

ABSTRACT

This study presents a comprehensive slope stability analysis of an embankment dam using the Limit Equilibrium Method (LEM), in accordance with IS 7894:1975. A total of six critical loading conditions cases were considered to simulate realistic scenarios, including end of construction, sudden drawdown, steady seepage (both upstream and downstream), and seismic loading cases. Each case was modeled using the Morgenstern-Price method to determine the factor of safety under different pore water pressure and loading conditions.

Slope stability analysis is crucial in the design and safety assessment of embankment dams because it ensures that the structure can withstand various loading conditions without experiencing failure or excessive deformation. A thorough analysis helps identify potential failure surfaces, assess safety margins, and guides the selection of appropriate construction materials and geometries. In this slope stability analysis was carried out on Wellington dam, Tamil Nadu.

The modeling and analysis were carried out using 2D FEM based **GEOSTUDIO 2024** software, specifically the SLOPE/W, SEEP/W, SIGMA/W and QUAKE/W modules. Mohr Coulomb linear elastic model was used for the dam materials in establishing the static stress-strain conditions. The study involved the definition of appropriate soil parameters, boundary conditions, and seepage characteristics for different dam zones. Each case was analyzed to understand the impact of hydraulic and seismic forces on slope stability, without dissipation or with partial dissipation of pore pressures, where applicable.