



WITH RECOMMENDATION OF THE
PHILIPPINE INSTITUTE OF CIVIL ENGINEERS, INC.

- and -

THROUGH THE ASSISTANCE OF THE
JAPAN SOCIETY OF CIVIL ENGINEERS



Submitted by:

Engr. JOHN MARK A. GUIMBA

Engineer IV

Department of Public Works and Highways

Philippine Institute of Civil Engineers, Inc.

STG 2024 Participant (Philippines)

September 01 - 06, 2024

Sendai, Miyagi, Japan

Supported by the
**International Scientific Exchange Fund
(ISEF)**

STUDY TOUR GRANT 2024 REPORT

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ACKNOWLEDGEMENT AND GRATITUDE

My participation in the 2024 Study Tour Grant (STG) would not be possible without the assistance and guidance of a great number of people, who all helped ensure that my stay in Japan would be a rousing success.

Firstly, I would like to express my sincerest gratitude to the *Japan Society of Civil Engineers (JSCE)*, through President Yoh Sasaki, the International Activities Center (IAC) and the International Scientific Exchange Fund (ISEF) Committee, for selecting me to represent the Philippines in the 2024 STG program. My special thanks also go to Mr. Koichiro Shibasaki, whose constructive and very insightful comments were instrumental in my presentation during the 26th International Summer Symposium (ISS), as well as Ms. Yukiko Shibuya and Mr. Koji Arai of the IAC who patiently responded to all of my queries with regard to the STG.

To the *Philippine Institute of Civil Engineers, Inc. (PICE)*, led by my mentor National President and DPWH Senior Undersecretary Emil K. Sadain, including National President-Elect Frederick Francis M. Sison, National Auditor and former STG Participant Michael J. David, and the rest of the National Board of Directors, thank you for entrusting me of representing our esteemed organization in this year's STG Program. I am deeply honored to be part of the great lineage of Filipino civil engineers that have represented the PICE in the JSCE STG in the past, and I am forever grateful for this opportunity.

To the *Department of Public Works and Highways (DPWH)*, headed by Secretary Manuel M. Bonoan and Senior Undersecretary Sadain, thank you for authorizing me to represent not only the PICE, but also the DPWH, in the JSCE STG. I look forward to being able to utilize my learnings in Japan in the implementation of many of our foreign-assisted projects (FAPs) and Infrastructure Flagship Projects (IFPs), many of which are to use modern Japanese technologies, be it in the design, construction, as well as operation & maintenance.

To my family, my parents Arlene and Marcos, and my brother Justine Marc, thank you for supporting me throughout my pursuit of representing the Philippines in the STG program. To my lovely partner, Leonora Jane, thank you for continuing to inspire and motivate me, even during the times when I would lose time focusing too much on preparing my paper and presentation. All of your love and patience are what fueled me to push through with the STG program. All of you are the reasons to my success!

Finally and most importantly, all glory goes to our creator, the Almighty God, for continuing to shower me with blessings capped with this once-in-a-lifetime opportunity of participating in such a prestigious international endeavour. All praises go to Him for his love, wisdom, and guidance, allowing me to complete my STG participation in Japan safely and successfully..



1. INTRODUCTION

1.1. ABOUT JSCE

Established in 1914, the Japan Society of Civil Engineers (JSCE) is an incorporated association which aims to advance scientific culture through promoting the field of civil engineering, and expanding all its related activities. JSCE aims to do so by facilitating scientific exchange among members and researchers, promoting science and technologies related to civil engineering, as well as fostering social involvement. Further, with the ushering of the 21st Century, JSCE also has its eyes set on the following objectives^[1]:

- 1) Propose an idea for social infrastructure development in the future from civil engineers' perspective;
- 2) Acquire a steadfast relationship of mutual trust with the society;
- 3) Promote scientific and technological researches/studies with a high degree of transparency; and,
- 4) Evaluate public works from a neutral standpoint, and reach a social consensus on proper standards.

1.2. ABOUT THE STUDY TOUR GRANT (STG)

Officially launched in 1992 as a way to efficiently utilize its International Scientific Exchange Fund (ISEF), the JSCE Study Tour Grant (STG) is an annual program which aims to facilitate scientific exchange and promote Japanese civil engineering technologies and projects to young civil engineers inside and outside Japan. The STG is a one (1) week program held during the week of the JSCE Annual Meeting (usually in September), in which candidate engineers are nominated by countries with existing Agreements of Cooperation (AOCs) with the JSCE.

