

## STEPS Students Report

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During this internship, I joined the engineering geology laboratory at Moscow State University. Geological engineering laboratory is conducting different types of experiment on soil samples collected from different region of Russia to investigate their engineering properties for design purposes. In addition to conducting my own planned experiments, I joined the research groups to deepen my understanding about the soils of Russia.

Saint Pietersburg area is famous for its problematic soil exists in that area up to depth of 20-30m. These problematic soil leads to excessive settlement during and after construction of infrastructures. This is one of the reason of lack of high rise building in that region of Russia. One of the research group was investigating the undrained response of undisturbed samples collected from Saint Pietersburg region using Triaxial apparatus. These samples were frozen to keep intact the fabric of the particle.

Before conducting the test, these specimen were taken out of the refrigerator and taken out from the mold (Fig a). Specimen was fixed on pedestal on the Triaxial machine (Fig b). After connecting all the connections, the specimen was enclosed in the cell with water. Specimens were consolidated up to 50kPa to know the characteristics of soil behavior followed by the unconfined loading.



Fig a : Undisturbed samples collected from Saint Petersburg



Fig b : Undisturbed sample collected from Saint Petersburg



Fig c : Triaxial Apparatus with undisturbed sample

Second research was related to the theme that was part of my Ph.D. work in Japan. Geological laboratory already collected natural river sand in Moscow to conduct liquefaction test. This sand consist of fine content,  $F_c$  of 8%. We devised the plan to do eleven (11) tests on this sand to compare the behavior with Japanese standard Toyoura sand. First, we created a pluviation device with opening of 3mm to pour the sand into the mold to achieve the desire density. After preparation of samples, carbon di oxide ( $CO_2$ ) was injected into the specimen to remove air from the specimen. It is followed by allowing the water into the specimen to saturate. After the saturation of specimen, high back pressure is applied to increase the degree of saturation in the specimen. The back pressure was left for overnight to increase the saturation more than 95%. After checking the saturation, different cyclic loading was applied on the sandy specimen. As one month was insufficient to complete the series of the entire test. Therefore, students in the MSU plan to conduct remaining test. Different phases of test is shows from Fig. d to h.



Fig d: Mold for pluviation of sample



Fig e: Specimen during saturation



Fig f: Specimen after failure during monotonic loading in Triaxial

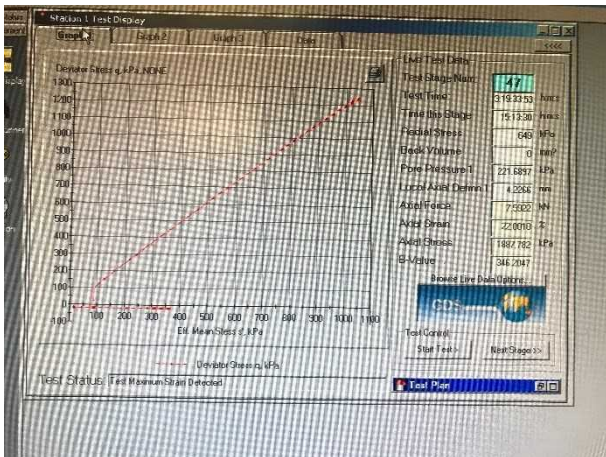


Fig g : Stress path of Russian Natural river sand

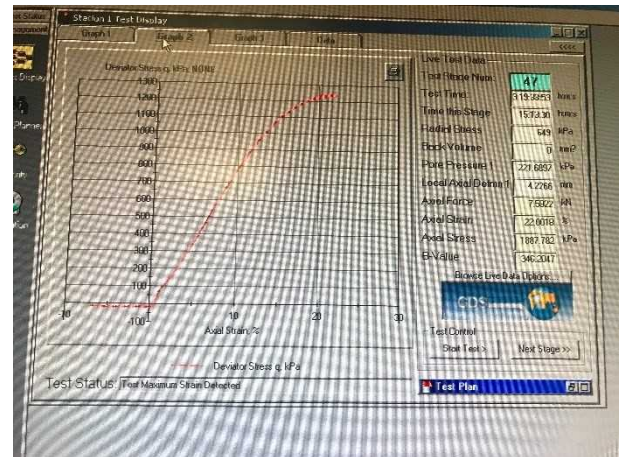
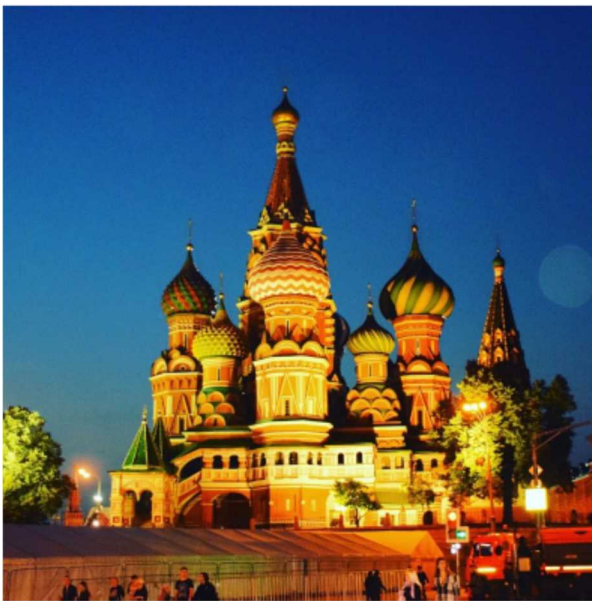


Fig h : Stress- Strain curve of Russian Natural river sand

Apart from participation in the research activities, I also participated in the international student club at the MSU. There in met number of international and Russian students. I experience a number of cultural shocks there and happy to learn the diversity of Russian culture. Russia has a very long history, during first week of my exchange I participated in the Moscow birthday even, where many dancing and singing activities were held. I also visited number of museums, especially in the center of the Moscow city. I feel dynamics of personality has improved by learning the research culture as well as festivals there. Below are some pictures I took during my sightseeing in different part of Moscow city.



Saint Basil's Cathedral

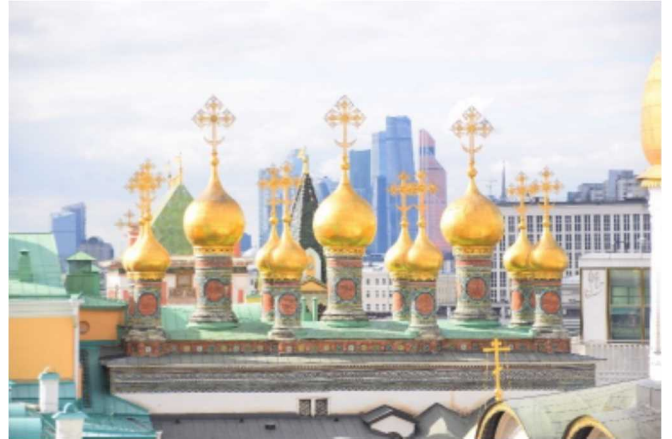


Moscow State University Night View





Theater square (circle of light festival)



Cathedrals in city center