Numerical Analysis and Evolution of the Slope Factor of Safety of CFG Pile Supported Embankment Against Deep Seated Failure

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ABSTRACT

One of the most approaches for improving embankment stability is to supported cement fly-ash and gravel into the soft underlying soil. To increase the stability of problematic soil as well as greater height road embankment need a ground improvement technique. The cement flyash gavel (CFG) pile is one of the effective techniques. The Effect of partially replacing deficient foundation soil with CFG pile on greater high embankment performance has to be investigated using a three-dimensional finite element model, the performance of (CFG) Cement fly ash gravel pile and geosynthetic-cement Fly-ash and gravel (GCFG)–supported embankments is investigated (PLAXIS3D). The impact of several elements such as the spacing to diameter ratio (S/D) was quantified using parametric research. The effect of encasement stiffness, soil cohesion, CFG pile friction angle, and embankment friction angle on the factor of safety against deep-seated failure. The findings demonstrate that encasing CFG improves embankment stability. Reduced column spacing (S/D) improves stability, lowers excess pore pressure development, and lowers average settlement. Increases in geotextile layers as reduced the embankment load, cohesion of underlain soft soil, friction angle of CFG in MC (Mohr-Columb model), and embankment friction angle increase embankment performance while also reducing average ground settlement. Results of the parametric study factor of safety were used to develop of data-driven models. The factor of safety of greater height embankment increased remarkable in soil treated with CFG.

Keywords: *CFG Piles, Embankment, FEM Analysis, Lateral Displacement.*