

Usama R. Mishal

Building and Construction
Eng. Dept. University of
Technology, Iraq.

thshkhma@yahoo.com

Thair Sh. Khayyun

Building and Construction
Eng. Dept. University of
Technology, Iraq.

usama.raed92@gmail.com

Received on: 02/05/2017

Accepted on: 20/12/2017

Stability Analysis of an Earth Dam Using GEO-SLOPE Model under Different Soil Conditions

Abstract Numerical models are used to check the stability of earth dams and to simulate the effects of all the parameters, which affect its safety. The physical properties of the materials used in the construction of an earth dam are one of these important parameters. The finite element analysis software used for numerical modeling in this study is GeoStudio 2007 (SEEP/W and SLOPE/W). The total number of finite elements used to simulate the standard model is 13508 (triangular elements with global size = 2m), while the total number of nodes is 6939. The selected case study is Al-Adhaim dam, which is an earth dam, located in Diyala governorate at the eastern part of Iraq, crossing Al-Adhaim River with a total length of (3.1 km). The major objective of this study is to derive an empirical equation to calculate the factor of safety for earth dams of similar geometries and materials without the need for sophisticated analysis, by assuming different soil conditions. In addition to the soil parameters (the total weight density γ , the angle of internal friction ϕ , the cohesive strength C) for the shell, core and filter within the dam, more parameters have been taken into consideration in predicting the critical factor of safety against slope failure to derive the empirical equation, which are: water depth H (m), coefficient of permeability k (m/s) and Seepage rate Q_s ($m^3/s/m$). The values of the computed factor of safety (F_s) using nine installed slope stability methods: Ordinary, Bishop, Morgenstern-Price, Janbu Generalized, Lowe-Karafiath, Corps of Engineers #1 and #2, Spencer and General Limit Equilibrium (GLE) are close to the safety factors values calculated using the general empirical equation which is a function of the soil and hydraulic parameters of the shell, core and filter within the dam.

Keywords: Slope Stability; GeoStudio 2007; Al-Adhaim Dam; Soil Conditions.

How to cite this article: U.R. Mishal and Th.Sh. Khayyun, "Stability Analysis of an Earth Dam Using GEO-SLOPE Model Under Different Soil Conditions," *Engineering and Technology Journal*, Vol. 36, Part A, No. 5, pp.523-532, 2018.