

Earth Sciences Department

Geotechnical risk management in rock mass tunnelling

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Objectives

This investigation intends to implement an effective geotechnical risk management tool in rock mass tunnelling, namely to control the risk assessment and the need for mitigation measures to avoid collapse and instability of the tunnel (fig. 1). The overall objective is to ascertain the level of geotechnical risk in the construction phase, due to rock mass heterogeneities (fig. 2) and to the lack of their complete knowledge, to validate such assessment and to support the implementation of mitigation procedures.



Figure 1

Methodology

The proposed objectives will be achieved, to begin with, by evaluating geotechnical design data complemented by new data gathered during the technical assistance to tunnelling through rock masses from a set of already built tunnels (fig. 3). The purpose of such study is to validate a checklist of geological and geotechnical hazards and associated risks, to quantify them by using mathematical tools such as multivariate data analysis and geostatistical models, and to define adequate mitigation measures, including the definition of contingency plans. The developed methodology will be applied to a tunnel under construction, where the methodology will be tested and/or emphasized, thus demonstrating its economic and execution time optimization, always within the adequate safety criteria.



Figure 2

Expected Results

The main result is the implementation of a new approach in geotechnical risk management in rock mass tunnelling, with hazard identification, determination of rock mass characteristics in advance and, objectively, evaluate tunnelling geological and geotechnical risks, ensuring the adequability of design and increasing productivity, security and economy of construction works.



Figure 3

Funding: