ANALISIS POTENSI LIKUIFAKSI DAN PENGARUHNYA PADA KAPASITAS DUKUNG FONDASI TIANG PANCANG PASCA KONSTRUKSI (STUDI KASUS FONDASI TIANG PANCANG *SLAB ON PILE* PROYEK LOT 3 PEMBANGUNAN JEMBATAN KRETEK 2)

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INTISARI

Pembangunan Jembatan Kretek 2 merupakan upaya menyambungkan dan mengembangkan koridor Jalan Lintas Selatan Pulau Jawa yang dibangun melintasi Sungai Opak. Pembangunan Jembatan Kretek 2 berada dekat dengan Sesar Opak yang merupakan sesar aktif di sepanjang Sungai Opak dan memiliki riwayat penyebab kegempaan di Yogyakarta tahun 2006. Lokasi pembangunan Jembatan Kretek 2 memiliki lapisan tanah yang cenderung merupakan tanah berpasir lepas dengan muka air yang dangkal. Penelitian ini dilakukan untuk mengetahui potensi likuifaksi pada area tanah pembangunan struktur jembatan *slab on pile* Jembatan Kretek 2 dan kapasitas dukung fondasinya dalam pengaruh potensi likuifaksi.

Dalam penelitian ini, analisis potensi likuifaksi dilakukan berdasarkan pada analisis gradasi butiran usulan *Tsuchida* (1970) dan berdasarkan metode *safety factor* usulan *Idriss dan Boulanger* (2008) berdasarkan data uji SPT (*Standart Penetration Test*). Analisis kapasitas dukung fondasi tiang pancang berdasarkan pada metode empiris berdasarkan data uji SPT dan berdasarkan metode uji PDA/CAPWAP, yang dianalisis pada dua kondisi yaitu tanpa pengaruh potensi likuifaksi dan dalam pengaruh lapisan tanah dengan potensi likuifaksi.

Berdasarkan pada analisis potensi likuifaksi pada ke-empat titik uji SPT BH-10, BH-11, BH-12 dan BH-01 diketahui pada BH-10 potensi likuifaksi terdapat pada kedalaman 0 - 9 m, 12 m dan 15 m, pada BH-11 terdapat pada kedalaman 0 - 4.5 m dan 10.5 - 15 m, sedangkan pada BH-12 terdapat di kedalaman 0 - 4.5 m dan 10.5 m, terkahir pada BH-01 pada kedalaman 0 - 4.5 m. Berdasarkan hasil analisis kapasitas dukung fondasi tiang pancang, dalam kondisi lapisan tanah tanpa pengaruh potensi likuifaksi, fondasi mampu menahan beban yang bekerja yaitu beban Layan II sebesar 77.70 Ton dan Ekstrem I sebesar 65.64 Ton. Hasil analisis kapasitas dukung fondasi dalam pengaruh potensi likuifaksi, fondasi masih mampu menahan beban yang bekerja meskipun terjadi penurunan kapasitas dukung sebesar 6%-12% pada fondasi SOP (*slab on pile*) sisi kiri dan pada SOP sisi kanan berdasarkan analisis metode empiris, sedangkan berdasarkan pada uji PDA/CAPWAP penurunan sebesar 35%-59%.

Kata kunci : *Likuifaksi, Potensi Likuifaksi, Tsuchida, Idriss dan Boulanger, Fondasi Tiang Pancang, Kapasitas Dukung Aksial Fondasi Tiang, Uji PDA, CAPWAP*

ANALYSIS OF LIQUEFACTION POTENTIAL AND ITS EFFECT ON THE BEARING CAPACITY OF POST-CONSTRUCTION PILE FOUNDATIONS (CASE STUDY: FOUNDATIONS OF SLAB ON PILE AT CONSTRUCTION PROJECTS OF LOT 3 KRETEK 2 BRIDGE)

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ABSTRACT

The construction of the Kretek 2 Bridge is an effort to connect and develop the Trans South-South Java Road which was built across the Opak River. The construction of the Kretek 2 Bridge is close to the Opak Fault which is an active fault along the Opak River and has a history of causing earthquakes in Yogyakarta in 2006. Location of the Kretek 2 Bridge construction has a layer of soil that tends to be loose sandy soil with a shallow water table. This study was conducted to determine the potential for liquefaction in the soil area for the construction of the slab on pile bridge structure of Kretek 2 Bridge and the bearing capacity of its foundation under the influence of liquefaction potential.

In this research, the analysis of liquefaction potential was carried out based on the grain size analysis proposed by Tsuchida (1970) and based on the safety factor method proposed by Idriss and Boulanger (2008) based on SPT (Standart Penetration Test) test data. The analysis of the bearing capacity of the pile foundation is based on the empirical method based on the SPT test data and based on the PDA/CAPWAP test method, which is analyzed under two conditions, without the influence of liquefaction potential and under the influence of soil layers with liquefaction potential.

Based on the analysis of the liquefaction potential at the four test of SPT BH-10, BH-11, BH-12 and BH-01, resulted in BH-10 the liquefaction potential is at a depth of 0 - 9 m, 12 m and 15 m, on BH-11 it is at a depth of 0 - 4.5 m and 10.5 m, while on BH-12 it is at a depth of 0 - 4.5 m and 10.5, the last on BH-01 at a depth of 0 - 4.5 m. Based on the results of the analysis of the bearing capacity of the pile foundation, in the condition of the soil layer without the influence of liquefaction potential, the bearing capacity of the foundation is able to withstand the working load, the Service load II of 77.70 Tons and Extreme I of 65.64 Ton. The results of the analysis of the bearing capacity of the foundation under the influence of liquefaction potential, the foundation is still able to withstand the working load even though there is a decrease in bearing capacity of 6%-12% on the left side of the SOP (slab on pile) foundation and on the right-hand side of the SOP based on the analysis of empirical methods, while based on in the PDA/CAPWAP test, the decrease was 35%-59%.

***Keywords** : Liquefaction, Liquefaction Potential, Tsuchida, Idriss and Boulanger, Pile Foundation, Axial Bearing Capacity of Pile Foundation, PDA Test, CAPWAP*