Geotechnical characteristics of Bantargebang solid landfill waste using a laboratory test on artificial waste samples and a field test

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Abstrak

To analyze the stability of landfill waste, it is necessary to know the geotechnical characteristics of the solid waste material, especially the parameters related to the stability calculation such as the strength parameters (cohesion and friction angle). The physical properties of the materials are also important, as well as the composition of the waste. This study conducts laboratory and field tests to obtain the aforementioned characteristics from a typical urban landfill in Indonesia. The case study is taken to be the TPST Bantargebang landfill. Due to the difficulties in obtaining an undisturbed sample from landfill waste, a laboratory test was conducted using artificial solid waste samples. The strength parameters of the artificial waste samples were determined using a direct shear test. Besides the laboratory test, field tests (cone penetration test (CPT) and dynamic cone penetrometer test (DCPT)) were also conducted on the closed landfill zones in TPST Bantargebang to obtain the typical bearing capacity of the fill materials. The results of the direct shear test show that the cohesion value of the waste material aligns with the initial compression: higher compression results in higher cohesion, while the contrary applies to the friction angle. The cohesion values range from 0 to 41 kPa, and the friction angle ranges from 0 to 26°. The cone resistance value (qc) up to a depth of 10 m is in the range of 2 to 10 MPa. The equivalent CBR (California Bearing Ratio) value from the DCPT ranges from 4% to 21%. Despite the large variability of the bearing capacity at the top layers, as shown by the DCPT results, the CPT results in the field reveal that the bearing capacity (also the strength characteristics) of the waste materials shows linear increase in line with the depth.