

APPLICATION OF BACK-ANALYSIS FOR STRUCTURAL FOUNDATION IN SOFT SOIL IN SEISMICALLY PRONE AREA

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SUMMARY

This paper presents some experience gathered during the application of the back-analysis approach in founding of a residential-business complex located in seismically prone area.

The previously performed field and laboratory geomechanical tests proved that the geotechnical medium of the location was characterised by a high heterogeneity of soil materials with predominant presence of layers of low strength-deformability characteristics. A high underground water level and layers of fine-grained uniform sands susceptible to dynamic instability under seismic effects were observed. Such an unfavourable geotechnical situation of the given location imposed the need of improving of the natural foundation soil. The most favourable and rational solution that could provide safety and stability of structures was the use of gravel piles and a sub-base.

The analyses were done in three phases. The first phase consisted of two parts: analyses of possible settlement by using the parameters of natural non-improved soil and analyses by using the parameters of improved soil. The fact that the location was of specific geotechnical properties imposed the need to include also the effect of soil-structure interaction in the analyses. To analyse the integral soil-structure system, the substructure method was applied, which represented the second phase. The project anticipated observation of the structure in all the phases of construction and later during the serviceability period. The data from the observations were used to perform a back-analysis, which was the third and final phase of the analyses.

The application of the back-analysis represents a qualitative advance made in determination of the Stress-strains State of soil. In the presented project, the application of the back analysis was of a great benefit because of the results and data that verified not only the methods and the models but also the applied technical solution.

Special attention was focus on the seismic response and site effects of the location. Also seismic soil-structure interaction was taken under consideration.

INTRODUCTION

Presented in this paper are the analyses and the results on the Stress-strain State of soil and soil-structure interaction.

The field and laboratory geomechanical surveys done for the considered structure have shown that the location is characterised by a great heterogeneity of soil materials, with dominant presence of layers of weak strength-deformability characteristics. Improvement of the foundation soil was done by gravel piles and a sub-base layer. The analyses have been performed based on the results obtained from the performed control geomechanical tests on the level of improvement of the natural soil. Apart from the mentioned analyses, the effect of soil-structure

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