

Analisis Daya Dukung dan Penurunan Pondasi Tiang Berdasarkan Data *Standard Penetration Test* (SPT) dan *Cone Penetration Test* (CPT)

(Studi Kasus : *East Cross Taxiway Bandara Internasional Soekarno – Hatta*)

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INTISARI

East Cross Taxiway Bandara Internasional Soekarno – Hatta terbagi atas 2 bagian yakni struktur bawah dan struktur atas. Dimana kestabilan suatu struktur tidak hanya ditentukan oleh struktur atas yang secara langsung memikul beban pesawat dan beban perkerasan, tetapi kestabilan struktur bawah dalam hal ini pondasi memegang peranan yang sangat penting dalam menjaga kestabilan struktur tersebut. Peran pondasi adalah untuk meneruskan beban bangunan yang terletak di atas tanah ke tanah keras pada kedalaman tertentu sehingga pondasi mampu memberikan dukungan kepada beban tersebut oleh gesekan sisi tiang dengan tanah di sekitarnya.

Tujuan penelitian ini untuk mengetahui daya dukung pondasi tiang secara perhitungan manual dengan metode Meyerhof menggunakan data *Standard Penetration Test* (SPT) dan data *Cone Penetration Test* (CPT). Sedangkan untuk mengetahui penurunan pondasi tiang secara perhitungan manual dengan metode Vesic. Penelitian ini juga menganalisis menggunakan *software* GEO5 2018 menggunakan data *Cone Penetration Test* (CPT).

Hasil analisis daya dukung pondasi tiang secara perhitungan manual menggunakan data *Standard Penetration Test* (SPT) didapat nilai daya dukung rata-rata (Q_{ult}) = 1310,38 kN dengan rata-rata *safety factor* (SF) = 2,6 dan menggunakan data *Cone Penetration Test* (CPT) didapat nilai daya dukung rata-rata (Q_{ult}) = 2009,60 kN dengan rata-rata *safety factor* (SF) = 4,0. Sedangkan hasil analisis penurunan pondasi tiang secara perhitungan manual menggunakan data *Standard Penetration Test* (SPT) didapat nilai penurunan rata-rata (S) = 11,73 mm dan menggunakan data *Cone Penetration Test* (CPT) didapat nilai penurunan rata-rata (S) = 13,27 mm. Hasil analisis menurut *software* GEO5 2018 untuk daya dukung pondasi tiang didapat nilai daya dukung rata-rata (Q_{ult}) = 1710,41 kN dengan rata-rata *safety factor* (SF) = 3,5 dan penurunan rata-rata (S) = 4,8 mm. Selisih perbedaan antara analisis manual dan analisis menggunakan *software* secara keseluruhan sebesar 14 %.

Kata kunci : *Standard Penetration Test*, *Cone Penetration Test*, Daya Dukung, Penurunan

Analysis of Bearing Capacity and Pile Foundation Settlement Based on Standard Penetration Test (SPT) and Cone Penetration Test (CPT)

(Case Study : East Cross Taxiway Soekarno – Hatta International Airport)

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ABSTRACT

East Cross Taxiway at Soekarno – Hatta International Airport is divided into two parts, namely the lower structure and the upper structure. The stability of a structure is not only determined by the upper structure which directly bears the aircraft load and pavement load, but the stability of the lower structure plays an equally important role in maintaining the stability of the structure, in this case the foundation. The function of the foundation is to continue the load of the building upper the soil into the hard soil at a certain depth so that the foundation is able to support loading by skin friction.

The purpose of this study is to determine the bearing capacity of pile foundation by manual calculation using the Meyerhof method with the Standard Penetration Test (SPT) and Cone Penetration Test (CPT) data. Whereas to find out the settlement of pile foundation by manual calculation using Vesic method. This study also analysed using the GEO5 2018 software with the Cone Penetration Test (CPT) data.

The results of the analysis of pile foundation bearing capacity by manual calculation using the Standard Penetration Test (SPT) data obtained the average bearing capacity (Q_{ult}) = 1310.38 kN with an average safety factor (SF) = 2.6 and using Cone Penetration Test (CPT) data obtained the average bearing capacity (Q_{ult}) = 2009.60 kN with an average safety factor (SF) = 4.0. While the results of the analysis of pile foundation settlement in manual calculation using the Standard Penetration Test (SPT) data obtained an average settlement (S) = 11.73 and using the Cone Penetration Test (CPT) data obtained an average settlement (S) = 13.27 mm. The results of the analysis according to the GEO5 2018 software for pile foundation bearing capacity obtained the average bearing capacity (Q_{ult}) 1710.41 kN with an average safety factor (SF) = 3.5 and an average settlement (S) = 4.8 mm. The difference between manual analysis and analysis using software overall 14%.

Keywords : *Standard Penetration Test, Cone Penetration Test, Bearing Capacity, Settlement*