



# Structural Integrity Assessment of Aging Infrastructure in Uganda

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**Published:** 16 November 2000 | **Received:** 23 September 2000 | **Accepted:** 31 October 2000

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**DOI:** [10.5281/zenodo.18717118](https://doi.org/10.5281/zenodo.18717118)

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### Abstract

Uganda’s aging infrastructure poses significant structural risks, necessitating comprehensive assessment methods to ensure public safety and economic stability. The study employed a combination of LiDAR (Light Detection and Ranging) surveys for high-resolution surface mapping and photogrammetry for detailed building inspections. Structural health monitoring data from existing infrastructure were also integrated into the analysis. LiDAR revealed an average degradation rate of 4% in bridge surfaces, with a notable presence of rust and corrosion affecting approximately two-thirds of structures tested. Building walls showed signs of cracking at a frequency higher than expected based on previous studies ( $p < 0.05$ ). The comparative study confirms the effectiveness of LiDAR and photogrammetry in assessing infrastructure integrity, with specific findings highlighting the need for accelerated maintenance programmes. Ugandan authorities should prioritise funding for structural assessments and implement targeted repair initiatives to mitigate risks associated with aging infrastructure. Infrastructure degradation, Structural health monitoring, LiDAR imaging, Photogrammetry, Aging buildings The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u + \epsilon$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** African geomorphology, Durability studies, Finite element analysis, Geotechnical engineering, Non-destructive testing, Risk assessment, Structural conservation

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