

## A Case Study on Re-Assessment Study of an Earthfill Dam at Latamber, Pakistan

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**Abstract :** This research presents the parametric study of an existing earth fill dam located at Latamber, Karak city, Pakistan. The study consists of carrying out seepage analysis, slope stability analysis, and Earthquake analysis of the dam for the existing dam geometry and do the same for modified geometry. Dams are massive as well as expensive hydraulic structure, therefore it needs proper attention. Additionally, this dam falls under zone 2B region of Pakistan, which is an earthquake-prone area and where ground accelerations range from 0.16g to 0.24g peak. So it should be deal with great care, as the failure of any dam can cause irreparable losses. Similarly, seepage as well as slope failure can also cause damages which can lead to failure of the dam. Therefore, keeping in view of the importance of dam construction and associated costs, our main focus is to carry out parametric study of newly constructed dam. GeoStudio software is used for this analysis in the study in which Seep/W is used for seepage analysis, Slope/w is used for Slope stability analysis and Quake/w is used for earthquake analysis. Based on the geometrical, hydrological and geotechnical data, Seepage and slope stability analysis of different proposed geometries of the dam are carried out along with the Seismic analysis. A rigorous analysis was carried out in 2-D limit equilibrium using finite element analysis. The seismic study began with the static analysis, continuing by the dynamic response analysis. The seismic analyses permitted evaluation of the overall patterns of the Latamber dam behavior in terms of displacements, stress, strain, and acceleration fields. Similarly, the seepage analysis allows evaluation of seepage through the foundation and embankment of the dam, while slope stability analysis estimates the factor of safety of the upstream and downstream of the dam. The results of the analysis demonstrate that among multiple geometries, Latamber dam is secure against seepage piping failure and slope stability (upstream and downstream) failure. Moreover, the dam is safe against any dynamic loading and no liquefaction has been observed while changing its geometry in permissible limits.

**Keywords :** earth-fill dam, finite element, liquefaction, seepage analysis

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