

INTISARI

Pada kawasan Ibu Kota Negara Nusantara (IKN) terdapat berbagai infrastruktur baru, salah satunya adalah Gedung Rumah Susun Polri dan BIN. Proses pembangunan gedung tersebut tentunya berkaitan dengan adanya pekerjaan struktur bawah berupa fondasi. Penelitian ini bertujuan untuk membandingkan pengaruh variasi diameter 60 cm, 80 cm, dan 100 cm pada kedalaman 17 meter terhadap stabilitas sistem fondasi tiang bor. Variasi diameter dilakukan untuk mendapatkan desain optimal berdasarkan aspek total volume material.

Pembangunan Rumah Susun Polri dan BIN terletak di Kawasan Inti Pusat Pemerintahan Ibu Kota Negara (KIPP-IKN), Kecamatan Penajam Paser Utara, Kalimantan Timur. Data yang digunakan pada penelitian ini adalah data penyelidikan tanah hasil uji *boring log*, data uji laboratorium, dan dokumen *Detail Engineering Drawing* (DED). Berdasarkan dokumen DED dilakukan perhitungan pembebanan struktur atas, selanjutnya berdasarkan hasil uji *boring log* dan uji laboratorium dilakukan analisis parameter tanah untuk perhitungan stabilitas sistem fondasi tiang bor. Analisis stabilitas meliputi, analisis kapasitas dukung aksial tiang menggunakan metode oleh Reese O'Neill (1989) dan metode Skempton (1966), analisis defleksi lateral dengan bantuan *software* geo5 dengan *spring methode*, dan analisis penurunan menggunakan metode Vesic (1977) dan *software* geo5.

Berdasarkan analisis perhitungan, didapatkan nilai kapasitas dukung tiang tunggal diameter 60 cm sebesar 1822,85 kN, diameter 80 cm sebesar 2634,15 kN, dan 100 cm sebesar 3173,08 kN. Nilai kapasitas dukung tiang tunggal seluruh diameter telah memenuhi batas faktor aman sebesar 2,5 dan terdapat hubungan yang berbanding lurus dengan besarnya diameter. Defleksi lateral tiang tunggal diameter 60 cm sebesar 2,4 mm, diameter 80 cm sebesar 1,9 mm, diameter 100 cm sebesar 1,7 mm. Seluruh nilai defleksi tersebut telah memenuhi batas persyaratan sebesar 25 mm pada gempa kuat dan hubungan berbanding terbalik dengan besarnya diameter. Penurunan tiang tunggal pada diameter 60 cm sebesar 1,1 mm, diameter 80 cm sebesar 0,9 mm, dan diameter 100 cm sebesar 0,9 mm. Seluruh nilai penurunan tiang telah memenuhi batas persyaratan sebesar $15\text{ cm} + d/600$ dan memiliki hubungan yang berbanding terbalik dengan besarnya diameter. Berdasarkan analisis terhadap total volume material yang dibutuhkan, fondasi dengan diameter 60 cm memiliki nilai total volume material terkecil, yaitu sebesar $34,27\text{ m}^3$ sehingga diameter 60 cm merupakan desain yang paling optimum berdasarkan nilai total volume material dan memenuhi batas persyaratan stabilitas sistem fondasi tiang bor.

Kata kunci: Fondasi tiang bor, kapasitas dukung aksial, defleksi lateral, penurunan tiang, variasi dimensi



ABSTRACT

There will be various infrastructure in the development of Capital City of Nusantara (IKN) area. One of these infrastructures is Polri and BIN flats which will be used as a residence. The building construction process is related to the existence of the structural work of foundations. This research aims to compare the effect of diameter variations of 60 cm, 80 cm, and 100 cm at a depth of 17 meters on the stability of the bored pile system. The diameter variations is done to get the optimal design based on the aspect of total material volume..

The development of Rumah Susun Polri dan Bin are located in Kawasan Inti Pusat Pemerintahan Ibu Kota Negara (KIPP-IKN), district Penajam Paser Utara, Province Kalimantan Timur. This analysis using various data, such as Standard Penetration Test, laboratory data, and document of Detail Engineering Drawing (DED). The soil parameters need to determine from interpretation of soil data based on Standard Penetration data. Furthermore, the document of detail engineering drawing is using to analysis the loading from upper structure and based on the soil parameters. The stability analysis includes, the axial bearing capacity is analyzed by the method of Reese O'Neill (1989) and Skempton (1966). Lateral deflection is analyze by geo 5 software with spring methode analysis, and settlement is analyze by geo 5 software and based on Vesic (1977) methode.

Based on the calculation analysis, it is found that the bearing capacity of a single pile with a diameter of 60 cm is 1822.85 kN, a diameter of 80 cm is 2634.15 kN, and 100 cm is 3173.08 kN. The bearing capacity value of a single pile of all diameters has met the safety factor limit of 2.5 and there is a directly proportional relationship with the diameter. The lateral deflection of a single pile of 60 cm diameter is 2.4 mm, 80 cm diameter is 1.9 mm, 100 cm diameter is 1.7 mm. All of these deflection values met the required limit of 25 mm in strong earthquakes and the relationship was inversely proportional to the diameter. The settlement of a single pile at 60 cm diameter was 1.1 mm, 80 cm diameter was 0.9 mm, and 100 cm diameter was 0.9 mm. All values of pile settlement have met the required limit of $15 \text{ cm} + d/600$ and have an inversely proportional relationship with the diameter. Based on the analysis of the total volume of material required, the foundation with a diameter of 60 cm has the smallest total volume of material, which is 34.27 m³ so that a diameter of 60 cm is the most optimum design based on the total volume of material and meets the stability requirements of the bored pile foundation system.

Keywords: *bored pile foundation, axial bearing capacity, lateral deflection, pile settlement, dimensional variation*