During their stay, STG participants visit project sites and research institutes around Japan, meet with leading civil engineering professionals and academics, and share their research projects at the International Summer Symposium during the JSCE Annual Meeting. At the end of the program, STG participants are required to submit a report back to their home organizations, narrating their STG experience in Japan.

1.3. APPLYING FOR THE STG

Through my volunteer work with the 2024 National Board of Directors of the Philippine Institute of Civil Engineers, Inc. (PICE), I was made aware that PICE and JSCE already had an existing AOC effected last 2001. Through the leadership of PICE National President Emil K. Sadain, I became involved in coordinating with the JSCE International Activities Center (IAC) for the amendment of the existing PICE-JSCE AOC. While researching on the provisions of the AOC, I learned about the JSCE STG.

Shortly after this, through the help of the PICE National Secretariat, I expressed my intention to apply for nomination to the STG. Thankfully, the PICE National Board endorsed my application to the JSCE, and eventually, I was selected as the official representative of the PICE.



1.4. PARTICIPANTS TO THE STG

For the first year of the JSCE STG after being suspended during the COVID-19 pandemic, there are five (5) participants from various AOC countries for the JSCE STG 2024:

Table 1. Participants to the JSCE Study Tour Grant (STG) 2024

	Name	Affiliation	Country
1	Ms. Urantogos Agvaanluvsan	MACE , Master Student & Senior Lecturer, Mongolian University of Science & Technology	Mongolia
2	Mr. Zin Moe Htut	Fed. MES , Developed Professional Engineering Consultants, Co. Ltd.	Myanmar
3	Mr. Satharat Pianfuengfoo	EIT , Ph. D. Student, Dept. of Civil Engineering, Faculty of Engineering, King Mongkut's University of Technology North Bangkok	Thailand
4	Mr. Hachnayen Ahmed	IEB , Master Student, Founder / CEO of CADD COARE Training & IT Services, Bangladesh University of Engineering & Technology - Japan Inst. of Disaster Prevention & Urban Safety	Bangladesh
5	Mr. John Mark Guimba	PICE , Public Officer / Engineer IV, Department of Public Works and Highways (DPWH)	Philippines

2. STUDY TOUR ACTIVITIES

2.1. STG ITINERARY

The JSCE STG 2024 Program which involved visits at various project sites and research facilities, as well as the JSCE Annual Meeting and 26th International Summer Symposium, went on from September 01 to 06, 2024.

Table 2. JSCE Study Tour Grant (STG) 2024 Itinerary

Date	Time	Activity	Attended By
Sept. 01 Sunday	19:40	Arrive at Narita International Airport	Mr. Fukumoto (SOUBUN), Ms. Sakamoto, and Mr. Okuda (TC)
	22:20	Check-in at Hotel Intergate Tokyo Kyobashi, Kyobashi, Chuo-Ku, Tokyo	
Sept. 02 Monday	-	Free Time / Sightseeing in Tokyo	-

**Table 2. JSCE Study Tour Grant (STG) 2024 Itinerary (cont.)**

Date	Time	Activity	Attended By
Sept. 03 Tuesday	08:40	Check-out at Hotel Intergate Tokyo Kyobashi and travel to JSCE HQ	Mr. Okuda
	09:30 - 11:00	STG Orientation with the ISEF Committee	Assoc. Prof. Tetsuhiro Ishizaka, Mr. Goichi Tasaka, Ms. Yukiko Shibuya, Mr. Koji Arai (JSCE)
	11:00 - 12:00	Lunch at JSCE HQ	
	12:10	Travel to Kajima Technical Research Institute (KATRI)	Assoc. Prof. Ishizaka, Mr. Tasaka, Mr. Arai
	13:30 - 15:30	Visit at Kajima Technical Research Institute (KATRI)	
	15:30	Go to Tokyo Station	
	17:28 - 19:37	Travel to Sendai via Shinkansen (Yamabiko 151)	
	20:00	Check-in at Sendai International Hotel	
Sept. 04 Wednesday	08:30	Go to Sendai International Center	Assoc. Prof. Ishizaka, Mr. Tasaka, Mr. Arai, Ms. Shibuya (JSCE), and Mr. Okuda (TC)
	10:00 - 12:00	Participate in the IAC Discussion at Sakura, Sendai International Center	
	12:00 - 12:20	Board the technical tour bus and leave Sendai International Center	
	13:00 - 14:00	Lunch at Kirin Brewery Sendai	
	14:10 - 16:10	Visit Minami-Gamo Wastewater Treatment Plant	
	16:20 - 17:00	Visit Ruins of the Great East Japan Earthquake: Sendai Arahama Residential Foundation	
	17:10 - 17:40	Go back to Sendai International Hotel	
	18:30 - 20:00	Attend the 2024 JSCE Annual Meeting Welcome Reception at the Hotel Metropolitan Sendai	
Sept. 05 Thursday	07:50	Go to Tohoku University	Assoc. Prof. Ishizaka, Mr. Tasaka, Mr. Arai (JSCE)
	09:00 - 10:20	Present at the 26 th International Summer Symposium	
	10:45 - 11:45	Meet with JSCE President Yoh Sasaki together with DPWH and PICE delegates	
	12:00 - 16:00	Attend the 26 th International Summer Symposium	
	14:00 - 16:00	STG Meeting at Mozart Klees Coffee, Tohoku University	
	18:00 - 19:00	Attend the IAC Networking Reception	Mr. Tasaka, Ms. Shibuya, and Mr. Arai (JSCE)

