

MODIFYING OF EXPANSIVE CLAY SOILS USING ALKALI ACTIVATED ESKOM DUMP ASH

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Expansive clays the more commonly occurring problem soils in South Africa. Due to spatial constraints, development of ESKOM substations is increasingly undertaken on these marginal soils, thus increasing earthworks construction costs. To reduce these costs, the option of using ESKOM dump ash to modify expansive clayey soils should be explored.

In this study, ESKOM dump ash from Kendal power station will be used to replace Portland cement a binder to stabilize in-situ clayey soils within the power station. ESKOM dumped coal ash is classified as silicious, class f(v), coal ash, which requires activation to be used as a binder for modifying soils. Alkali activators will be used to activate the dump ash. It is important to note that stabilization of soils using non-cement alkali activators is a concept that has not been well studied, and unlike cement activators, these alkali activators do not pose any health or safety risk to persons working with them.

The modified soils will be used to create a platform They will be sampled and taken to a SANAS accredited soils lab. Basic characterisation will be undertaken on the soil samples and the chemical stabilisers i.e., Eskom dump ash and an alkali activator, hereafter referred to as Alkali Activated (AA) coal ash. The AA coal ash will be mixed with the clayey soils and testing of the modified soils engineering behaviour will be tested using the following tests:

- CBR tests (min of CBR = 25 required),
- UCS tests,
- ITS tests,
- Durability tests: Wetting and drying tests, and
- In-situ resistivity tests as per Soil Resistivity testing for Substation application guide (240-96393507).

The results of the resistivity testing will be analysed using CDEGS.

- Hydraulic conductivity of the samples after all the above tests have been carried out, and lastly,
- The leaching of trace metals such as As, Cd, Cr, Cu, Pb, Ni, Zn from the modified samples will be analysed using DSAB and water leach tests.

Resistivity and leachability will be important parameters to understand the viability of using the alkali activated ash to replace Portland cement in these type of subsoil applications.