Seepage Problem Through the Foundation of a Spillway with Selected Treatment Methods

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Abstract

One of the main concerns for engineers, during operation of dams, is uncontrolled seepage though the foundations of dams and hydraulic structures which is mainly resulted from poor geological conditions and lead to undermine erosion or piping that may endanger the safety of dam. In this study, numerical models were utilized to evaluate the excessive seepage problem underneath the spillway of Horan 2 Dam in Iraq as the seepage have led to dissipate storge and malfunction the dam. Two treatment methods were proposed to reduce the quantity of seepage by using a cutoff wall and a clay blanket. The results of the models indicated that the foundation of the spillway was unsafe against piping, as the calculated factor of safety was less than the allowable value. A clay blanket of 6 m long is recommended to sufficiently reduce the quantity of seepage and maintain the factor of safety within the allowable limits. As the cut off wall and clay blanket were used, the quantity of seepage decreased up to 73% and 96%, respectively, and the safety factor increased up to 100% and 110%, respectively. As discussed herein, using a clay blanket is the most cost-effective method comparing to using a cutoff wall.