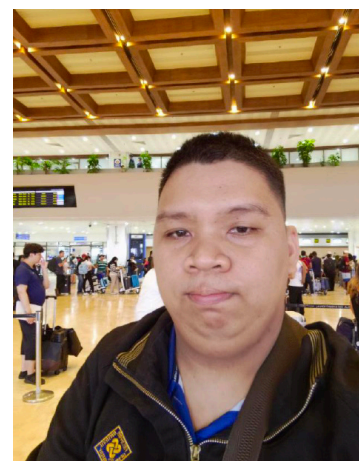
**Table 2. JSCE Study Tour Grant (STG) 2024 Itinerary (Cont.)**

Date	Time	Activity	Attended By
Sept. 06 Friday	09:00 - 11:16	Check-out at Sendai International Hotel and Travel to Tokyo via Shinkansen (Yamabiko 210)	Ms. Morichika (TC), Mr. Mori and Mr. Arai
	12:00 - 13:00	Travel to Narita International Airport	
	14:15	Depart to Manila	-

2.2. STG DAY 01 - ARRIVAL IN JAPAN

I left my residence in Cavite Province at around 09:00 (PST) to go to the Ninoy Aquino International Airport (NAIA) in Pasay City, which is about a one (1) hour drive. I reached NAIA Terminal 1 shortly after 10:00 (PST), and after saying a few goodbyes to my family, I entered the terminal building with much excitement, but also a lot of nerves.

Although this is my second time flying to Japan, it will be my first time doing it alone. My last Japan visit was in late September 2022, when I, together with my colleagues in the Department of Public Works and Highways (DPWH), went on a Study Tour in relation to an ongoing Detailed Engineering Design (DED) contract for one of our projects funded by the Japan International Cooperation Agency (JICA).



Arriving at the very busy NAIA Terminal 1.

I was also extra anxious because days before, Typhoon Shanshan had made landfall in Japan and was forecasted to move towards the Tokyo area the day of my flight. Even after arriving in the airport, I was repeatedly checking my phone to monitor the weather situation in Japan. Fortunately, it turned out that the typhoon weakened into just a Tropical Depression (TD) and slightly changed its track northwest-ward, making my trip to Japan slightly safer.



Waiting for the Airport Bus at Narita Airport Arrival Area with Mr. Fukumoto.

Nevertheless, after passing through the pre-boarding assessments and check-in procedures, and various security and immigration checks, I took my lunch and patiently waited for boarding. At around 13:30 (PST), I boarded the Philippine Airlines Flight PR432 on an Airbus A321 plane, and soon thereafter the plane took-off at around 14:30 (PST). After a safe four (4) and a half hour flight, I landed at Terminal 2 of Narita International Airport at around 19:40 (JST).

At arrival, I was greeted by Mr. Taichiro Fukumoto of SOUBUN who helped me board an airport bus from Narita International Airport to the Tokyo Station. Upon arriving at the station, I was greeted by Ms. Sakamoto, who assisted me in hailing a cab to Hotel Intergate Tokyo Kyobashi amidst the heavy rain. Mr. Okuda met us at the hotel lobby, and soon after, I checked-in to my room where I would be spending my first two (2) nights.



2.3. STG DAY 02 - FREE TIME

For September 02, originally a tour was scheduled in the afternoon for us to see the popular attractions around Tokyo. However, JSCE decided to cancel it a few days ago in anticipation of Typhoon Shanshan. Although the weather is quite better now than yesterday, I just decided to take the opportunity to rest and prepare my body for what will be a very hectic four (4) days to come.

