \( E_p F_p = \frac{\sum E_p F_p}{\bar{E}_w} \) \( (0 < \alpha < 1) \)


3. Design.

Amplitude \( A = 575 \mu \) (calcul.);

\[ A = 475 \mu \ (\text{test}). \]

Frequency \( f = 10.6 \ \text{Hz} \) (calcul.);

\[ f = 9 \sim 11 \ \text{Hz} \ (\text{test}). \]

Under the same condition of production as 3 ton hammer, this hammer has been used for years without any problems. A better effect of technology and economy has been made by this design.

REFERENCES
