BSc Project

# Soil improvement of dredged material for geo-engineering purposes: experiments and theory

**Multiscale Mechanics (Utwente)**

In the Netherlands, a large amount of material is dredged, which is often wasted due to its poor soil characteristics. Increasing the strength of dredged soil can help with the problem of soil as a waste product in the Netherlands, using the dredged material in a beneficial way.

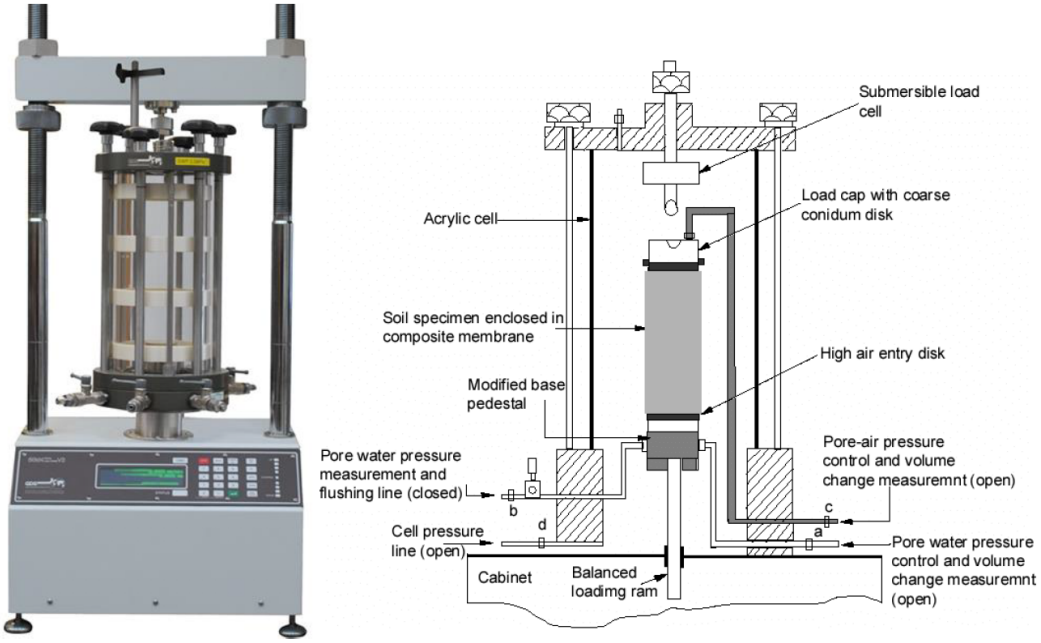


Figure 1: Triaxial cell picture and schematic.

**Goal:** Goal of this project is to explore whether the strength of soil could be increased through mixing with environmentally friendly additives, to make it suitable for the formation of a typical dyke. This will also make land reclamation a more sustainable process.

**Background:** The typical composition of dredged soil from rivers in the Netherlands can be reproduced using a mixture of sand and silt. Desired soil characteristics can be achieved by mixing the dredged material with another artificial/natural material. Preliminary results have been achieved by means of environmentally friendly additives that were researched are alginate, beta-glucan and xanthan gum. In order to make a comparison with popular techniques, also tests on soil mixed with PP fibers have been conducted. It was found that PP fibers increase the undrained shear strength of the dry reconstructed sample significantly. One very interesting result of the dry tests is that the deviator stress-strain plots for the samples with additives show a behavior that is similar to the behavior of overconsolidated soil. More research is needed to explore the strength increase of dredged material, such as research on saturated soil with a higher silt content and the optimization of the additive content.

**Method:** The project involves the determination of the strength of the soil using triaxial tests in undrained condition, for a wide set of sand-silt-additives mixtures. Results of the test can be implemented for a theoretical study based on the Cam-Clay model.

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