Japan Society of Civil Engineers

Report for

Japan Society of Civil Engineers
2018 Study Tour Grant Program
Supported by International Scientific Exchange Fund- ISEF

Prepared by
Anindya Samya Saha
2018 STG Participant
Department of Civil Engineering
Bangladesh University of Engineering and Technology (BUET)

Recommended by The Institution of Engineers, Bangladesh (IEB)

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1.1 About Japan Society of Civil Engineers (JSCE)

Japan Society of Civil Engineers (JSCE) was established as an incorporated association in 1914 entrusted with the mission to contribute to the advancement of scientific culture by promoting the field of civil engineering and the expansion of civil engineering activities. Since its establishment, JSCE has endeavored to achieve the above mission, through extensive activities including scientific exchange among members, researchers/promotion of science and technologies relating to the field of civil engineering, social involvement, etc. Over the years, the JSCE membership has increased significantly from the initial 443 members to approximately 39,000 members at present, and is currently engaged in various wide-ranged activities around the world.

With the birth of the 21st century, JSCE has reconfirmed its goals to exert perpetual efforts

- to propose an idea for social infrastructure development in the future from civil engineers' perspective,
- to acquire a steadfast relationship of mutual trust with the society,
- to promote scientific and technological researches/studies with a high degree of transparency, and
- to evaluate public works from a neutral standpoint, and to reach a social consensus on those proper standards.

Furthermore, JSCE will implement such new indispensable programs as Civil Engineers' Qualification System, Continuing Professional Development, etc., for the benefit of creating an environment where civil engineers can widely taka on an active role in the international community, and where civil engineering technologies may contribute to the amenity of the people both in and outside of Japan.

1.2 About Study Tour Grant (STG)

JSCE Study Tour Grant (STG), supported by International Scientific Exchange Fund (ISEF), is a unique program for young civil engineers to learn Japanese civil engineering technlogy and projects. The STG program invites the civil engineering sutdents who are nominated by the AOC societies to Japan to stay for about one week. During their stay, those students visit project sites and research institutes, meet leading civil engineering professionals and academics, and share their projects with other students. At the end of the program they are requested to

submit a report on their experience gained in Japan to JSCE and also to the AOC to which they belong home. This program gives a chance not only to see technological innovations, but also to experience them in the environment that they are achieved.

1.3 Selection Procedure

Near the end of March, it suddenly came as a beautiful surprise. I heard from Dr. A. F. M. Saiful Amin that I along with two of my colleagues have been nominated for the JSCE 2018 STG program from The Institution of Engineers, Bangladesh (IEB). Being the toppers of our institution in the Department of Civil Engineering, Bangladesh University of Engineering and Technology (BUET), getting nominated was convenient but it was still far from getting selected for this prestigious program. With proper guidance from my professor Dr. A. F. M. Saiful Amin and also communicating with Ms. Yukiko Shibuya, we were able to submit the required documents meeting the deadlines. I remember finishing the STG questionnaire within a day or two before the deadline deemed quite a challenge. My undergraduate thesis was based on finding appropriate aggregates for future concrete structures in Bangladesh such as recycled aggregate which has an environment friendly image. Bangladesh is prone to earthquake like Japan and the performance of such aggregate based concrete structures is very important. Japan with their extensive research facilities specially related to earthquakes made me believe my research interests align with the Japanese civil engineering and getting selected will help me learn a lot. Near the end of May, JSCE International Scientific Exchange Fund (ISEF) Committee announced the recipient of the 2018 Study Tour Grant. From thereon, there was no turning back. Preparing papers and presentation for the symposium, getting visa and e-ticket, finally I was ready to pay a visit to the land of the rising sun.

1.4 Participants of JSCE STG 2018

I was curious about the participants of this program since it would give me a chance to meet civil engineers from different nations.

There were 7 participants from different countries attending this year's STG program. The details are given below:

No.	Name of Participant	Affiliation	Country
1.	Mr. Anindya Samya Saha	Lecturer, Department of Civil Engineering, Bangladesh University of Engineering and Technology - IEB	Bangladesh
1.	Ms. Khin Phyu Phyu Thandar	UN- Habitat Programme Associate (Structural) – MES	Myanmar
3.	Mr. Ngoc Lan Nguyen	Vietnam- Japan Research and Development Center (University of Transport and Communications) – VFCEA	Vietnam
4.	Engr. Amie Lou G. Cisneros	Program Head- Civil Engineering, College of Engineering and Technology, Cor Jesu College, Digos City – PICE	Philippines
5.	Mr. Jetsada Kumphong	2nd year PhD. Student, Department of Civil Engineering, Faculty of Engineering, Khon Kaen Universtiy – JSCE Thailand Section	Thailand
6.	Ms. Khaliunaa Darkhanbat	University of Seoul, Reinforced structure laboratory (fulltime student, assistant) – MACE	Mongolia
7.	Mr. Ali Gürkan Genç	Istanbul Technical University, Structural Engineering Graduate Program – JSCE Turkey Section	Turkey

Figure 1: Participants in STG 2018

2. JSCE STG 2018 PROGRAM

2.1 JSCE 2018 Study Tour Grant Schedule

This year's study tour grant program schedule was set from Aug. 26th, 2018 (Sunday) to Sept. 1st, 2018 (Saturday). The program included visit to various technical research institutes, construction project site visit, places of geological importance, participation in the International Summer Symposium, attending networking reception and sightseeing in Tokyo. The detailed schedule of the program is given in the table below:

Date	Time	Event	Attend
26th August, 2018 (Sunday)	am	• Arrive at Narita Airport • Check in to NISHITETSU INN Shinjuku	Ms. Suzuki
27th August, 2018 (Monday)	am	• Kajima Technical Research Institute, Nishichofu Complex	Mr. Yoshizawa, Ms. Suzuki
	pm	• Tokyo Outer Ring Road JCT North Ramp Project Site	Mr. Yoshizawa, Ms. Suzuki, Mr. Nomura
28th August, 2018 (Tuesday)	am	• Railway Technical Research Institute	Mr. Yoshizawa, Ms. Suzuki
	pm	• Shimizu Institute of Technology • Haneda Airport to New Chitose Airport • Arrive at Sapporo Sumire Hotel	Mr. Araki, Ms. Suzuki Mr. Yoshizawa, Ms. Suzuki
29th August, 2018 (Wednesday)	am	• Go to Hokkaido University • Participate in International Summer Symposium, JSCE Annual Meeting at Hokkaido University	Mr. Yoshizawa, Ms. Suzuki Mr. Yoshizawa, Prof. Ishizaka
	pm	• Sosei Bridge • Kawano Museum • Oyafuru Channel • Makunbetsu Marsh • Canal Sluice • Ishikari River Drain • Ishikari River Estuary • Participate in Networking Reception at Hokkaido University	Mr. Yoshizawa, Prof. Ishizaka Ms. Suzuki

