STEPS Students Report

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My report is presented in two parts, my laboratory work and general life experiences from my stay in Russia.

Laboratory work at Lomonosov Moscow State University

During my study period at Lomonosov Moscow State University, I had the opportunity to improve my experimental testing skills by joining two Triaxial test research groups. I alternated my laboratory time between the two research teams.

In the first team, we were undertaking Triaxial soil tests on soil samples obtained from a commercial project site at the Amur River in Eastern Russia. At this site, a bridge will be constructed for a road connecting Russia and China. The soils were mainly sandy soils. From the tests done, I was able to learn the following:

- Procedures for preparing sandy soil samples for Triaxial test.
- General procedures for undertaking consolidated drained Triaxial test on sandy soils.

Fig 1: Set up of CD Triaxial test.

The second research group was involved in undertaking precise stress path tests on undisturbed samples from two sites:

1. Onegs Lake in Russia: undisturbed samples had been obtained up to a depth of 3m.These samples mainly consisted of loose silt material. As the soil material was loose and could be easily disturbed, the freezing method of sample preservation was used. In this method, the samples were frozen to make it easy to install them on the Triaxial test machine. Volume change was monitored as the ice melted to determine the effects of the preservation method.

(a)

(b)

Fig. 2(a) Frozen sample obtained from site. (b) Frozen sample after demoulding positioned on Triaxial pedestal.

2. Paks Atomic Station in Hungary: from this site, soil samples had been obtained up to a depth of 110m. Precise stress path tests using Triaxial test equipment were conducted on the soil samples to simulate the conditions on site before construction and those predicted to occur after construction. On this site, a nuclear power plant is to be constructed. The test to be undertaken included Consolidated-Drained, Consolidated-Undrained and Unconsolidated-Undrained Triaxial tests. I took part in the Consolidated-Undrained test, which involved the following steps:

a) Isotropic consolidation to initial ground stress;
b) anisotropic consolidation (including the weight of the new structure to be installed);
c) compression loading and unloading at predetermined stress;
d) compression loading to failure.

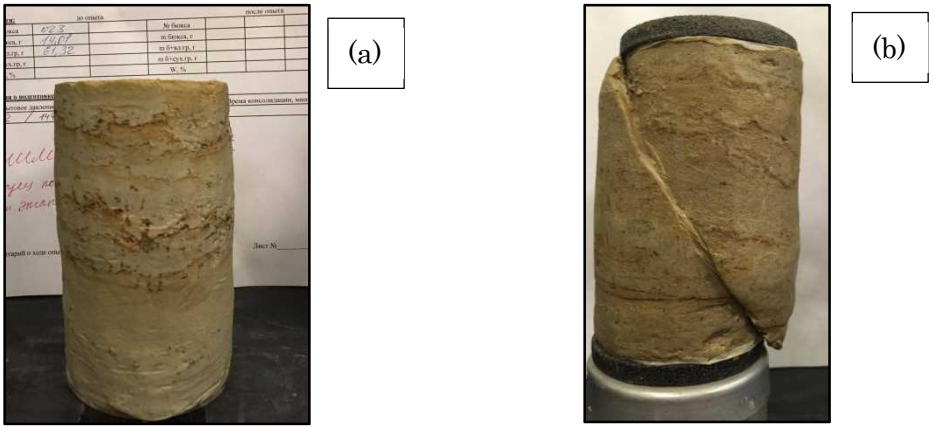


Fig. 3(a) Paks Undisturbed sample before testing. (b) Sample after testing

From my laboratory work and discussions with research teams, three areas of interest arose:

1. The effect of variation of moisture content in soil samples with low permeability. The laboratory at Lomonosov Moscow State University utilized a mid-length water transducer to observe the effect of this. In addition, to determine the water content of the sample, parts of the sample along the failure plane were utilized. These are methodologies, I would like to explore in my own laboratory test at the University of Tokyo.
2. Effects of loading speed during Triaxial testing and the different procedures for estimating the same as provided by various testing codes.
3. Methods of preserving undisturbed samples of loose soil materials for testing.

General Life Experiences

Some of my most treasured experiences in Tokyo are from understanding the preparations being undertaken for Tokyo Olympics 2020. Being in Moscow was a good opportunity to compare the approaches by different cities in preparing to host international events. Admittedly, it is an unbalanced comparison, as in Russia the 2018 football (soccer) World Cup events will be hosted in eleven cities, while the Tokyo 2020 Olympics will be hosted by one city.

The contrast, from my point of view, between the approaches toward preparations for the two events are:

1. Tokyo 2020 is aggressively being marketed; on the minimum, every month there is a news item about Tokyo 2020, not only in Japan but also in international news, media such as BBC. On the other hand, there is very little in the news about the 2018 World Cup.

