

**PERBANDINGAN DAYA DUKUNG AKSIAL TIANG BOR
BERDASARKAN METODE ANALITIK,
HASIL UJI PEMBEBANAN
DAN METODE ELEMEN HINGGA**

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ABSTRAK

Pesatnya perkembangan pembangunan gedung bertingkat di Indonesia menuntut perencanaan fondasi yang cermat, khususnya dalam menentukan daya dukung aksial secara akurat, karena kesalahan perhitungan dapat mengakibatkan kegagalan struktural. Penelitian ini bertujuan menganalisis dan membandingkan kapasitas daya dukung aksial fondasi *bore pile* pada Gedung Perkuliahan 21 lantai di Kota Semarang melalui pendekatan analitik, pengujian lapangan, dan pemodelan numerik berbasis metode elemen hingga. Analisis analitik menggunakan metode NAVDOC dan kombinasi metode Decourt-Quaresma + Reese and Wright berdasarkan data SPT dari dua titik *bore hole* sedalam 30 meter serta nilai N-Design sebagai parameter representatif. Hasil uji PDA pada tiang BP-22 menghasilkan daya dukung ultimit sebesar 844 Ton. Uji SLT Tekan pada tiang BP-99 menghasilkan daya dukung ultimit sebesar 980 Ton pada metode Davisson, 909,09 Ton pada Metode Chin dan 810,00 Ton Metode Mazurkiewicz. Metode analitik kombinasi Decourt-Quaresma + Reese & Wright menghasilkan daya dukung ultimit berkisar antara 818,16–842,59 Ton, sedangkan metode NAVDOC menghasilkan 761,94–775,85 Ton. FEM 2D menghasilkan daya dukung ultimit sebesar 780 Ton pada BH-01, 800 Ton BH-03, dan 832 Ton N-Design. Perbandingan terhadap hasil uji lapangan menunjukkan bahwa metode Decourt-Quaresma + Reese & Wright secara umum menghasilkan nilai yang lebih mendekati kondisi lapangan dibandingkan metode analitik lain. Pada N-Design, metode ini menunjukkan selisih 0,2% terhadap PDA pada N-Design, 1,5% pada BH-01, -10% terhadap Metode Chin dan +1% terhadap Metode Mazurkiewicz pada BH-03. FEM 2D menunjukkan selisih -7,6% (BH-01), -12% (BH-03 terhadap Chin), dan -1,2% (BH-03 terhadap Mazurkiewicz), lebih baik dari NAVDOC yang mencapai -11,6%, -15%, dan -4,2% pada skenario yang sama.

Kata Kunci: *bore pile*, daya dukung aksial, SPT, SLT, PDA Test, metode elemen hingga.

**AXIAL CAPACITY COMPARISON OF BORE PILES
BASED ON SPT MEASUREMENTS
AND LOAD TEST OUTCOMES**

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ABSTRACT

The rapid development of high-rise building construction in Indonesia demands careful foundation planning, especially in determining the axial bearing capacity accurately, because calculation errors can result in structural failure. This study aims to analyze and compare the axial bearing capacity of bore pile foundations on a 21-story Lecture Building in Semarang City through an analytical approach, field testing, and numerical modeling based on the finite element method. Analytical analysis uses the NAVDOC method and a combination of the Decourt-Quaresma + Reese and Wright methods based on SPT data from two borehole points with a depth of 30 meters and the N-Design value as a representative parameter. The results of the PDA test on the BP-22 pile produced an ultimate bearing capacity of 844 tons. The SLT Compression test on the BP-99 pile produced an ultimate bearing capacity of 980 tons in the Davisson method, 909.09 tons in the Chin method and 810.00 tons in the Mazurkiewicz method. The combined analytical method of Decourt-Quaresma + Reese & Wright produces an ultimate bearing capacity ranging from 818.16–842.59 tons, while the NAVDOC method produces 761.94–775.85 tons. 2D FEM produces an ultimate bearing capacity of 780 tons on BH-01, 800 tons on BH-03, and 832 tons on N-Design. Comparison with field test results shows that the Decourt-Quaresma + Reese & Wright method generally produces values that are closer to field conditions than other analytical methods. On N-Design, this method shows a difference of 0.2% to PDA on N-Design, 1.5% on BH-01, -10% to the Chin Method and +1% to the Mazurkiewicz Method on BH-03. The 2D FEM shows a difference of -7.6% (BH-01), -12% (BH-03 against Chin), and -1.2% (BH-03 against Mazurkiewicz), better than NAVDOC which reached -11.6%, -15%, and -4.2% in the same scenario.

Keyword: *bore pile, axial bearing capacity, SPT, SLT, PDA Test, finite element method.*