ABSTRACT

The correct stabilization of foundation soils constitutes an increasingly important issue in the present civil engineering world. Concerns over the environment have taken significant proportions, and there is the awareness today that efforts must be made to diminish the environmental damage caused by the development of infrastructures. Therefore, it has become urgent not only to find building procedures, which will allow this objective to be achieved, but also to accelerate their implementation.

Recycling material from the original site, independently of the simplicity avoids its substitution by better materials, recovered elsewhere; which has severe consequences for the environment. This also eliminates the need for a deposit site of unused material.

Soil stabilization with cement and/or lime is a way of achieving the proposed goals, which is at the same time inexpensive and easy to apply in practically any type of soil.

Residual granite soils can be found in large areas of northern Portugal. Their clay fraction, being significant in quantity, is formed almost exclusively by kaolin, a mineral which in comparision with other types of clays does not react very much with lime. On the other hand, the high percentage of clay reduces the fitness of the this type of soil for stabilization with cement.

The main goal in this research work is to quantify the benefits achieved with the lime stabilisation of a residual granite soil, with respect to water sensibility and mechanical resistance. The characteristics of two soils, with different clay fractions are discussed and the evolution of their properties after mixing with 2, 6 and 10% lime is studied. A calcitic hydrated lime was used in this research work. The results were monitored up to ten weeks after the admixture, at which point resistance had improved more than ten times the initial values.

The compressive strengths of both soils in saturated conditions were also tested, once again significant improvements relatively to the initial values were observed. The effects of the addition of sodium chloride and lime are also reported. It was concluded that this is an efficient way of reducing costs, without losing the strength gains and water sensibility already achieved..

Furthermore, a review of the state-of-the art was also undertaken with regard to mechanical, physical and chemical stabilization of soils.