30th August, 2018 (Thursday)	am	• Ishikari Port Ishikari LNG Terminal Station	Mr. Yoshizawa, Ms. Suzuki, Mr. Yamamura, Mr. Nakayama, Ms. Ito
	pm	• Toya-Unesco Global Geopark • New Chitose Airport to Haneda Airport • Arrive at Keio Presso Inn Otemachi	Mr. Yoshizawa, Ms. Suzuki, Mr. Yamamura, Mr. Nakayama, Ms. Ito Mr. Yoshizawa, Ms. Suzuki, Ms. Suzuki
31st August, 2018 (Friday)	am	• Free time	
	pm	• Asakusa • Tokyo Skytree • Dinner at Tokyo Station Buffer "Gochiso Zanmai" with ISEF members	Mr. Arai, Ms. Suzuki Mr. Arai, ISEF members
1st September, 2018 (Saturday)	pm	• Depart from Narita International Airport	Ms. Suzuki

Figure 2: Journey to the land of the Rising Sun

A dream trip, filled with expectations, a world of new things, unique experiences to pile upon – finally the day was here, 25th Aug, 2018. Even then, it took me time to digest that I'm actually hopping onto this plane and going for this roller coaster ride, as if getting selected didn't assure me enough. This was my first international tour alone and my first visit to Japan. If you ask me if I was nervous - yes, the bags were plenty of it, yet the excitement was surging through my veins. The plane departed from Hazrat Shahjalal International Airport at 1:35pm, bid farewell to my family and off I went. Arriving at Suvarnabhumi Airport, Bangkok at around 17:00 pm, I had plenty of time to roam around this huge airport, getting lost infact and rerouting my way back to the terminal twice in a row. It felt like the longest wait, but eventually the bird flew at 22:10 pm.

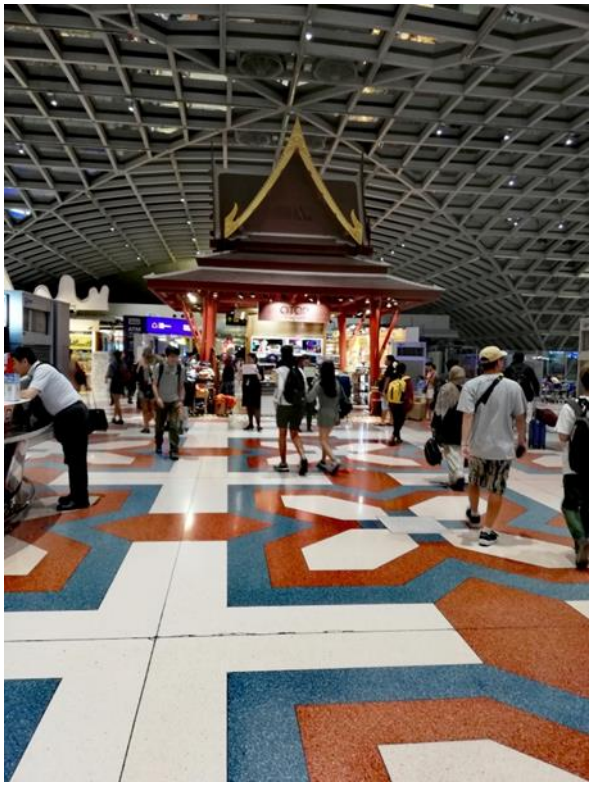


Figure 3: At Suvarnabhumi Airport, Bangkok

Figure 4: Arrival at Narita Airport, Tokyo

2.2 Day 1: Arrival at Narita International Airport

Destination: Tokyo, Narita

The first rays of sunlight beamed through the window, the land of the rising sun they say, and the spectacular view amazed me. It was 6:20 am, not much rush, and there was no trouble getting through the immigration. We were previously notified someone will be waiting at the airport with 'STG. JSCE' sign board and I met Ms. Tonomi from Top Tours at the arrival gate.

Pretty soon, I heard another STG participant from Myanmar, Ms. Khin Phyu Phyu Thandar has already arrived few minutes earlier. We introduced ourselves and Ms. Tonomi arranged the tickets. She guided us about the destination and we were on our way to Shinjuku in a limousine bus shortly. No wonder, we were a bit exhausted from the journey but gladly I had a new friend from a new nation to gossip about this exciting program and others.

On our way, I was thrilled to see the cityscape, skyscrapers towering into the morning sky, as elegant as ever. The city still seemed to be in its early hours, which meant there was hardly any traffic. We reached Hilton, Tokyo at around 9:15 am and Ms. Suzuki was already waiting for us at the bus stop. We took a short walk of about 5 minutes and arrived at Nishitetsu Inn Shinjuku. Ms. Suzuki cordially helped us out regarding check in, shared information about nearby places to visit and gave instructions for next day. As it turns out, check in was scheduled at 3 pm. So, we had time to spare and opted to visit Kamakura despite our exhaustion.

Figure 5: Arriving at Nishitetsu Innn and roaming around

Getting lost in Shinjuku station was another feat we achieved, given how huge it was and the number of trains that arrive and departs at the station amazed me. Not only that, the trains always maintain their time schedule and people are punctual as always keeping track of every minute. Japan's transportation system is really something. We paid a visit to Hase Kannon temple first followed by Kamakura's Great Buddha. The view from Hase Kannon was spectacular and the peace in visiting such religious places was something to be felt. Eventually, after a day long trip, we came back at the hotel at around 6:30 pm and checked in. Still I had

few things left to do before this wonderful day could end. I met with one of my Bangladeshi friend, Ms. Zahura Chowdhury Abonti, who is currently studying civil engineering at Tokai University, Japan and we roamed around a rather flashy Shinjuku for a while.

(a)

(b)

(c)

(d)

Figure 6: (a) Shinjuku Station (b) Journey by train to Kamakura (c) At Hase Kannon (Hase-dera) (d) Visiting Kotoku-in (Kamakura's Great Buddha）

Finally, I came back to hotel at around 9:30 pm and with tired legs, I thought I should call it a day. To wrap up, Day 1 couldn't have been any better, everything was worth it. It almost felt like the sightseeing really set me up for the days ahead, full of energy, full of excitement.

