

ABSTRAK

Pondasi tiang pancang adalah salah satu jenis pondasi yang digunakan untuk menyalurkan beban pondasi melewati lapisan tanah. Daya yang dukung tiang pancang yang diperoleh dari daya dukung ujung (*end bearing capacity*) yaitu dari tekanan ujung tiang dan daya dukung gesek atau selimut (*friction bearing capacity*) yang diperoleh dari daya dukung gesek atau gaya adhesi antara tiang pancang dan tanah sekelilingnya. Penyelidikan *Standard Penetration Test (SPT)* bertujuan untuk mendapatkan gambaran lapisan tanah berdasarkan jenis dan warna tanah melalui pengamatan secara visual, sifat-sifat tanah, karakteristik-karakteristik tanah. Data *Standard Penetration Test (SPT)* dapat digunakan untuk menghitung daya dukung. Selain penyelidikan *Standard Penetration Test (SPT)*, analisis ini juga dilengkapi dengan pengambilan sampel dilaboratorium dan pengujian pembebanan langsung terhadap tiang (*Loading Test*) serta data sondir untuk memastikan daya dukung.

Tesis ini menganalisis kapasitas daya dukung dan penurunan pada pondasi tiang *square pile* diameter 40 x 40 cm tiang tunggal maupun kelompok tiang, menggunakan program *Plaxis* dan membandingkan hasilnya dengan interpretasi uji beban statis (*loading test*) pada pondasi proyek Rusunawa Jatinegara Jakarta. Analisis menggunakan data penyelidikan tanah lapangan dan laboratorium serta membandingkan terhadap model tanah *Mohr Coulomb*.

Daya dukung ultimit dari data SPT pada tiang pancang sepanjang 15,4 meter diperoleh sebesar 189,81 ton dan berdasarkan parameter kuat geser tanah sebesar 198,67 ton. Dan dari titik sondir diperoleh berdasarkan daya dukung *Aoki* dan *De Alencar* sebesar 276,241 ton dan berdasarkan *Meyrehoff* sebesar 305,49 ton. Berdasarkan hasil daya dukung *Loading Test* nilai daya dukung ultimit untuk 3 metode diantaranya yang menggunakan metode *Davisson* (260 ton), metode *Mazurkiewicz* (270 ton) dan Metode *Chin* (250 ton). Efisiensi kelompok tiang menurut *Converse – Labrare Equation* = 0,73, menurut *Los Angeles Group Action Equation* = 0,59 dan menurut Metode *Sheiler – Keeney* = 0,94. Daya dukung berdasarkan kekuatan tiang sebesar 221,76 Ton, daya dukung berdasarkan data kalendering sebesar 201,71 ton, daya dukung lateral pondasi tiang tunggal sebesar 12,96 ton. Pada waktu diberikan beban sebesar beban maksimum (280 ton), penurunan yang lebih besar terdapat pada hasil Pemodelan Elemen Hingga metode *Maintained load test* yaitu sebesar 21,00 mm dan metode *Quick load test* yaitu sebesar 20,67 mm, dibandingkan dengan penurunan yang terjadi hasil dari *Loading Test* di lapangan yaitu sebesar 18,74 mm. Berdasarkan ASTM D1143/81, penurunan yang diizinkan adalah sebesar 25,40 mm. Maka berdasarkan penurunan bahwa tiang pondasi aman dalam konstruksi. Tekanan air pori sangat dipengaruhi oleh waktu sehingga didapatkan kesimpulan antara *Slow Maintained Load Test* dan *Quick Load Test* terdapat perbedaan tingkat tekanan air pori. Dari hasil perhitungan yang dilakukan, *Quick Load Test* menunjukkan tekanan air pori yang lebih cepat terdisipasinya air pori.

Kata Kunci: *Loading Test*, Metode Elemen Hingga, *Square Pile*

ABSTRACT

Piling foundation is one of the foundations which is used to penetrate its load through soil layer. The power carried by the piling is obtained from the end bearing capacity, that is, the compressive end piling and friction bearing capacity obtained from friction bearing capacity and adhesive capacity between the piling and the soil around it. The investigation on the Standard Penetration Test is aimed to get the description of soil layer, based on the type and color of soil through visual observation, and soil characteristics. SPT data can be used to calculate bearing capacity. Besides investigating the SPT, this study is also equipped by taking the samples in laboratory and loading test on the piling and sondir data to confirm its bearing capacity.

This study analyzed bearing capacity and settlement in square pile of 40X40 cm in diameter in single pile or grouped piles, using empirical method, AllPile program, Plaxis program, and comparing the result with interpreting its loading test in the foundation of Rusunwa project, Jatingara, Jakarta. The analysis was done by using the data on soil investigation and laboratory by comparing them with Mohr Coulomb soil model.

Ultimate bearing capacity from the SPT data in the piling of 15.4 meter was 189.81 tons and the parameter of soil shear strength was 198.67 tons. The sander point, based on Aoki and De Alencar bearing capacity was 276.241 tons and based on Meyrehoff it was 305.49 tons. Based on the loading test of bearing capacity, unlimited bearing capacity for the 3 methods was Davisson (260 tons), Mazurkiewicz (270 tons), and Chin (250 tons). The efficiency of grouped piles according to Converse-Labrare Equation method = 0.73, according to Los Angeles Group Action Equation method = 0.59, and according to Sheiler-Keeny method = 0.94. Bearing capacity based on piling strength was 221.76 tons, bearing capacity based on calendaring data was 201.71 tons, and lateral bearing capacity of single piling foundation was 129.6 kN (12.96 tons). When the maximum load (280 tons) was given, more decrease occurred in the Maintained load test of 21.00 mm and Quick Load Test method of 20.67 mm, compared with the decrease in the result of Loading Test in the field of 18.74 mm. Based on ASTM D1143/81, it was found that the permitted decrease was 25.40 mm. Therefore, based on the decrease, it could be concluded that foundation piles were safe in the construction. The pore water pressure is highly influenced by time so that in Maintained Load Test and Quick Load Test, there was the disparity in the level of pore water pressure. From the result of the calculation, Quick Load Test showed that in pore water pressure, the pore water was dissipated in its acceleration.

Keywords: *Loading Test, Finite Element Method, Square Pile*