การรับน้ำหนักของเข็มสั้นที่มีหน้าตัดต่างกันในกรุงเทพ ฯ

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"The Bearing Capacity of Short Piles Having Various Shapes in Bangkok Clay"

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ABSTRACT

Piles of equilateral triangle, square, double half moon, circular, Y and octagonal shapes were tested to observe the compression characteristics at the site in Chulalongkorn Uneversity. It was observed that all piles were suddenly failed when the range of settlement was between 4.4 mm to 5.5 mm. The load settlement curves obtained seem to indicate that the failure were reached as soon as the shaft frictions are mobilized. Upon comparision of the shapes of pile investigated, it may be concluded that the effective perimeter which is equal to the minimum perimeter multiplied by reduction factor, must be used in calculating the shaft load of pile. For the piles which possesses geometrical shape, the recuction factor of one may be selected. The most economical shape of short pile should have maximum perimeter with the minimum cross section. Besides this the cross section of piles may not necessary to have an unusal boundary.

The quick test method is the best method in finding the ultimate load of pile. The critical load ratio of piles range from o.72 to o.8 and the adhesion factor is between o.75 to o.89

หัวข้อวิทยานิพนธ์ การรับน้ำหนักของเข็มสั้นที่มีหน้าตัดต่างกันในกรุงเทพ ฯ
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หอสมุดกลาง จุฬาลงกรณมหาวิทยาลัย

บทคัดย่อ

เข็มรูปหน้าตัดต่าง ๆ กัน ๖ แบบ คือ สามเหลี่ยมด้านเท่า สี่เหลี่ยมจัตุรัส Double Half Moon วงกลม เข็ม Y และแปดเหลี่ยม ได้ถูกนำมาทดลองที่จุฬาลงกรณมหาวิทยาลัย ผลจากการทดลองพบว่า เข็มทุกต้นจะรับน้ำหนักถึงจุดพิบัติทันที เมื่อมีระยะทรุดตัวอยู่ระหว่าง ๔.๔ มม. ถึง ๕.๕ มม. ในการคำนวณแรงฝืดทางข้างของเข็ม ควรใช้เส้นรอบรูปประสิทธิผลของเข็ม (effective perimeter) เส้นรอบรูปประสิทธิผลนี้ คือ ผลคูณของเส้นรอบรูปที่น้อยที่สุดของเข็มกับ reduction factor สำหรับเข็มรูปทรงเรขาคณิต ค่าreduction factor จะมีค่าเท่ากับหนึ่ง เข็มสั้นที่ประหยัด คือ เข็มที่มีเส้นรอบรูปมากแต่มีพื้นที่หน้าตัดน้อยที่สุด นอกจากนี้ เส้นรอบรูปเข็มไม่ควรเว้าแหว่งมาก

การทดลองแบบ Quick Test เป็นการทดลองที่ดีที่สุดเมื่อต้องการหาเพียงแต่ค่าน้ำหนักแบกทานสูงสุดของเข็ม Critical load ratio ของเข็มที่ทำการทดลองอยู่ระหว่าง ๐.๗๒ ถึง ๐.๘ ส่วนสัมประสิทธิ์การเกาะตัว (Adhesion Factor) อยู่ระหว่าง ๐.๗๕ ถึง ๐.๘๔

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LIST OF DEFINITIONS AND SYMBOLS

N_c, N_q, N_γ	Bearing capacity factors
Q, Q_e, Q_s	Total, end, friction loads respectively
Q_u, Q_m, Q_f	Ultimate maximum and failure loads respectively
Q_{eu}, Q_{em}, Q_{ef}	End loads at ultimate, maximum and failure respectively
Q_{su}, Q_{sm}, Q_{sf}	Shaft loads at ultimate, maximum and failure load
L	Length of pile
α	Adhesion factor
ρ	Settlement of pile
ρ_{top}	Settlement of pile top
ρ_{toe}	Settlement of pile toe
ρ_d	Plastic settlement of soil
Δ_p	Elastic shortening of pile
Δ_{pE}	Elastic shortening of pile due to end load
Δ_{pF}	Elastic shortening of pile due to shaft load
Δ_s	Elastic compression of subgrade
Δ_r	Elastic rebound of pile
A	Cross section area of pile
C	Cohesion of soil
C_a	Adhesion between soil and pile