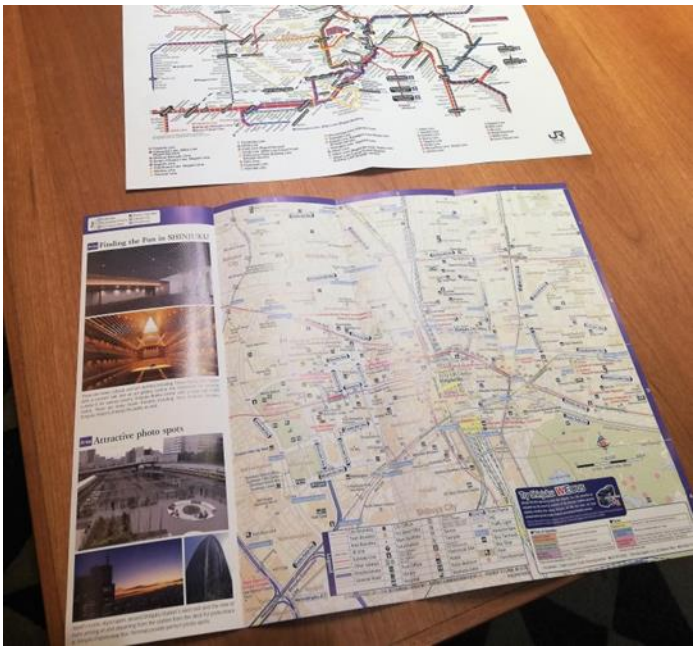


Figure 7: Meeting my Bangladesh friend, Ms. Zahura Chowdhury Abonti, roaming around Shinjuku and getting hold of the Shinjuku Map

2.3 Day 2: Meeting STG participants, visit to Kajima Technical Research Institute and Tokyo Outer Ring Road

It was 6:30 am and I woke up before my alarm even rang. The Japanese timing seemed already stitched into my head. I went downstairs to have my breakfast and after that, one by one, we all gathered at the hotel lobby within 7:50 am. We brushed through the introductions before Ms. Suzuki came by to pick us up. Ms. Suzuki informed us about the schedule for the whole day and a chartered bus took us to the Kajima Technical Research Institute (KaTRI), Nishichofu Complex in Chofu City, Tokyo. We arrived at the facility at around 9 am and were warmly greeted by Mr. Yoshizawa together with Ms. Umehara, General Manager for International Division. At the facility, Ms. Umehara briefed us about the institute followed by a presentation about KaTRI. Kajima is one of the five major construction companies in Japan. And Mr. Yoshizawa told us an interesting fact that construction companies in Japan have their own research institute which is quite interesting.

KaTRI was established in 1949 and moved to Chofu city later. The Nishichofu complex is one of the largest experimental facilities in the industry, center of research and development and covering an area of 12000 square meters.

(a)

(b)

Figure 8: (a) Kajima Technical Research Institute (b) Group photo with Ms. Umehara at KaTRI

KaTRI supports Kajima through three missions: Research and Development, Technical Cooperation & Consultation and Training and Information Dissemination. The Nishichofu Complex has eight Laboratories and Buildings in total and we could visit three laboratories in the allocated time namely

i) Shaking Table Laboratory
ii) Concrete and Wind-tunnel Laboratory
iii) Large-size Structural Testing Laboratory.

Ms. Umehara briefed us about the facilities along the way.

2.3.1 Shaking Table Laboratory

As I heard, the first shaking table was used in 1975, while the second generation came in 1990 and the one we saw at the Nishichofu Complex is the third generation shaking table called W-Decker (3-Dimensional 6 D.O.F Shaking Table). It included two types of shaking table, main shaking table and long-period shaking table and together they can reproduce almost accurately any earthquakes that occurred in recent times in Japan, including massive ones such as the East Japan Earthquake. The specifications of the shaking table fascinated me.

The main table (5 x 7 m) can reproduce earthquake ground motion and has a capacity of 60 ton. It can generate motion in two horizontal directions (± 200 cm/sec and ±70 cm) and one vertical direction (±100 cm/sec and ± 30 cm). On the other hand, the small table (2 m x 2 m) can reproduce long-period and large amplitude motion, replicating the response at the top of a high

rise building due to an earthquake. Its ability to generate a displacement of ± 2.7 m left me dumbfounded.

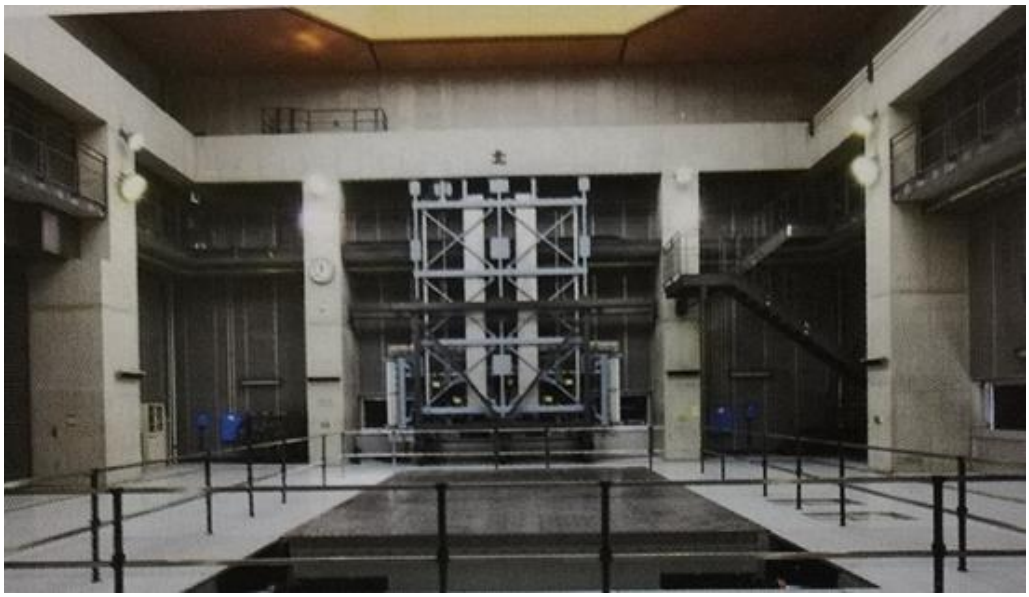


Figure 9: Shaking Table Laboratory

2.3.2 Base Isolation Building

Before moving to the next facility, we visited the "Base Isolation Building" and understood some of its features. It was built in 1986 and is supported by 18 base isolation components which comprised of laminated rubber and steel plate. There were two types, one can resist horizontal motion only and the other can resist both horizontal and vertical motion. Base isolation is an effective way of reducing the damage during earthquake, minimizing all amplitudes of vibration by 56 percent on average. This certainly serves better than conventional foundation with a replacement period of 60 years and with no foundation beneath it, this technique really intrigued me a lot.

2.3.3 Concrete Laboratory

The concrete laboratory produces concrete under different conditions, using various composition of ingredients and evaluates comprehensively concrete properties such as workability, durability and strength. A portion of my undergraduate research focused on the properties of concrete. So, visiting this laboratory was an eye-opening one for me, specially getting to know that all these sorts of concrete product even existed. To mention a few:

1. SUQCEM – Ultra high strength fiber reinforced concrete
2. Recycled Concrete with Aggregate of Concrete Debris
3. ECM (Energy. CO2. Minimum) Concrete – Low CO2 Emission Concrete using High Volume Blast Furnace Slag Cement
4. NV concrete
5. Hydrocrete – Anti-washout Underwater Concrete
6. EIEN (Earth, Infinity, ENvironment) – High- Durability Concrete with Special Admixture, Carbonation Curing

2.3.4 Wind Tunnel Laboratory

Visiting wind tunnel laboratory was another wonderful experience. This technology was completely alien to me. The three wind tunnels could be used to evaluate the architectural and structural design issues of structures. The wind blows in a clockwise direction in the tunnel and its effects are considered. The model was then used to demonstrate how it works. I took even more interest in how they determined the effect of constructing high rise building at a particular location by replicating the entire surroundings with small scale structures and placing the object of interest at center of the round table. 190 nodes are placed in strategic locations throughout the model region. Wind blows from 16 directions, one at a time, and wind force and pressure are calculated using those nodes which help to understand the design pressure and also to identify whether the construction of such building might create wind pressure beyond the standard limits or not. I found this method really innovative.

