

Characterizing Geotechnical Properties of Drinking Water Sludge Blended with Graded Crushed Clay Brick for Road Subgrade: Effects of Gradation and Mixing Proportion of Crushed Clay Brick on Compaction Property

*Tserenlkham Ikhagvasuren¹, Muhammad Rashid Iqbal¹, Ken Kawamoto¹

1. Graduate school of science and engineering Saitama University, Japan

With rapid construction and renovation works, a huge amount of construction and demolition waste (CDW) is generated in urban areas of developing countries. The CDW is mostly dumped at the landfill sites directly and/or reused for construction works such as ground levelling and backfilling without any quality control of materials. Effective use and recycling of CDW is highly required to establish sustainable urban development. In this study, drinking water sludge (DWS) blended with crushed clay brick (CCB) was tested for the possible application to road subgrade. Especially, the effects of gradation/particle size of CCB and its mixing proportion to DWS on compaction properties have been examined using laboratory tests. A series of the modified Proctor compaction test was conducted using testing samples with three different particles of CCB; the finer (2-10 mm), coarser fraction (10-30 mm), and graded fraction (2-30 mm) and with different mixing proportions to DWS; 20, 40, 60, 80 and 100% on the dry mass basis. The tested results showed that particle breakage of all the above-mentioned fraction was almost the same up to 40% addition of CCB to DWS and was independent of particle size as well. A coarser fraction of CB showed the highest value of particle breakage (45.7%) which was almost double than that of finer (26.9%) and graded fraction breakage (22.8%) respectively. Measured compaction curves of all the mixed samples showed a linear relationship between maximum dry density and mixing proportion of the blended samples. The CCB mixing proportions more than 40% did not show any peak in the compaction curve probably due to a higher quantity of the cohesionless material (i.e., CCB).

Keywords: Drinking water sludge, Crushed clay bricks, Compaction, Particle breakage