Geotechnical Foundations on Expansive Soils: Comparative Analysis in Sudan and Senegal

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Abstract

Geotechnical foundations on expansive soils are critical in regions where soil properties change significantly over time due to moisture content variations. Sudan and Senegal both face challenges with expansive clays, which can lead to significant foundation instability. A review of existing literature and field data from both countries was conducted. Standardised geotechnical tests were applied to representative soil samples to assess their behaviour under varying moisture conditions. The analysis revealed that while the proportion of expansive soils in Sudan (50%) is higher than in Senegal (20%), the direction of soil swelling and shrinkage patterns was similar, indicating comparable risks but different intensities. Despite regional differences, both countries face significant challenges with expansive soils, necessitating standardised geotechnical engineering approaches to mitigate foundation instability. Standardised testing protocols should be adopted in both regions to ensure consistent and reliable foundation designs. Enhanced collaboration between engineers and soil scientists is recommended for future research. Geotechnical Engineering, Expansive Soils, Sudan, Senegal, Foundation Design The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geography, Soil Mechanics, Foundation Engineering, Durability, Expansive Soils, Case Study, Comparative Analysis*

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