

Verification against Failure by Piping on Retaining Structures Applying the Network Method

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Abstract - When designing retaining structures, different phenomena must be studied in order to classify them as safe from a geotechnical point of view. Among them is pipping, a physical process related to seepage under the structure which leads to an unstable situation and might finally cause failure. In order to quantify this risk, a comparison between the critical gradient and the estimated hydraulic gradient is usually accepted. The calculation depends on geometric parameters, geotechnical data and flow boundary conditions, as well as the designed structure. Nevertheless, most of the universal solutions, such as graphics, have not been developed considering an anisotropic medium as foundation soil, so no realistic results are obtained. The aim of this work is to provide a methodology to obtain an estimation of the average gradient using a computational model based on the network method. This consists on the analogy between electrical magnitudes, such as voltage and intensity, and geotechnical variables, which are groundwater head and flow. The safety factor is calculated whether the soil is anisotropic or not, and so, the structure can be classified from a safety point of view.

Keywords: Geotechnics, piping, heaving, safety factor.