

STUDI MODEL LANTAI BASEMENT DENGAN MENGGUNAKAN TIANG PANCANG MINI PILE GUNA MENGGURANGI PENURUNAN

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ABSTRAK

Pembangunan basement pada gedung bertingkat di wilayah dengan kondisi tanah lunak memerlukan sistem pondasi yang mampu meningkatkan daya dukung tanah sekaligus mengurangi risiko penurunan (settlement). Penelitian ini bertujuan untuk menganalisis model lantai basement dengan penggunaan tiang pancang mini pile pada proyek Hotel Grand Jambo Kabupaten Jember sebagai upaya meminimalkan penurunan tanah dan meningkatkan kestabilan struktur. Metode penelitian dilakukan melalui analisis data investigasi tanah berupa uji Standard Penetration Test (SPT), data perencanaan bangunan, serta pemodelan struktur menggunakan program SAP2000. Analisis meliputi perhitungan gaya uplift, pembebanan struktur, koefisien subgrade reaction, kapasitas daya dukung tiang berdasarkan metode Meyerhof, penulangan pelat basement, serta evaluasi settlement dan differential settlement. Hasil penelitian menunjukkan bahwa nilai reaksi struktur maksimum sebesar 48,869 kN masih lebih kecil dibandingkan daya dukung izin tiang sebesar 121,239 kN, sehingga sistem pondasi dinyatakan aman. Analisis penurunan menunjukkan settlement maksimum sebesar 1 cm, masih berada di bawah batas izin Bowles sebesar 7,5 cm, sedangkan nilai differential settlement sebesar 0,002 juga memenuhi syarat keamanan. Dengan demikian, penggunaan tiang pancang mini pile pada lantai basement terbukti efektif dalam meningkatkan stabilitas struktur dan mengurangi potensi penurunan pada tanah lunak.

Kata kunci : basement; daya dukung tanah; mini pile; penurunan tanah; SAP2000.

BASEMENT FLOOR MODEL STUDY USING MINI PILE PILES TO REDUCE SETTLEMENT

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ABSTRACT

The construction of basements in multi-storey buildings in areas with soft soil conditions requires a foundation system that can increase the bearing capacity of the soil while reducing the risk of settlement. This study aims to analyze the basement floor model using mini pile piles in the Grand Jamboo Hotel project in Jember Regency as an effort to minimize land subsidence and increase structural stability. The research method was carried out through analysis of soil investigation data in the form of Standard Penetration Test (SPT), building planning data, and structural modeling using the SAP2000 program. The analysis includes calculations of uplift forces, structural loads, subgrade reaction coefficients, pile bearing capacity based on the Meyerhof method, basement slab reinforcement, and settlement and differential settlement evaluations. The results showed that the maximum structural reaction value of 48.869 kN was still smaller than the permitted pile bearing capacity of 121.239 kN, so the foundation system was declared safe. The settlement analysis showed a maximum settlement of 1 cm, still below the Bowles permit limit of 7.5 cm, while the differential settlement value of 0.002 also met the safety requirements. Thus, the use of mini piles on basement floors has proven effective in increasing structural stability and reducing the potential for subsidence in soft soils.

Keywords: basement; soil bearing capacity; mini piles; land subsidence; SAP2000.