Figure 10: Wind Tunnel Laboratory

2.3.5 Large-size Structural Testing Laboratory

The last facility we visited was the large-size structural testing laboratory which basically examines the strength of large scale structures. There are two reaction walls for providing support and prevent overturning.

After finishing the tour in KaTRI, we came back to the exhibit. We had our lunch there and I had my first go with a chopstick. Unfortunately, success wouldn't come that easy, right? It takes practice. It was time to leave after this insightful visit. We were really thankful to Ms. Umehara and also Mr. Yoshizua for explaining everything properly and answering our queries during the visit.

2.3.6 Tokyo Outer Ring Road JCT North Ramp Project

We arrived at the Tokyo Outer Ring Road JCT North Ramp Project Site at around 1:30 pm. It was a true mega project, the largest of its kind. After a brief introduction, we went to the project site wearing safety helmets and aprons.

The Tokyo Outer Ring Road (GAIKAN) is approximately 85km long and connects area within an approximate 15km radius form the center of Tokyo. The Ring Road is constructed by joint venture between Obayashi and Omoto. The purpose of constructing the ring road are as follows:

i) Reduction of travelling time – The travel time from Kanetsu to Tomei can be reduced from 60 min to 12 min.
ii) Reduces the impact on environment by decreasing air pollution as both travel time and volume of traffic is minimized.
iii) Safety improvement of the community road
iv) Security of the transportation network that functions at the time of the disaster – if any radial road within the city is affected, the traffic can be diverted along the ring road and enter the city through another radial road.

Initially they opted to use the open cut method but due to time constraints, part of it is constructed using the pneumatic caisson method which is much faster. The pneumatic caisson has a working chamber inside at the lower part where pressurized air supply prevents underground water from coming in and excavation work of soils is carried out there. The whole caisson structure then sinks in.


Figure 11: Site Visit to Tokyo Outer Ring Road JCT North Ramp Project, group photo before and after visit

The tunnel boring machine used has a diameter of 40 m. The depth of construction underground varied from 20 m to 40m which stunned me. At one portion, the thickness of the slab is as large as 2m. They also took into account that ground water flow might be affected due to construction at such large depths. For this, they included horizontal boring for water collection so that water can flow from one side to the other side in a diverted path. During the construction, they used movable soundproof fence to prevent noise pollution from escaping into the neighborhood. It seemed to me they were well aware of the challenges they might face, devise proper strategies and go forward with this truly beautiful mega construction project. Unfortunately, no pictures were allowed at the construction site.

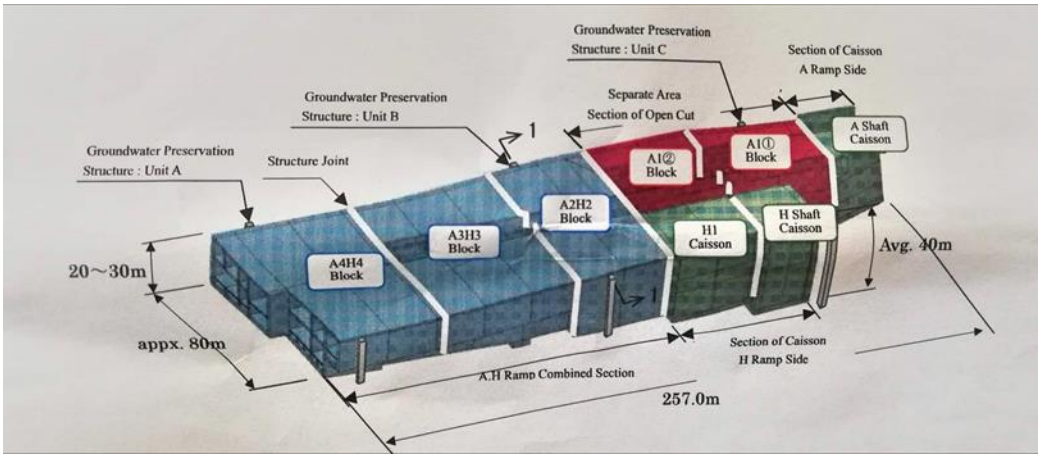


Figure 12: General View of the Structure of Tokyo Outer Ring Road JCT North Ramp Project

We walked back from the site to their office, had some refreshments which was much needed given the scorching heat outside and finally left the place at around 4 pm. We reached our hotel at 5 pm. I could learn so much from these two technical tours. It will certainly help me in the future.

Time was abundant and all of us decided to go out for a walk in Shinjuku, and at the same time getting to know each other more and also about our culture, traditions, history etc. Later we had Japanese “Soba” for dinner.

Figure 13: Roaming around Shinjuku with the STG participants

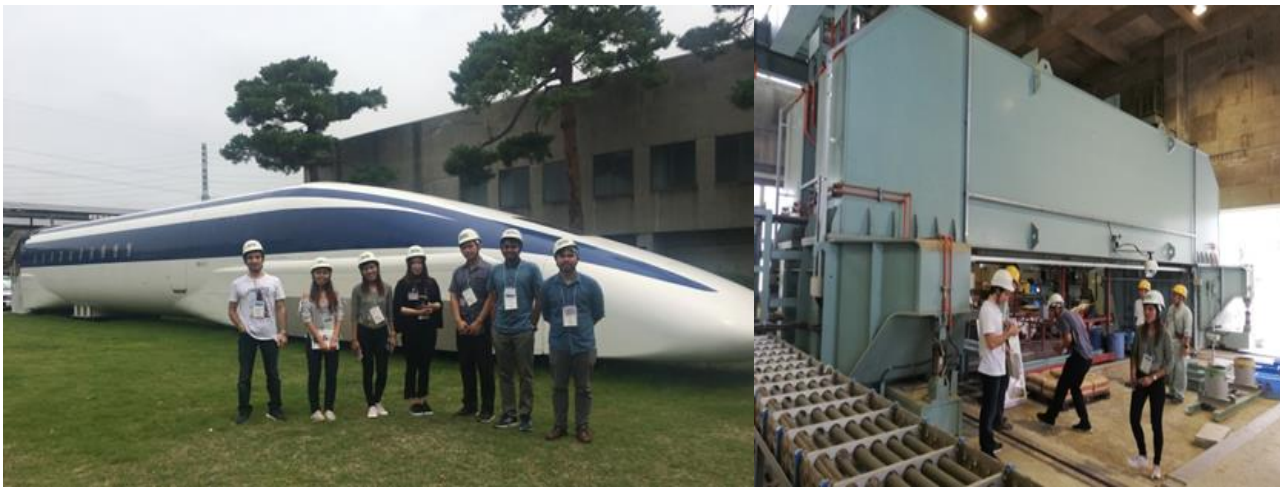
2.4 Day 3: Visit to Railway Technical Research Institute, Shimizu Institute of Technology and fly to Hokkaido

