

GEOTECHNICAL CHARACTERIZATION OF CLAY SOILS FROM SOUTHERN TO EASTERN LOWLANDS OF SRI LANKA: IMPLICATIONS FOR INDUSTRIAL APPLICATIONS

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Clay-based industries have been prevailing since ancient times in Sri Lanka despite the scientific input to identify and improve the quality of the materials has been insignificant. Thirteen soil samples employed in various clay-based businesses were collected from the southern and eastern lowlands of Sri Lanka (Ampara to Matara). The geotechnical properties of these soil samples were determined and assessed to check their suitability in different industries. The natural water content, grain size distribution (GSD), specific gravity (Gs), liquid limit, and plastic limit of all samples were determined as per the ASTM standards. A high variation of water content as recorded for the soil samples indicating the minimum at Thanamalwila (4.9%) in the Dry one of Sri Lanka, whereas the maximum at Kamburupitiya (29.5%), which is in the Wet Zone. The high water content may be due to the high water absorption capability of the soils and the climate condition of the particular area. The majority of the soils contained sand with an average of 60.6% (49.5 – 69.5%) and less gravel (0.1 – 26.6%). The average bulk finer fraction is 31.4% and showed a discrepancy in different locations indicating high silt contents (17.5 – 40.8%) than the clays (3.5 – 8.2%). The average Gs of the samples was 2.67 (2.59 – 2.78), indicating a strong influence of inorganic contents on the composition. Based on the Unified Soil Classification system (USCS), nine samples were classified as ‘silty sands’, and the rest as ‘clayey sands’. Eight collected soil samples were low plastic; four samples were medium plastic, whereas only one showed high plastic soil based on their Atterberg limits. The soils' low to medium plastic nature suggests their moderate to high standing capacity in applied load; however, this needs further testing. In conclusion, the acquired clay industrial soils of the region have favourable geotechnical characteristics, suggesting their suitability for industries such as bricks and roof tiles rather than soft industries such as pottery and porcelain.

Keywords: Clay characterization, Clay industrial soils, Geotechnical properties