

Paper Number: 2027

## Geotechnical Investigations into the cracks in Buildings: A case study

Letlole, P.T.<sup>1</sup> and Nnoj, K. W.<sup>2</sup>

<sup>1</sup> Botswana Geoscience Institute, Private bag 14, Lobatse, Botswana, [tletlole@gov.bw](mailto:tletlole@gov.bw)

<sup>2</sup> Botswana Geoscience Institute, Private bag 14, Lobatse, Botswana.

---

Post construction defects including crack formation in structures such as buildings are often unavoidable but remain questionable to community as well as builders and engineers. This might be due to the founding soil properties, which need pre-treatment before constructions, or poor workmanship [1]. In this study, investigation of possible causes of cracks in five single-storey municipal residential buildings at different sites in Ramotswa, Botswana, was carried out. Cracks are thought to have developed during construction and immediately after.

Investigation was done through reconnaissance survey, in situ and laboratory soil testing. In situ methods included Dynamic Cone Penetration (DCP) while laboratory soil tests included particle size distribution and Atterberg limits. Other factors that could enhance crack development such as mature trees and drainage systems are not present at any of the investigated sites. Site investigation has shown that most of the cracks were active with their width increasing with time. The in situ test has shown that the subsurface is competent and dense with low DCP penetration values (3-13mm/blow) indicating high strength. Even if the foundations were too shallow (~0.6m of depth). Laboratory soil tests showed that founding soils had low percentage of fines (2 to 10%) and non to medium plasticity with plastic index (PI) of (0-19%). The low percentage of fines and low PI indicates low expansiveness of founding soils [2]. It is therefore concluded that the development of the cracks in the five buildings can be attributed to poor workmanship.

### Reference

[1] Kashyzadeh Y.K et al. (2012) International journal of Emerging Technology and Advanced Engineering 8:528–531

[2] Van Der Merwe D.H (1964) Civil Engineer in South Africa 6 (6): 103–107