2.4. STG DAY 03 - STG ORIENTATION AND TECHNICAL TOUR

Our first official activity for the 2024 STG Program was scheduled in the morning of September 03, which is the STG Orientation at the JSCE Headquarters at Yotsuya 1-Chome, Shinjuku, Tokyo. After taking my breakfast, I checked out of the hotel and met with my other STG co-participants for the first time at the hotel reception area. Afterwards, we headed towards the Tokyo Station to board a train for Yotsuya.



2024 STG Participants (from front, left to right): Mark (PICE), Satharat (EIT), Moe (Fed. MES), Ahmed (IEB), and Uran (MACE), with Tour Conductor Mr. Okuda (back).

At around 09:00, we arrived at the JSCE HQ and got to finally meet Ms. Yuki Shibuya and Mr. Koji Arai, with whom we have been coordinating only via emails for months now. Shortly after, the STG Orientation started where Associate Professor Tetsuhiro Ishizaka briefed us on the official itinerary, as well as what to expect in the coming days for the STG Program. He also informed us of the destination sites for our technical tour for tomorrow, the Minami-Gamo Wastewater Treatment Plant and the Arahama Residential Foundation Ruins, both of which demonstrate the magnitude of devastation caused by the M9.0 Great East Japan Earthquake which occurred in March 2011. I have been raring to see these sites for the longest time, since I wanted to fully appreciate how nature could easily take lives and properties in an instant, and perhaps learn from the experiences of the Japanese people on how to not only rehabilitate critical infrastructures, but also recover emotionally after such a massive catastrophe.

After having our lunch at the JSCE HQ, we boarded a chartered bus and headed straight towards our technical tour destination for today, the Kajima Technical Research Institute (KATRI) Nishichofu Complex in Chofushi, Tokyo. When I was reading the reports of the previous STG participants, this site always stands out to me because I have always wanted to witness first-hand a shaking table experiment, and Kajima has one of the most state-of-the-art shaking table laboratories in the world, or at least how they claim it.

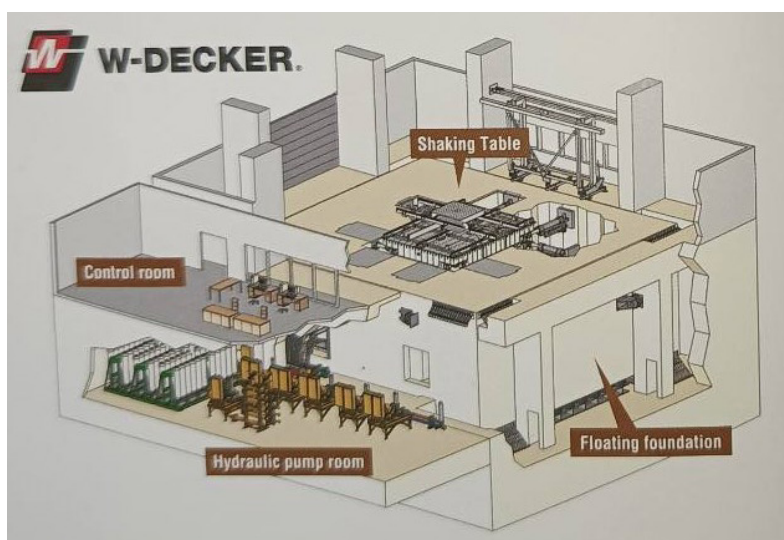
Shortly after we arrived at about 13:00, Ms. Umehara, the Head of Public Relations of Kajima Corporation, briefed us on the profile of KATRI, its organization, and the research facilities that are located in their Nishichofu Complex. We were informed that we will be visiting three (3) of the research laboratories in the complex: the Shaking Table, Large-Size Structural Testing, and Kajima Experimental Concrete Laboratories. We will also be accessing the Kajima Open Laboratory, where we will get to experience the intensity of the 1995 Great Hanshin Earthquake (Kobe Earthquake).



At the JSCE Headquarters in Yotsuya, Tokyo, Japan for the 2024 STG Orientation.

a) Shaking Table Laboratory

The first experimental laboratory that we viewed was probably the one I am most excited about - the Shaking Table Laboratory. Ms. Umehara showed us the **W-Decker® 3-Dimensional 6-Degree of Freedom (D.O.F) Shaking Table**, the 3rd Generation main shaking table of KATRI and supposedly one of the most advanced in the world. The size and rated capabilities of the apparatus was quite astonishing: 5 meters by 7 meters, with a 60-ton specimen capacity, and can simulate horizontal displacements of up to 70 centimeters, and vertical displacements of up to 30 centimeters, corresponding to a Peak Ground Acceleration (PGA) of about 0.2g or nearly 200 gals. There is also a smaller shaking table of size 2 meters by 2 meters that can be mounted onto the main shaking table which can carry specimens of up to 5 tons, and can simulate a PGA of up to 500 gals. The laboratory also included several sensors that measure specimen response at various heights, especially at the base and top. Unfortunately, there were no available specimen at the time so we were not able to witness an actual shaking table test in the facility.



