

## SOIL STABILIZATION USING STEIN

*Wednesday 23 April 2025 08:30 (20 minutes)*

Soil in its natural state is usually unsuitable for engineering applications and must be treated to improve its load bearing characteristics. Emerging technologies make it possible to improve soil properties. STEIN is a commercial product that is mixed with cement and used for the stabilization of soil. It has been used in road pavements and in lining of water canals and other water retaining structures in south-east Asia and is now being introduced to Kenya and Africa. There is little in the literature on its strength, hydraulic characteristics and environmental impacts. This paper presents the findings of laboratory experiments on soils stabilized with STEIN-cement. Six local soil types from different parts of Kenya were used: planosols, ferrosols, acrisols, andosols, nitisols, and unclassified local soil. X-ray diffraction tests were performed on the soils and the STEIN. Two types of cement were used: pozzolanic Portland cement (PPC) and ordinary Portland cement (OPC). The soils were stabilized in three categories: cement only (control); cement containing 3% STEIN; and cement containing 5% STEIN. The specimens were prepared, cured and tested for unconfined compressive strength (UCS) at 7, 14, and 28 days. The results showed that STEIN and cement consist of numerous similar minerals but in different proportions. There was significant increase in the strength of the soil when STEIN is introduced into the cement compared with stabilizing with cement only. The 5% STEIN-cement specimens gave higher UCS values than the 3% STEIN-cement specimens confirmed by the paired T-test. From the foregoing, it was inferred that STEIN-cement stabilizes soil by combined hydraulic and pozzolanic reactions leading to enhanced strength. The reactions are inorganic, cementitious and thus create a stable medium for multi-purpose engineering use. However, further research is recommended on the cost, hydraulic characteristics and environmental impacts of the STEIN-cement stabilized soil.

Key words: Soil stabilization, STEIN, Unconfined compressive strength

**Author:** Prof. KIBIY, Joel (Moi University)

**Co-authors:** NDAGA, Cleophas (Moi University); MUKUWA, John (Moi University); Dr RAMKAT, Rose (Moi University)

**Presenter:** Prof. KIBIY, Joel (Moi University)

**Track Classification:** Cross-cutting areas: Other cross-cutting areas