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TITLE OF DIPLOMA THESIS:

Risk analysis of a retaining wall project

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ABSTRACT

The ensuing dissertation discusses the modern claim to determine the reliability of geotechnical projects in the framework of risk analysis by implementing methods of structural reliability. The latter determine the safety of a structure by means of data likelihood, so that the uncertainty of data (soil parameters and loads) is taken into account while using numerical methods of analysis. The accepted probability of failure is that which ensures the social security requirements with restrictions as to the construction cost of the project. Moreover the design of a retaining wall project of an open excavation was studied using the method of reliability analysis of reliability index β . For this purpose, failure of the project in question is defined by the non-satisfaction of certain constraints regarding the expected magnitude of movements construction will cause to an adjacent pre-existing building. Also, limit state functions were formed. Then, the parameters that affect mostly the calculations of the probabilistic analysis were found and they were considered as random variables. In order to take into account the variability of values of the basic soil parameters, point estimate method (PEM) was chosen as the appropriate method of credibility, which uses mean value and standard deviation of the stochastic figures. The parametric analyses were executed with the aid of the numerical method of finite elements in Plaxis 7.2. Subsequently, the characteristics of the distribution of the tested construction responses, the mean value and the standard deviation, were identified; lastly the reliability index β . Finding the corresponding probability of failure for various failure set criteria yielded a fuller picture of the adequacy of the designed retaining project according to the expected safety, than is obtained from the factor of safety alone. Additionally, in correlation to the safety factors, the aforementioned reliability analysis undoubtedly leads to a more rational choice of the appropriate safety factor regarding the design, so that, without undue expense, a small acceptable probability of failure is achieved.

KEYWORDS

Retaining wall project, Reliability, index, Probability of failure