KATRI's 3-D 6-D.O.F Shaking Table Laboratory Setup

Shaking Table labs have been one of the advances in research that I have long-been praying to be installed in our home country in the Philippines, as this will significantly revolutionize Research and Development (R&D) in Earthquake Engineering and Seismology in our country. The urgency of establishing such facilities in the Philippines cannot be stressed enough, as like Japan, we daily face the threat of earthquakes being located along the Pacific Ring of Fire.

Most especially in Metro Manila where I work, experts say that the Marikina West Valley Fault has long been overdue to move, and once it does, it is said to be capable of generating M7.2 or stronger earthquakes, using the Richter Scale. For context, the Great Hanshin Earthquake, also known as the 1995 Kobe Earthquake, registered a M7.2 in the Richter scale. Having Shaking Table laboratories in the Philippines will greatly help us bolster our drive for more stringent seismic design guidelines, and hopefully avoid casualties and extensive property damage once such massive earthquakes occur.

Fortunately, there are some efforts towards this end that are currently ongoing. My alma mater, the University of the Philippines Diliman through its Institute of Civil Engineering, has been currently installing a 3 meter by 3 meter Shaking Table, though it can only simulate movements in two (2) dimensions, but still, it is a major step forward.

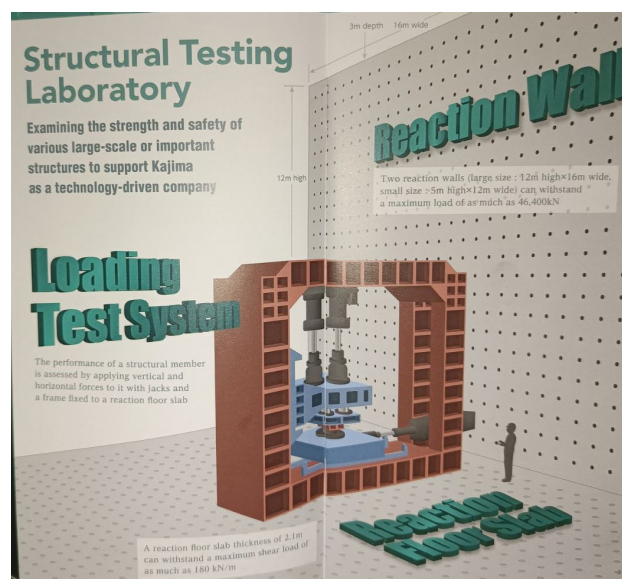


One special feature of the Shaking Table Laboratory is its *floating foundation*. The foundation system is actually applied with Kajima's base isolation and damping technology. Ms. Umehara guided us to an access point at one side of the laboratory to view the various base isolators installed strategically at the base of selected columns and on top of the footing tie beams. Samples of Kajima's base isolators and dampers were also displayed in between the Shaking Table and Concrete & Wind Tunnel Testing Laboratories. I noticed that Kajima also uses high-damping rubber and lead-reinforced high-damping rubber in their base isolators, which I have also seen in other Japanese companies who specialize in such seismic devices, such as Kawakin Core-Tech. In our projects in the DPWH, we have also been ramping up our efforts to include seismic devices in the design to make sure that our infrastructures are seismic-resilient. For instance, in the recently-constructed New Clarin Bridge in Bohol, Philippines, the DPWH have installed base isolators alongside the bridge bearings.

One particular interest to me is how Kajima usually installs such base isolators. Ms. Umehara mentioned that the base isolators in the Shaking Table Laboratory was installed during construction. I then asked if Kajima has done retrofitting works, such as installing isolators on already-built structures. I mentioned a similar approach that was done with the Capitol Building in the United States, wherein the building was lifted using a system of hydraulic jacks to install base isolators as retrofitting works. Ms. Umehara informed me that Kajima has done such works in the past, but it is usually only under specific conditions. I asked the question thinking of the currently ongoing rehabilitation of the DPWH Central Office, wherein one of the options being looked at is installing base isolators in the foundations.

b) Large-Size Structural Testing Laboratory

The second facility that we were able to view is the Large-Size Structural Testing Laboratory. This is again a first for me, as this is the only facility I have seen so far that can test the performance of real-scale models of structural members against various stresses. Most of our conventional techniques rely only on predictions based on material properties, as well as theories of Structural Analysis, Engineering Mechanics, Reinforced / Pre-stressed Concrete Design, Structural Steel Design, among others. However, this facility of Kajima is indeed a game-changer, because it could verify the performance of real members, and compare the results with predicted results, and perhaps detect inconsistencies with the predictive models that designers could then amend, even before constructing the actual members.



