

## Evaluation of the Mechanical Behavior of a Retaining Wall Structure on a Weathered Soil through Probabilistic Methods

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**Abstract :** Retaining slope structures are increasingly considered in geotechnical engineering projects due to extensive urban cities growth. These kinds of engineering constructions may present instabilities over the time and may require reinforcement or even rebuilding of the structure. In this context, statistical analysis is an important tool for decision making regarding retaining structures. This study approaches the failure probability of the construction of a retaining wall over the debris of an old and collapsed one. The new solution's extension length will be of approximately 350 m and will be located over the margins of the Lake Paranoá, Brasília, in the capital of Brazil. The building process must also account for the utilization of the ruins as a caisson. A series of *in situ* and laboratory experiments defined local soil strength parameters. A Standard Penetration Test (SPT) defined the *in situ* soil stratigraphy. Also, the parameters obtained were verified using soil data from a collection of masters and doctoral works from the University of Brasília, which is similar to the local soil. Initial studies show that the concrete wall is the proper solution for this case, taking into account the technical, economic and deterministic analysis. On the other hand, in order to better analyze the statistical significance of the factor-of-safety factors obtained, a Monte Carlo analysis was performed for the concrete wall and two more initial solutions. A comparison between the statistical and risk results generated for the different solutions indicated that a Gabion solution would better fit the financial and technical feasibility of the project.

**Keywords :** economical analysis, probability of failure, retaining walls, statistical analysis

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