EMPIRICAL AND NUMERICAL PREDICTIONS OF SETTLEMENT AND BEARING CAPACITY OF FOUNDATIONS FROM SPT DATA IN NORTH-WEST REGION OF NIGERIA

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ABSTRACT
This study utilized Standard Penetration Test (SPT) results obtained from the North-West Region of Nigeria in conjunction with suitable conventional empirical/analytical models and numerical modelling technique to predict bearing capacity and magnitude of for preliminary design of foundations of structures in the area. The SPT N-values were corrected to the standard average energy of 60% (N60) before the soil properties were evaluated. Using the corrected N-values, allowable bearing pressure of shallow foundations, ultimate capacity of piles, elastic settlement of shallow foundation and total settlement of piles were predicted for applied foundation pressures of 50, 100, 200, 300 and 500 kN/m². The results of numerical analysis using Plaxis 2D Finite Element Technique show that the analytical/empirical methods formulated by Meyerhof and Peck et al. for estimating the allowable bearing pressure of shallow foundations yielded acceptable results. An average bearing capacity value in the range 135 – 310 kN/m² can be used for foundations with embedment of 0.6 to 3.6 m. Based on recommendation of Eurocode 7 which allows a maximum total settlement of 25 mm for serviceability limit state design, it is recommended that raft or deep foundations should be considered for applied foundation pressures exceeding 300 kN/m² in the North-West zone of Nigeria.