2. In Tokyo, at major tourist sites, there are small constant reminders of Tokyo 2020, including brochures branded with Tokyo 2020 logo and adverts in train. Furthermore, one can also find Tokyo 2020 merchandize goods (four years in advance!), but this is not the case for Russia.

3. The host cities in Russia are all clustered in the West, which is closer to Europe. I think that despite minimal publicity, the event will have a large attendance, as football is most popular in Europe and the locations are easily accessible for both Eastern and Western European countries. Tokyo on the other hand is in the completely far east and hence requires much publicity to achieve good attendance.

Fig. 4(a) World cup 2018 host cities.

(b) Countdown clock for world cup 2018 in down town Moscow.

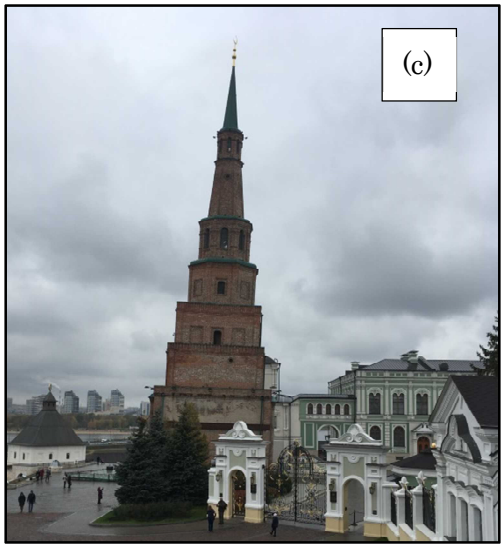
In addition to Moscow, I visited two world cup host cities: Saint Petersburg and Kazan. It was amazing for me to understand how the history of the Russian empire (Peter the great and Catherine the great), inspired the brutalist architecture in Russia. Previously, I thought this kind of architecture was mainly influenced by the communist Soviet era, but it was interesting to learn how the Russian Emperors and Empresses were obsessed with construction and grandeur structures. Nothing is small in Russia, even statues are humongous.

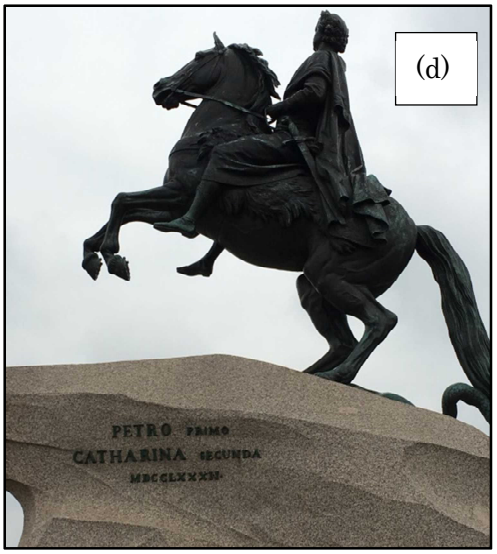
The level of preservation of historical sites and continued use of historical buildings from as far as the 16th century was very admirable. The variation in culture of the three cities I visited was also interesting: Saint Petersburg has more of European influence; Kazan had elements of Middle East influence with a Mosque located within the Kazan

Kremlin; while Moscow satisfied the stereotypical image of Russia, with the Red square and Kremlin in it.

Conclusion

The experiences from this program will be of at most importance in my current studies at the University of Tokyo and in my future professional career.





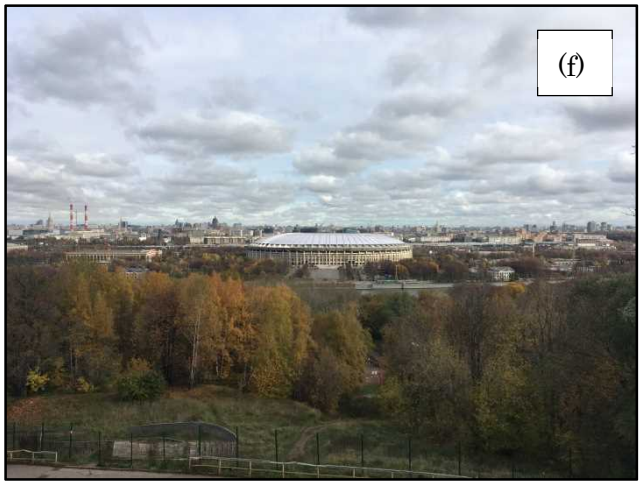


Fig. 5(a) Qol Sharif mosque at the Kazan kremlin, (b) Kazan Kremlin, (c) Soyembika tower in Kazan kremlin, (d) Monument of Catherine the great in Saint Petersburg, (e) Main building of Moscow State University, (f) Luzhniki stadium in Moscow: venue for final match of world cup 2018.