Typical Setup of the Large-Size Structural Testing Laboratory



The most interesting feature for me is the huge orange-colored testing apparatus, which can be assembled uniquely to suit certain testing requirements, as well as the size of the member. During our visit, we have actually witnessed the assembly of the testing apparatus, although it was not mentioned whether what structural member was to be tested in the facility. One thing that was not described though during our visit is how the testing apparatus is being calibrated upon assembly, to make sure that the results that would be generated are accurate and not in any other way biased or polluted.

c) Experimental Concrete Facility

We next viewed the showroom of the Kajima Experimental Concrete Facility, wherein they feature several new concrete mix innovations that Kajima is pioneering, highlighted by perhaps their most prized invention, the CO_2 - SUICOM concrete, claimed to be the world's first carbon-capturing concrete. This is, once again, another amazing pioneering Japanese technology, because if it is mass-produced worldwide, this will greatly contribute to the reduction of CO_2 emissions in the atmosphere caused by concrete structures, mainly due to cement production.

During our visit, it was explained that CO_2 - SUICOM is actually a type of admixture intended to be added to conventional cement or other cementitious materials such as fly ash or blast furnace slag, as well as aggregates, in order to produce concrete. The admixture is made up of *Gamma - Dicalcium Silicate* (or simply $\gamma\text{-C}_2\text{S}$), which reacts with CO_2 in the atmosphere to produce a form of Calcium Carbonate (CaCO_3) to make the concrete stronger, in a process known as *carbonation*. By using CO_2 - SUICOM, Kajima claims that the use of cement in concrete could go down to as much as 50%.

I inquired Ms. Umehara whether CO_2 - SUICOM has been applied to structural concrete members, and she informed me that current applications are only limited to non-structural and unreinforced concrete components, such as curbs, balcony ceilings, fence foundations, tile blocks, and other road elements. This is probably because CO_2 - SUICOM requires carbonation curing to accelerate hardening. Carbonation typically reduces the PH level of concrete, promoting the corrosion of rebars, unless of course the rebars themselves are treated to be corrosion-resistant. Still, I think it is very important to continue to advance this innovation because once the same carbon-negative mixtures become applicable to reinforced concrete, then we will slowly be able to check-off a major Sustainable Development Goal (SDG) by dropping significantly the global carbon emissions.

There were several other novel concrete mixes that were showcased in Kajima's Experimental Concrete Laboratory. One of these that really caught my attention is the "EIEN", a high-durability concrete which also uses carbonation curing, and can last, at least according to Kajima's brochures, up to 10,000 years.

d) Kajima Open Laboratory (KOLabo)

Finally, we got into the Kajima Open Laboratory, which is mainly an exhibition room showcasing Kajima's profile, its projects and innovations. However, our main target is its Hands-On Vibration Table, which lets you experience the actual intensity of vibration using data recorded from real earthquakes. The table could carry a load of up to 200 kilograms, thus only up to three (3) people at a time are allowed to ride.

I, Moe, and Satharat went to try the table first. Actual vibration data from the 1995 Kobe Earthquake was used, and we were subjected to two (2) cases: without base isolation and with base isolation. First few seconds were uneventful, but then the table suddenly jolted during the main sequence of the earthquake. I was securely fastened to my seat thanks to the seatbelt, but I still felt as if



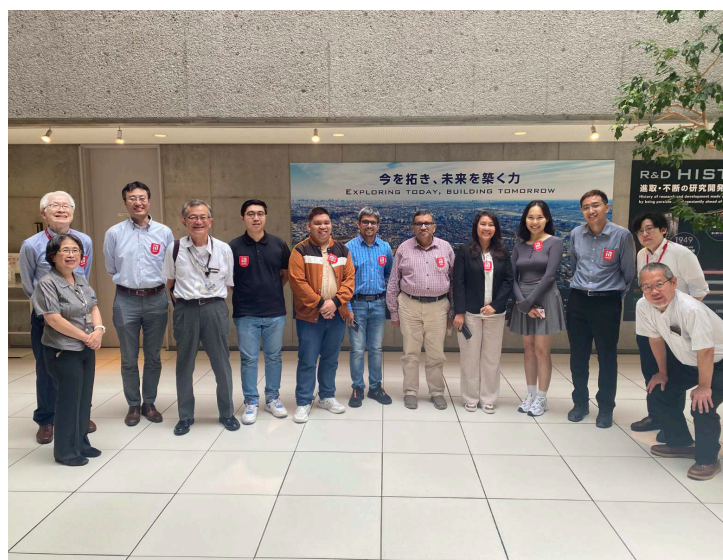
I would be flying off my chair without it. The strong shaking lasted for what felt like about 30 seconds to a minute, then movement gradually weakened until the apparatus came to a halt. That was only the first case without base isolation. After a few moments of rest, we were subjected to the case with base isolation, and unlike the first case, the feeling was much less erratic this time around. Although I could feel that the movement is still strong, it seemed as if we were just riding the wave, and it definitely did not feel as scary.

