

ABSTRAK

Bendungan merupakan struktur yang sangat kompleks dan beresiko jika mengalami kerusakan. Keseluruhan bendungan harus tetap stabil dalam segala kondisi, termasuk gempa bumi selama pengoperasian dan pemeliharaan yang mungkin terjadi selama umur layanan bendungan. Stabilitas bendungan merupakan salah satu persyaratan yang harus dipenuhi dalam pembangunan bendungan, bila syarat stabilitas tersebut tidak terpenuhi, maka akan mengakibatkan masalah keamanan bendungan yang berupa kebocoran, rembesan, longsoran, erosi, dan retakan. Stabilitas bendungan dipengaruhi oleh banyak faktor, antara lain penentuan zona tubuh bendungan, kemiringan tebing, lapisan fondasi, beban gempa, dan lain-lain. Bendungan Leuwikeris merupakan bendungan tipe urugan batuan sehingga memiliki kerentanan terhadap bahaya keruntuhan akibat beban material penyusun maupun gaya-gaya luar yang terjadi. Hal tersebut yang mendasari perlunya perhitungan stabilitas lereng bendungan dalam perencananya. Analisis stabilitas lereng bendungan menggunakan bantuan aplikasi komputer, *software* Geostudio 2024.1.0 *Student Edition* merupakan salah satu program LEM (*Limit Equilibrium Method*) yang digunakan untuk aplikasi permasalahan rekayasa geoteknik, seperti pemodelan material pada saat melakukan tahapan simulasi terhadap perilaku dari tanah. Analisis tersebut dilakukan dengan membuat simulasi kondisi muka air dan menerapkan kondisi gempa OBE (*Operating Basis Earthquake*) dan MDE (*Maximum Design Earthquake*). Hasil penelitian menunjukkan bahwa faktor keamanan bendungan dalam kondisi setelah pembangunan, MAN (Muka Air Normal) el. 151.350 m, dan MAB (Muka Air Banjir) el. 152.410 m dengan dan/atau tanpa beban gempa berada dalam batas aman sesuai standar. Sedangkan faktor keamanan terhadap rembesan ketika kondisi MAN diperoleh $q_f = 1.420 \times 10^{-6} \text{ m}^3/\text{detik}$, dan ketika kondisi MAB $q_f = 1.465 \times 10^{-6} \text{ m}^3/\text{detik}$. Dengan nilai keamanan *piping* pada saat kondisi muka air normal dan muka air banjir dinyatakan aman karena memenuhi syarat $FK \geq 4$.

Kata Kunci : Bendungan, GeoStudio, Muka Air, Rembesan, Stabilitas Lereng

ABSTRACT

Dams are very complex structures and are at risk if damaged. The entire dam must remain stable under all conditions, including earthquakes during operation and maintenance that may occur during the service life of the dam. Dam stability is one of the requirements that must be met in dam construction, if these stability conditions are not met, it will result in dam safety problems in the form of leaks, seepage, avalanches, erosion, and cracks. The stability of the dam is influenced by many factors, including the determination of the dam body zone, the slope of the cliff, the foundation layer, the earthquake load, and others. The Leuwikeris Dam is a rock-type dam so that it is vulnerable to the danger of collapse due to the load of the constituent materials and external forces that occur. This is the basis for the need to calculate the stability of the dam slope in its planning. Dam slope stability analysis using the help of a computer application, Geostudio 2024.1.0 Student Edition software is one of the LEM (Limit Equilibrium Method) programs used for the application of geotechnical engineering problems, such as material modeling during the simulation stages of soil behavior. The analysis was carried out by simulating water level conditions and applying OBE (Operating Base Earthquake) and MDE (Maximum Design Earthquake) earthquake conditions. The results of the study show that the safety factor of the dam is in the condition after construction, NWL (Normal Water Level) el. 151,350 m, and FWL (Flood Water Level) el. 152,410 m with and/or without earthquake load is within safe limits according to the standard. Meanwhile, the safety factor against seepage is obtained when the MAN condition is obtained $q_f = 1.420 \times 10^{-6} \text{ m}^3/\text{sec}$, and when the MAB condition $q_f = 1.465 \times 10^{-6} \text{ m}^3/\text{sec}$. With the safety value of piping when the water level is normal and the flood water level is declared safe because it meets the requirements of $SF \geq 4$.

Keywords: Dam, GeoStudio, Seepage, Slope Stability, Water Level