

Earth Sciences Department

## Title

Alexandre Manuel Gameira dos Santos Ferreira



A. Santos Ferreira

PhD Student

Civil Engineer, IPTM, I.P.

Research collaborator of  
CIGEGe, FCT-UNL

Thesis supervisor: PhD Alcino Rodrigues de Carvalho, FCT-UNL

## Objectives

Given the importance of the soil improvement technologies, due to the fact that an increasing area of soft soils is being used for urban development, and that one of the possible soil improvement methods consists in the use of vertical prefabricated drains, in general combined with surcharges, and taking in account the traditional consolidation theory, uni or bi dimensional, and the increasing power of computers, that allow us to consider more complex 3D solutions, it is object of this study the study of 2 and 3D solutions, and, using some real works, compare the accuracy of both approaches, 2 and 3D, assessing the eventual increase in accuracy of the 3D solutions, taking in account the increase in complexity and cost of such solutions.

## Methodology

- Review of the 2D and 3D consolidation theories;
- Analysis of case studies of instrumented earth fills on soils improved with prefabricated vertical drains, both applying 2D and 3D consolidation theories, comparing the results of both cases with field observation;
- Verify if the present 3D theories are indeed more accurate than the 2D solutions, comparing the eventual increase in accuracy with the inherent increase in complexity in the formulation of the problem, difficulty in its implementation, and increase in cost of such an analysis.

## Expected Results

It is expected the 3D approach to be more accurate, and to represent better the real behaviour of soft soils; anyway, it is not yet clear that such improvement in accuracy will be in proportion with the increase in cost, and technical difficulty in its improvement.

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