The Railway Technical Research Institute (RTRI) was originally founded as Imperial Railway Agency’s Railway Research Center in 1907 and then changed its name to RTRI and moved to Kunitachi. When Japanese National Railways was divided and privatized to Japan Railway (JR) Companies, RTRI became an independent organization in 1987. RTRI developed the world’s first bullet train “Shinkansen” and then the Maglev system.

The main objectives of RTRI are:

i) Improvement of safety – derailment mechanism and preventive measures, development of preservation technologies against natural disaster, simulation of passenger behavior during an earthquake etc.
ii) Cost Reduction
iii) Harmony with the environment
iv) Improvement of convenience

We reached RTRI at around 10 am after leaving the hotel at 9 am. After a presentation at a seminar room about the history and research interests of RTRI, we were ready to explore the area. Among the various testing facilities in RTRI, we visited the rolling stock test plant, large scale shaking table, full scale roadbed apparatus, large scale tunnel lining model testing machine, large scale rainfall simulator. At the beginning, we saw in display, the Shinkansen, the Maglev and a future project of RTRI. By a mini bus, we were transferred to the facility having the full scale roadbed apparatus.



(a) (b)

Figure 14: Visiting Railway Technical Research Institute (RTRI) (a) Maglev exposition (b) Full Scale Roadbed Apparatus

2.4.1 Full Scale Roadbed Apparatus

The full scale roadbed apparatus can conduct cycling loading tests for the solution of phenomenon and the performance evaluation against the real scale roadbed and track. The full scale track is constructed on this roadbed and a large frame moves on the constructed test

model. There are four roadbed and subgrade with different stiffness. The apparatus can apply 300 kN of static load and 250 kN of dynamic load.

2.4.2 Rolling Stock Test Plant

The rolling stock test plant can reproduce train running conditions upto a maximum speed of 500 km/hr using an actual vehicle. There are four wheel shaped rollers. The maximum axle load is 200 kN. It is able to produce transverse, vertical and rolling vibrations and interpret the effects on a running vehicle.

2.4.3 Large Scale Rainfall Simulator

This was a rather unique facility and surprised us the most. The simulator can generate rain of upto 300 mm/hr inside this whole building and analyse its effects on a moving train. Since we couldn't believe it firsthand, we gladly took the place of train and enjoyed a shower, getting all soaked up in this artificial rain.

Figure 15: Rolling Stock Test Plant

Figure 16: Large Scale Rainfall Simulator

So, the tour almost came to an end. We headed back to the seminar room. On our way, we saw another small model showing how Japanese railway can detect earthquakes and stop within time, preventing accidents. This was indeed a memorable experience. Our next destination was SHIMIZU Institute of Technology. Departure at around 12 pm.

2.4.4 Shimizu Institute Of Technology

Shimizu Institute of Technology was established in 1944. It has actively taken part in the modernization of construction technology. Just like Kajima, the Shimizu Corporation has their very own research institute.

The objectives of this institute are

i) Safety against disasters
ii) Environment-friendly Community
iii) Health and Comfort
iv) Advanced Technologies

Among the various facilities, we got the opportunity to visit the Geotechnical Centrifuge Laboratory, Materials Laboratory, Wind Tunnel Testing Laboratory and Advanced Earthquake Engineering Laboratory.

2.4.5 Geotechnical Centrifuge Laboratory

The Geotechnical Centrifuge is used to evaluate the bearing capacity of foundation such as pile or raft of high rise buildings, for tunneling work to sustain soil pressure, simulate liquefaction, lateral spreading in sandy soil such as in coastal areas, stonewall stability, retaining wall and seawall stability and eventually develop countermeasures against them. The behavior of actual ground and structures can be simulated in small-scale models by applying centrifugal force. The centrifuge is operated from a control room. The counterweight is placed in one arm and the other arm has either the test subject or the test subjected mounted on a shaking table in order to take into account the effects of earthquake.

Figure 17: Geotechnical Centrifuge at the Shimizu Institute Of Technology

2.4.6 Wind Tunnel Testing Laboratory

This laboratory ascertains the safety of structures against wind and analyzes the impact on the surrounding area. It is as important to consider wind load as seismic load in designing ultra-high-rise buildings. The norm is if the height exceeds 100m, the wind tunnel test needs to be conducted. Some of the tests performed here includes: wind load on large scale structures, wind speed around buildings etc.

(a)

(b)

Figure 18: (a) Wind Tunnel Testing Laboratory (b) Advanced Earthquake Engineering Laboratory

2.4.7 Advanced Earthquake Engineering Laboratory

There are two shaking tables in this laboratory namely E-Beetle and E-Spider. E-Beetle can simulate the ground motion during a major earthquake. Whereas, the E-spider which is currently the world's most advanced large-stroke shaking table is capable of simulating the seismic responses of structures during a long-period earthquake. We were briefed about this laboratory, about the types of tests it can conduct in a short presentation before leaving the facility.

2.4.8 Materials Laboratory

Materials Laboratory develops high performance and sustainable concrete materials. To mention a few include:

i) Zero Shrinkage Concrete – contains limestone
ii) HF SFRC – High Fluid Steel Fibre Reinforced Concrete
iii) Porous Concrete – used in the bank of river to allow plants to grow

iv) AFR – Advanced Fire Reinforced Concrete

Learning about all these concrete materials broadened my knowledge about material science and the huge stride Japan has already made in this sector. We headed back to the main building where we saw small scale models of all the constructions made by Shimizu Corporation over the years. They certainly are an indispensible part in the construction industry of Japan. Before leaving the facility, we saw another presentation, but this time using 3D glasses, regarding the construction of "Mode Gakuen Cocoon Tower". Interestingly it is the highest educational institution in Japan. During my stay in Shinjuku, I did see the Mode Gakuen Cocoon Tower and getting to know soon after that Shimizu Corporation constructed it really put a star mark on their fine effort in developing this nation.

Figure 19: Mode Gakuen Cocoon Tower

Figure 20: Before departure at the Shimizu Institute of Technology

It was time to say goodbye to the heat of Tokyo and say hello to the chilly Sapporo. We headed towards Haneda Airport and reached there around 5:20 pm. The flight was scheduled to be at 6 pm and we were off to Sapporo via Flight ANA075 without any delay. After reaching New Chitose Airport at around 7:30pm, we were transferred by chartered bus from the airport to our new hotel, Sapporo Sumire Hotel. We checked in the hotel at 9 pm and fortunately or unfortunately, it turned out my room number was a special one – "911" it read and we didn't stop ourselves from sharing a little laughter.

