



Geotechnical Engineering Methods in Foundation Design for Expansive Soils in Sudan: A Kenyan Perspective

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Published: 26 July 2010 | **Received:** 23 April 2010 | **Accepted:** 04 July 2010

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DOI: [10.5281/zenodo.18916401](https://doi.org/10.5281/zenodo.18916401)

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Abstract

This study addresses a current research gap in Engineering concerning Application of Geotechnical Engineering in Foundation Design on Expansive Soils in Sudan in Kenya. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Application of Geotechnical Engineering in Foundation Design on Expansive Soils in Sudan, Kenya, Africa, Engineering, methodology paper This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u + \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, Anisotropy, Consolidation, Soil Classification, Stress Analysis, Retaining Structures, Finite Element Method*

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