

ABSTRACT

Railways, or railroad tracks, provide the primary infrastructure designed expressly for passing trains. These tracks facilitate the movement of the train series from one location to another. The construction includes a supporting structure for the tracks, one component of which is a landfill. In practice, unstable soil conditions, characterized by limited bearing capacity, significantly affect landfills. To ensure the safety of the embankment, precise calculations must be conducted to achieve an optimal design that prevents landslides or structural failures. When geosynthetic technology is used in embankment soil, problems like reduced soil-bearing capacity and landslide risk are fixed. The soil becomes more stable and more potent.

The study involved an examination utilizing computer simulation to simulate embankment soil through Plaxis Version 8, software for finite element analysis in geotechnics, incorporating geosynthetics for enhanced reinforcement. Alongside the utilization of Plaxis, manual analysis was conducted for traditional verification. Both evaluations were conducted to ascertain the impact of geosynthetics on land subsidence and the value of the safety factor.

The simulation findings indicate that employing geosynthetics with a tensile strength of 150 kN/m resulted in a land subsidence of 144×10^{-3} m, whereas a tensile strength of 200 kN/m yielded a land subsidence of 46.59×10^{-3} m. Concurrently, the safety factor value rose, with a tensile strength of 150 kN/m yielding an SF of 1.43 and a tensile strength of 200 kN/m resulting in an SF of 1.52. A tensile strength of 200 kN/m yielded an SF value of 1.51 during manual analysis. The application of geosynthetics in railway embankments has demonstrated efficacy in enhancing stability and minimizing deformation. The results apply to project development.