The cool weather of Sapporo sort of teased us to go out and we were hungry too. We spent an hour or so outside and then came back to our hotel and call it a night. Because next day is a big day for all of us, for me, it's even bigger. After getting all fresh, I did manage to gather some energy and went through my paper and presentation for a few times to get me into the groove. Yes, it seemed I was ready for it.

Figure 21: Evening walk around the Sapporo City

2.5 Day 4: Participate in the International Summer Symposium, JSCE Annual Meeting at Hokkaido University, visit Kawano Museum and others, attending Networking Reception

2.5.1 International Summer Symposium

My first International Symposium, even better it's my first symposium – how can I not be nervous about it! All suited up, I had my breakfast at 7:10 am, with my heart pounding in a rather hilarious way. I'm not sure about others but I wasn't sure how it would go – it's that feeling of tense as if I was preparing for an exam or something. We left the hotel at 8:30 am and arrived at Hokkaido University at around 9 am. Watching so many participants in the university campus did pull some hiccups out of the stomach but I knew everything would go just fine. At Haneda airport, I asked Yoshizawa san about the timing of presentation if it is very strict or flexible. As it turns out, they do maintain their time and I have to finish within the allocated time. All these thoughts kept circling my head as I head to my venue for my presentation. Both Jetsada and me had the same venue but in different sessions.
CS-3 Venue (Hokkaido University Sapporo Campus, Institute for the Advanced of Higher Education, Great Auditorium)

International Session(10): 10:40 am to 12:00 pm

The auditorium was pretty big. As time passed by, the first session started and participants, guests, professors everyone filled in. I was STG-007, the last candidate of the second session. Jetsada san finished well enough in the first session. Mr. Yoshizawa accompanied us the whole time and my advisor Mr. Suzuki also came in. One of my professors from my university in Bangladesh, Dr. Amin was also present there at the campus who joined the session before my presentation. All of their presence really lifted my spirit up and I could successfully deliver my presentation at 11:50 pm in front of everyone without any trouble. I did manage to finish my presentation within the allocated time of 7 minutes.

Figure 22: Participating in the International Summer Symposium, JSCE Annual Meeting at Hokkaido University

This seemed like quite an achievement for me. Mr. Yoshizawa, Mr. Suzuki, Dr. Amin, Jetsada my STG Companion, they all congratulated me after my presentation and I was really over the

moon at that moment. Seeing my paper published in the proceedings was another exciting thing for me. All in all, it went simply perfect.

Coming out we all greeted each other and then had our lunch at the Hokkaido University cafeteria at 12:30pm. The bus departed from the Hokkaido University at 1:10pm and a short time after we had a peek at the Sosei Bridge. Mr. Yoshizawa and Ms. Suzuki gave us a little detail about the importance of that bridge. The bridge was made by stone and it's the oldest in Hokkaido. As 100 years back, there was nothing but only mountains in this region. So, this bridge acts as a memorandum.

Next stop: River Museum; Arrival time: 3 pm

Figure 23: Lunch at the cafeteria of Hokkaido University

Figure 24: View from the River Museum

2.5.2 River Museum

Prof. Ishizaka from Nihon University accompanied us along with Mr. Yoshizawa and Ms. Suzuki. There were interns from the Hokkaido University who joined us during our visit. The history behind Ishikari River was briefly explained and the changes that followed after flood strike.

After flood hit the area twice in a short span causing devastating effects, Bunkichi Okazaki was the one to devise a flood control plan in 1909. In order to maintain river channels, 'concrete single flooring blocks' were used to protect riverbank. As a result of the flood control projects, marshlands were converted to farmlands and urban areas started to increase. Leeves were constructed continuously for long distances for preventing the flood water from entering into the protected lowlands but they were also broken down after two major floods in August 1975 and in early August 1981.

However another problem remained. The route of the original Ishikari river was very long before it entered the sea. This increased the transportation costs of shipping goods. So they

decided to cut off the original river at two points and make a straight line flow providing the shortest distance. The cut off At the office, we were given the opportunity to maneuver the operating system of the canal sluice from the control room.

Figure 25: Ishikari River Museum

Having finished with all the introduction, we visited the Oyafuru Channel, Makunbetsu Marsh, Canal Sluice, Ishikari River Drain and Ishikari River Estuary. The wooden road through the Makunbetsu and the landscape there was truly beautiful. The canal sluice was operated by two gates, one front gate which is connected to the river and one rear gate which is connected to the sea. The Ishikari River Drain was used to connect the cut off portion, now known as Barato River, to the sea. This was done to discharge excess water to the sea in case of any flood. At the Ishikari River Estuary, we roamed around for a while. It was a memorable experience indeed. Eventually, we finished everything at around 5:10 pm and it was time to leave as we had to participate in the Networking Reception at Hokkaido University scheduled at 6:30 pm.

Figure 26: At the end of the beautiful wooden trail through the Makunbetsu Marsh, followed by visit to the Canal Sluice

Arriving at the Networking Reception, we were taken a little aback seeing so many civil engineers, professors from various nations all gathering together and sharing information. I met from the Institution of Engineers (IEB) the president, Engr. Md. Abdus Sabur, Honorary General Secretary (IEB), Engr. Khandker Manjur Morshed, few of the professors from Bangladesh, including Dr. Mizanur Rahman and Dr. A. F. M. Saiful Amin, as well as got to know some civil engineers from India, Nepal as well as from the host nation Japan. Right after our dinner, we had the opportunity to meet Ms. Yukiko Shibuya, the person behind all of these, who made it possible for us to be there at this prestigious program. We were really pleased to meet her. She talked to each of us in turn, asking about our experience, if we had any problems or not – we were truly grateful to her.

Time rushed by and the program came to a conclusion. Ms. Suzuki again accompanied us on our way to the hotel and also gave instructions about next day's schedule. But this STG group was more energetic than one could apprehend. We wanted to have a look at Hokkaido and so we went out, visited nearby places, did a bit of shopping and then came back at the hotel. As compared to Tokyo, Hokkaido seemed a little silent and rush free. Either way, we enjoyed the chilly weather and had a good time to keep for ourselves.


Figure 27: Attending the Networking Reception and meeting with Ms. Yukiko

2.6 Day 5: Visit to Ishikari Port Ishikari LNG Terminal Station, Toya – Unesco Global Geopark and fly to Tokyo

2.6.1 Ishikari Port Ishikari LNG Terminal Station

The morning started early enough as usual. The drizzle came down when we got into the bus at 8:10 am. The weather was all cloudy. Along the way, Mr. Yamamura (JSCE), Mr. Nakayama (Nippon Koei) and Ms. Ito (JR East) accompanied us in addition to Mr. Yoshizawa and Ms.