My experience in the Hands-On Vibration Table was truly an eye-opening experience, as it puts things into perspective on how scary strong earthquakes really are. I could not even imagine how it would feel like for a same magnitude earthquake, what we usually call “The Big One”, to hit Metro Manila, especially considering most buildings do not have base isolation systems. How would the people respond and recover from such an experience? How would I respond?

After us, Ahmed, Uran, and Mon Mon, the Secretary-General of Fed. MES, took their turns at the vibration table, and judging from how they responded visually, I could surmise that we all had the same feelings and thoughts during the shaking.

Nevertheless, once we were done in the KOLabo, we briefly visited the High-Definition Audio Demo Room, where we got to try a limited edition Sony Dolby Atmos HD Soundbar. I was quite surprised when Ms. Umehara explained to us that algorithm that was used by Sony in Dolby Atmos was actually pioneered and developed in KATRI. Having been introduced to Dolby Atmos several years ago, I already was aware of the quality of sound that such soundbars would be able to generate, but still it was quite a pleasant experience thanks to the fact that Kajima’s HD Audio Demo Room has excellent acoustics.

After returning to the meeting room for a brief Q&A, we left the KATRI Nishichofu Complex at around 15:45 and headed back to the Tokyo Station to catch the Yamabiko 151 Shinkansen. We reached Tokyo Station at around 16:30. We boarded the train at 17:10, and shortly thereafter, we left for Sendai at about 17:28. After more than two (2) hours of travel, we finally reached Sendai Kokusai Hotel, where we will be spending the rest of our stay in Japan.



STG Technical Tour at the Kajima Technical Research Institute (KATRI) Nishichofu Complex, Chofushi, Tokyo, Japan.



2.5. STG DAY 04 - JSCE ANNUAL MEETING

Finally, the day has come for the official start of the 2024 JSCE Annual Meeting. I was really anxious as this is the very first time that I would be attending an international engineering conference overseas. I woke up quite early at about 04:00 and was not able to sleep again since. I just readied my smart casual wear, prepared myself, took my breakfast, and headed straight to the hotel lobby to meet with my fellow STG participants. At about 08:30, we left the hotel and headed to the Aoba-dori Ichibancho Station to take the subway towards the Sendai International Center.

First in our itinerary for the day is the International Activities Center (IAC) Discussion with the theme, ***“Civil Engineering Turning Point @ Junction, Road, Future - Paradigm Shift”***. We reached Sakura Hall 1 of the Sendai International Center at about 08:10. I was very much looking forward to the IAC Discussion, since locally in our conventions in the PICE, we are also starting to organize such types of comprehensive panel discussions about pressing matters in civil engineering, though I was a bit confused as to what the theme means.

I also got to finally meet my other colleagues from the PICE and DPWH who are also attending the IAC Discussion, as part of the International Program of the JSCE Annual Meeting. It was nice to see a good-size Philippine contingent in this conference.

Nevertheless, at exactly about 10:00, the IAC Discussion finally started. JSCE IAC Senior Director Ryo Kimura first delivered his opening remarks, followed by the recapitulation of the previous year’s IAC Discussion done by Associate Professor Hiromasa Iwai of Kyoto University. Then came the main subject of the IAC Discussion, the Keynote Speech delivered by Mr. Koji Nakamura, a broadcaster from the NHK Broadcasting Center.



At the Sendai International Center for my very first International Engineering Conference.



