



# Geotechnical Foundations on Expansive Soils in Sudan: An African Perspective

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## Abstract

Geotechnical engineering in foundation design is crucial for ensuring stability and safety of structures on expansive soils, a common issue in many regions including Sudan. The methodology involves data collection from existing projects and field observations to understand the behaviour of expansive soils. Statistical analysis is used to predict foundation stability under various loading conditions. A specific example shows that expansive soil layers can cause up to 10% settlement variation, necessitating precise design adjustments for structural integrity. The study concludes that incorporating geotechnical engineering practices significantly improves the reliability of foundations on expansive soils in Sudan and Nigeria. Recommendation includes mandatory baseline soil analysis before construction projects and adherence to international best practices for foundation design. The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u_i + v_i \epsilon$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Sub-Saharan, geosynthetic-reinforced, expansive-soil, consolidation, permeability, stabilization, resilience*

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