Suzuki. We arrived at the Ishikariwan Shinko Thermal Power Station at 9:30 am. Just like the other technical tours, a brief introduction about the power station was delivered to us by the officers there.

(a)

(b)

(c)

(d)

Figure 28: Site Visit at Ishikari Port Ishikari LNG Terminal Station (a) Roof of the Power Station (b) Steam turbine, Power Generator and Gas Turbine (c) Ship for transferring fuel – natural gas (d) LNG Storage Tank

The construction work of Ishikariwan Shinko Thermal Power Station Unit 1 begin in August, 2015 and 90 percent of the work is completed. It can generate 569.4 MW of electricity. It is located 20 km North of Sapporo City. This thermal power station is actually a combined cycle power generation system. The gas turbine receives natural gas gasified from LNG supplied from Ishikari LNG base through gas piping. The boiling point is -162 degree centigrade, so an increase temperature quickly changes it into gas. Ships arrive and gas is transferred from there to the LNG storage tank and from there it goes to the gas turbine. About 140000 kL of gas is transferred from the ships although the capacity of storage tank is 230000kL. The distance from

LNG station to Gas turbine is 1.5 km and it takes about one day to completely empty the ship. At the gas turbine, natural gas is burned in the combustor to cause the generated combustion gas to rotate the gas turbine. As a result of combustion, heat and exhaust gas is produced. The heat of the exhaust gas is used to generate steam to rotate the steam turbine. Both the steam and gas turbine together generates power.

The main features of the thermal power station include high power generating efficiency, outstanding environmental performance and excellent operability. During the site visit, first we went to see the water intake from sea and the chimney that is used for denitration of exhaust gas. Then we saw the gas turbine, power generator and steam turbine. We were soon transferred by bus to the Ishikari LNG base where fuel is transferred from the ships to the tanks. Just by the end of discussion, the downpour began and we all made a beeline for the bus. It was a hurried goodbye, yet we had so much to learn from it.

Departure at 10:30 am.

2.6.2 Toya – UNESCO Global Geopark

We had our lunch on the way (12:30pm) and the next destination was Toya – Unesco Global Geopark. The journey was one to remember because of its beautiful landscape. Mountains on one side, sea at the other and it was raining all the way through – all of these together was a treat to the eyes. We arrived at the Volcano Science Museum at 1:45 pm. The museum was like watching history at the present. Starting from a damaged car in display from the 2000 eruption, buckled railway tracks due to crustal movement, elevated road surfaces and real size model of a gigantic volcanic cinder that destroyed a road, they preserved it all and are displayed on the floor. We went to a theatre and watched a short movie clip showing what happened in these areas before the eruption, during the eruption of Mt. Usu and also the aftermath of such a calamity. During the movie, the chairs were shaking just to give us the feel of those eruptions. We also watched a simulation of 1977 eruption, in which instance, the smokes and fumes from the volcano rose about 12000 m into the sky giving an idea how massive these eruptions were and the enormous damage they can instill. The rocks from the eruption have shootout as much as a distance of 300 m. Most of the buildings were flatten down either due to the shower of rocks or due to the mudslide.

(a) (b)

Figure 29: Site Visit to Toya – UNESCO Global Geopark (a) The damaged steel bridge due to Mt. Usu volcanic eruption at the back (b) Infront of the Tokyo Visitor Center and Volcano Science Museum

There has been 9 volcanic eruptions in the area till now and astonishingly there is no casualty. The people living there take pride it and they should. Each time before an eruption, they have successfully managed to evacuate everyone. Through cutting edge technologies and monitoring the spontaneity of earthquakes, they can predict when and where the next eruption will occur. This has saved the lives of so many people. It has been observed that the eruption has a recurrence period of 20-25 years. So, they are predicting the next one will hit somewhere between 2020 and 2025. After the tour in the museum, we went outside and saw some affected areas that were preserved till date to showcase the brutality of such eruptions.

We entered a house that was partially filled with mud from the landslide during eruption. The floor was about 1.2 to 1.5 m beneath the mud. The mud was at such a high temperature, that it boiled and sprinkled to the roof of the floor. Next we visited a 5 storied building. The side that was hit by the mudslide had only four stories and the other story was completely covered by mud. The building roof was also severely affected due to rock shower and left potholes over all the places. Next we saw a 600 ton steel bridge, as the supports were not fixed, it was dragged by the force of the mudslide and taken a good distance away from its original location. Despite all of these risks, people still live there because of the picturesque view of it and because all the time, they have been able to avoid any casualties.

Figure 30: Affected railway track, vehicles and buildings due to Mt. Usu volcanic eruption and sheet pile to prevent mudslide from entering the locality in case of future calamities

We left Toya-UNESCO Global Geopark at 4 pm and headed towards New Chitose Airport. The bus arrived at the airport at 5:10 pm and the plane departed for Haneda Airport at 6:30pm. After arriving at the airport, a chartered bus took us to our new hotel in Tokyo, Keio Presso Inn Otemachi.

Arrival time: 9 pm

Tired enough, we decided to rest a bit and that's how the day ended.

2.7 Day 6: Sightseeing in Tokyo

It deemed only yesterday I flew from Bangladesh, with all these excitement and thrill. And all of a sudden, I open my eyes one fine morning and five days went by like a flicker, just like the autumn leaves give away one by one. The fact that next day we will be flying out of Japan, didn't really set in my stomach, it was too soon.

We had spare time in the morning and decided to explore a bit. We visited Yasukuni Shrine and then went to akihabara and checked out electronic stuffs. After having lunch there, we took the train to come back to our hotel where Ms. Suzuki was already waiting for us. Ms. Suzuki wanted to make sure we had no trouble at the station but we were already used to the system and passed the exam with flying colors. We took a train to Asakusa as that's where our next destination was.

Figure 31: Yasukuni Shrine

Sensoji is an ancient Buddhist temple located in Asakusa, Tokyo. It is infact the oldest temple in Tokyo. Arriving at the gate, we were a taken aback by the hordes of crowd who visit this temple. We entered through the Kaminarimon or "Thunder Gate". The specialty of this gate was it has a massive paper lantern painted in vivid red-and-black tones to suggest thunderclouds and lightning. We were already lost among the crowd after getting through the gate and Ms. Suzuki had to raise the flag in order to keep us together. Walking through the Nakamise-dor, we peeked at the shops which were abundant of traditional things and a vast

collection of souvenirs. Tradition and culture bloomed in these little decorated shops. After crossing the Hōzōmon or "Treasure House Gate", we finally had a look at the Sensoji Temple, our eyes locked on the grandeur of it. Adjacent to the temple is a five story pagoda, Shinto Shrine, the Asakusa Shrine. Just before entering the temple, we took the blessings and then prayed inside the temple. But we were also curious about shopping, so soon after we rushed there and started buying some souvenirs. After Sensoji temple, we headed off towards the Tokyo Skytree.

