Influence of Depth and Arrangements of Cutoffs on The Uplift Forces

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Abstract:

Uplift is one of the main design factors for heading up works. This fact occupied the attention of many investigators in recent decades. The work presented herein comes as a trial for investigating the effect of arrangement of cutoffs and their depths on the uplift forces under the floor of diversion and head water structures. Cutoffs are one of the most important methods for decreasing the uplift forces if located at the right positions. Such positions are usually the beginning, the end of the solid apron, under the main heading up structure or combinations of them. The present study introduces an experimental investigation to clarify the precise behavior of the uplift forces due to the above mentioned locations. So, the experiments were carried out by providing the floor with one or two of cutoffs with different depths and locations. However, the sum of the total depths of the cutoff is kept constant and equal 20% of the floor length. The cutoffs were arranged in their locations to be at the beginning, end of the floor, or in-between to detect their effects on the uplift pressure. The obtained results for the studied cases proved that; for a fixed cut off depth, the nearer the location of such cutoff to the upstream the bigger the reduction of uplift distribution affecting the rest of the solid apron length. When the cutoff is used at the end of the floor, the reduction of the uplift force is not significant although its positive influence on exit gradient. The best location of cutoffs giving maximum uplift reduction is obtained. The results give a clear picture about the uplift distribution in longitudinal directions.

Keywords:

Cut offs, floors, Uplift forces, Heading up Structures

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