Cohesive soils, such as clays or till, subjected to repetitive loads have a different kind of response in the form of deformation than non-cohesive soils (sand and gravel).

Design of structures based on the soil subgrade based on two design processes. The first method, is empirical approach which relays on the tests of materials and the designer experience, to design the structure. Design in terms of mechanistic approach involves, as close as possible to reality, determining the values of geotechnical parameters to be used for modeling of work of construction.

The large variability of geotechnical and geological soil properties is the cause of the existence of such different approaches to the design of soil structures.

The aim of our project is to investigate how cohesive soil responds to cyclic loading in undrained conditions.

Cohesive soils loaded with a cyclic force accumulate excess pore water pressure in the conditions without the possibility of outflow of water from the pores of the soil. This phenomenon can be observed, for example, for fully saturated clays that are often subgrade for road constructions or foundations. Cyclic loading that has a low amplitude is found frequently in the case of the industrial foundations and construction of local roads.

A number of scientific studies on the cyclic loading of soil allowed for the identification of such phenomena as soil liquefaction. However, the way of cohesive soil response in cyclical loading conditions without drainage is still not clear. The result of this situation, is the use of approximate geotechnical parameters for the design of structures subjected to cyclic loads, and thus, improper characteristics of cohesive soil. This in turn, results in a poor estimate of the time construction work in the operation phase, and the wrong choice of construction materials.

Thanks to the development of quality of measuring instruments used in geotechnical field of studies, it is possible to examine the exact value of pore water pressure and the size of deformation.

The use of modern science equipment make possible to understand the phenomenon of increase in pore water pressure in cohesive soil and its effect on deformation under cyclic loading.

Understanding the principles governing this phenomenon, will allow for appropriate modeling work cohesive soil and thus the proper selection of building materials.

In order to properly identify the above-described phenomena, we are going to determine the influence of factors such as the maximum deviatoric stress, stress amplitude or frequency of the load. These factors will result in a different response cohesive soil under undrained conditions and therefore a different way of generating the excess pore water pressure.

In our project we will use the cyclic triaxial apparatus and resonance column. In this project we use three types of soil model with a different index of plasticity and thus with different content of clay fraction. We intend to examine how cohesive soil responds to cyclical conditions without water outflow from the pores of the soil through the successive stages of the project, which consists of an analysis of the effect of cyclic loading on the response cohesive soil with different plasticity index. Examine the physical and mechanical properties of three types of cohesive soils (as the angle of friction and cohesion, optimum moisture content, particle size distribution, compressibility), and to examine the values of the parameters necessary to perform numerical modeling.

Performance of the test triaxial under cyclic loading to determine the effect of the stress amplitude, maximum stress dewiatorowego and effective mean stress on the method of generating the pore water pressure.

Finally, we will conduct the numerical analysis to confront the research results with the results obtained using the finite element method and constitutive models. We also propose our own analytical model described above phenomenon

In summary, the role of the method for generating the pore water pressure on the value of cohesive soil deformation parameters is not properly recognized. This project will complement the knowledge on the subject.