Figure 32: Visit to Sensoji Kannon temple

Arriving at the bottom of this magnificent tower, a true symbol of the heights that Japanese Civil Engineering has conquered left me spell bound. It is a broadcasting, restaurant and observation tower in Sumida, Tokyo, Japan. Currently it is the tallest structure in Japan, with a height of 634 metres (2080 ft). It holds the title for the tallest tower in the world and the second tallest structure in the world after the Burj Khalifa. Standing at the bottom of the tower, I felt like an ant looking up to a Godzilla or something. The lift that carried us to the first observatory was so fast, it only probably took a minute to reach there. Then we made our way

to the second observatory and it almost seemed I could see the whole Japan. My eyes could stare down in any direction only to be amazed by the beauty of Tokyo. The second observatory has maximum elevation of 450 m.


Figure 33: Tokyo Skytree: Tallest tower in the world, observing cityscape

After some shopping at the Tokyo Skytree, we headed back to our hotel by bus at 5:20 pm to get ready for the dinner. At the dinner, we met with the ISEF members. We could share our experiences in Japan and also learn from them. It was a pleasant evening altogether.

The clock kept ticking away, and at last we went back to our hotel as Mr. Arai accompanied us. So, this beautiful journey was coming to an end. All of us, the lucky seven STG participants, gathered at the lobby. We took our time, and one by one gave a farewell speech. We didn't know whether we will meet each other again or not, maybe, maybe not but the bonding we stitched upon in those 7 days was really strong. After a good half an hour of conversation, we left. At night, I did went out with Mr. Lan to see the Asakusa Temple at night. They say it's really beautiful and indeed it was. The place was quite, with no hustle and bustle of people, and as we walk passed the Nakamise-dor, we did enjoy someone playing a traditional Japanese music in an instrument – I called it the voice of Asakusa. It was really worth it.

Figure 34: Returning back to hotel after dinner with ISEF members

2.8 Day 7 – End of STG 2018 Program

I woke up early in the morning, packed my luggage and had my breakfast at 7:30 am. Since I had time, I went out for a morning walk. By then 4 of us had already left the hotel. The last 3, me, Khaliunna and Ali departed at 9:50 am saying our goodbye to Ms. Suzuki, who has been so kind and helpful throughout this tour. At the airport, we roamed around, doing some last hour shopping and eventually hopped onto my plane 6:10 pm. There was a delay and our plane departed at 6:30pm. But I was thrilled that my return flight was in an airbus a380 – the most beautiful bird in the sky. It came as a surprise when I boarded it, more like the icing over the cake. After a transit at the Suvarnabhumi Airport, finally I reached Dhaka at 1:30 am at night local time. From there it was a one hour drive to home and the dream tour, how hard it could be, but it did come to an end.


Figure 35: Departure from Narita Airport, Tokyo

3. MY FEELINGS AS A CIVIL ENGINEER

As a civil engineer, I feel Japan has a lot to offer in this sector. The stride Japan has made in research sector, specially related to earthquake and mitigating its effects is beyond apprehension. Their cutting edge technologies, their urge to be innovative, economical and maintain a green environment and the ability to successfully implement their research works in the field has shown me how developed a nation Japan is and why they will go much further. The country, although being prone to earthquakes and other calamities, has always been able to recover from the depths. This is because Japanese Civil Engineering has indeed been its stronghold for years. If someone has to pursue their career in Civil Engineering, Japan should definitely be among the top priorities. I believe they have one of the finest infrastructures for undergraduate and postgraduate studies in this sector in the world. Moreover, the working environment for engineers as I have seen is indeed excellent and I believe they can do their job with full of enthusiasm, getting to explore and apply new technologies. So, establishing one's career in Japan as a civil engineer is undoubtedly a remarkable opportunity in my opinion.

4. CONCLUDING REMARKS

The STG tour has been an incredible experience for me from all aspects. From the moment I got selected for this JSCE 2018 STG Program, I knew this would be something new and exciting and I was up for the challenge. Getting through the initial stages and then finally making it to Japan was itself overwhelming enough. It would be a long string of beads if I start accumulating the specifics I gained from being there, these seven wonderful days of my life.

Firstly, the technical tours to various institutes, major construction sites and geological places of significance, offered immense opportunity for a young civil engineer like me to gain knowledge from. This was a remarkable opportunity for me to at least get a hint of their current condition in the branch of civil engineering. It has taught me new things, broadened my vision and inspired me to pursue with my career. Apart from the technical tours, I was thoroughly impressed with the traffic system of Japan, the metro service and expressways, how systematic and punctual everything is. Moreover, the Japanese people as a whole seemed to be extremely kind and generous, which is quite extraordinary. The diverse culture and traditions they still bear with them are something to be appreciated. Besides, meeting with STG participants from 6 different nations, getting to know about their culture and sharing information regarding the tour, working in group with them, was undoubtedly a beautiful experience. Not only that, I got the opportunity to meet engineers from various Japanese organizations. The knowledge and

the ideas I gained from this tour will reinforce my future line of work, help relay the information and technologies used here to the people of my country and also help my country develop, keeping Japan as a role model. As my first visit to Japan, everything was truly beyond expectation. This tour will certainly be one of the most memorable tour in my life.

5. ACKNOWLEDGEMENT

Firstly, I would like to express my heartfelt thanks and sincere gratitude to the Japan Society of Civil Engineering (JSCE) for giving me the opportunity to attend this prestigious program. Starting from preparing official documents for travel, managing air-ticket, covering all expenses such as accommodation, air-fare, travel costs and also preparing a well-crafted schedule for our tour, they did an amazing job. I would like to thank specially Ms. Yukiko Shibuya for continuously keeping in touch, guiding us and take the most out of this program. In addition, to say the least Ms. Suzuki, Mr. Yoshizawa, Mr. Arai, have been such a great company throughout the whole tour, helping us in problems and also explaining technical things. I'm really grateful to them. I would also like to thank all JSCE members, staffs and the ISEF members who supported, accompanied us and made our stay more meaningful.

Special thanks go to the Institution of Engineers, IEB for nominating me and my university, Bangladesh University of Engineering and Technology, for relieving me from the duties and allowing me to represent my country at such a prestigious stage. It also gives me pleasure to mention Mr. Suzuki (my advisor from Japan), Dr. A. F. M. Saiful Amin and my undergraduate thesis supervisor Dr. Khan Mahmud Amanat for their help and advice in preparing the paper that was accepted and published in the proceedings of the International Summer Symposium.

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One week seems less but the bonding we developed among us, the seven STG Particpants, my six new friends, will always be something to cherish about. Their participation made this tour even more memorable. At the same time, we believe in these seven days, we became a part of the JSCE STG family and will inspire others from our country to join this unique network. Lastly I want to thank my family for supporting me and I'm grateful to God for paving my way to this beautiful opportunity.