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Title : PERFORMANCE OF PFA-CEMENT-SAND STABILIZED COLUMN IN SOFT SOIL

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Renewable and eco-friendly development are vital concepts to be considered for ground improvement methods in construction practices. One of the method to achieve this is by implementing usage of waste material in construction. Therefore, the main objective of this research is to use Pulverized Fuel Ash (PFA) in stabilized column by studying the impact of this waste material against strength parameters of the stabilized column. small shear box (SSB) and big shear box (BSB) tests were conducted to determine shear strength parameters while unconfined compression test (UCT) are carried out to determine unconfined compressive strength (qu). Results have shown that by using PFA, strength parameters can be improved while for qu, the highest value recorded is close to the concrete grade 20 (G20). Plate load test was conducted on PFA-cement-sand column. 6 steel-tanks with dimension of 800 mm x 800 mm x 1500 mm containing soft soil collected from Klang Valley, Selangor are prepared. The columns (included sand and cement columns) are then installed and left for 28 days for curing process before plate-load test is conducted. Results for allowable load capacity (qa) of PFA-cement-sand column recorded almost 4 times higher load capacity at 3.37 kN compared to cement column (0.95 kN) and sand column (0.29 kN). Numerical analysis with PLAXIS software is then conducted to calibrate with the experimental test results. Further tests are conducted using PLAXIS to analyse the effect of various column dimension on qa. Data from laboratory test and PLAXIS analysis is then used to train the Artificial Neural Network (ANN) to predict qa and strength parameters. The ANN trained for this study provides a high value of regression, where $R > 0.92$ which indicates high level of accuracy. In conclusion, the PFA-cement-sand column has proved that the strength parameters of column can be increased by using PFA and can provide better solution compared to other stabilized columns such as cement and sand column. In fact, this column can produce a high qu, similar to concrete even though it uses low percentage of cement and without any crushed stone. In addition to that, the ANN model trained in this study will assist in designing stabilized column by predicting the strength parameters and allowable load capacity based on various input parameters without any calculation.