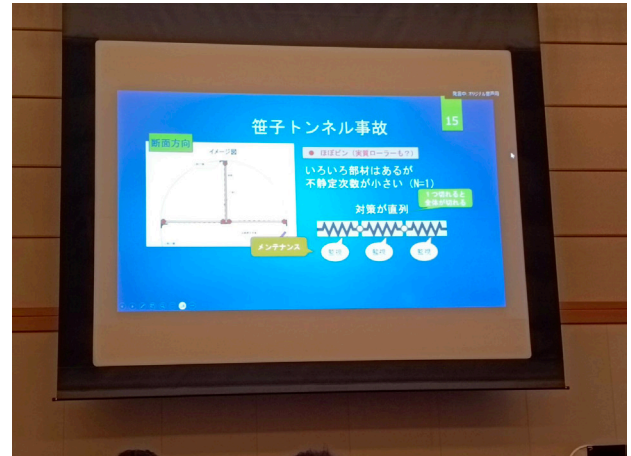
Mr. Koji Nakamura (NHK Broadcasting) delivers his Keynote Speech during the IAC Discussion.

Even before Mr. Nakamura started to deliver his speech, I already became so intrigued with the upcoming discussion. At first glance I thought, what is a broadcaster doing in a technical engineering conference? But then I learned that Mr. Nakamura is not only a broadcaster, but an architecture major himself, so he probably has enough credibility to speak in this conference after all. However, that is not where my intrigue mainly comes: it is with the fact that someone from the media is about to deliver a speech in front of civil engineers, talking presumably about infrastructure development. At least based on our experiences in the Philippines, engineers and media members are not exactly meeting



eye to eye most of the time. They have mostly been critical of us and our projects, so I am very much looking forward to what Mr. Nakamura would say.

At the start of Mr. Nakamura's speech, it seemed like my assumption was true. Though in a respectful manner, Mr. Nakamura appeared to criticize the current practices of civil engineers in most infrastructure projects. He started by showing an arch bridge whose deck collapsed and detached from one of its abutments during a major earthquake. He anecdoted an interview he made with one of the engineers involved in the project, which allegedly said that soil liquefaction was not a major consideration during the design. He also dwelled on the Sasago Tunnel Accident, wherein the tunnel collapsed due to an apparent lack of structural redundancies in the design, i.e. the degree of static indeterminacy is quite low. He posed a question as to why such negligence in the design continues to occur even if design codes, specifications, and manuals are being updated from time to time. Mr. Nakamura's main premise was that it appears that civil engineers has an over-reliance on guidelines and manuals, and supposedly forgotten the real "essence" of these projects.



Mr. Nakamura questioned the lack of static indeterminacy in the design leading to the collapse of the Sasago Tunnel.

Furthermore, he also tackled pipelined road and railway projects in Japan, and reminded that the clamor of the people for climate change and environmental sustainability of the project should not be put aside.

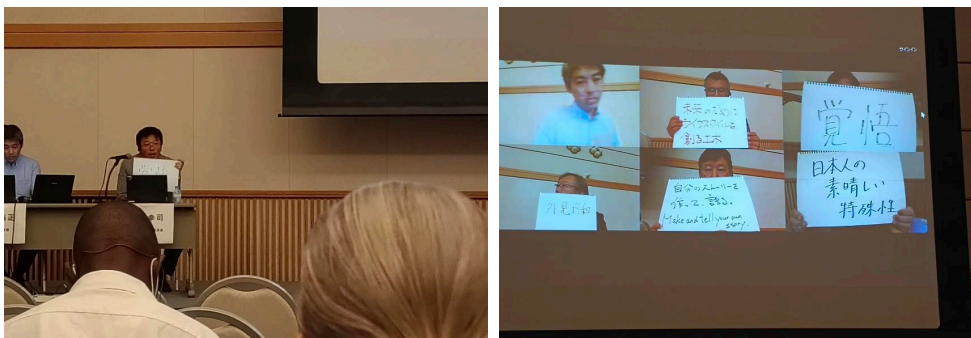
With all due respect to Mr. Nakamura, he raised very good points during his speech; however, I do not agree with some of his premises that the incidents he mentioned appear to be due to over-reliance in guidelines and manuals. Very clearly, those incidents are caused by *some* (an overwhelming minority at that) engineers not actually following those same manuals and guidelines. For example, in the bridge that collapsed, if it is true that liquefaction was not considered in the design, that itself is a blatant violation of existing international design codes. Engineers are taught to consider ALL possible failure limit states that could be ***predicted reasonably*** based on available data.

Notice that I emphasized "predicted reasonably"; it is because not every circumstance in the future will be predicted by engineers, and it is silly to assume otherwise. After all, we are not clairvoyants. What we can only do very good is infer from data that our latest available technologies can offer. As such, infrastructures are designed not to perfectly withstand earthquakes and other disasters without damage. Instead, the basic principle of engineers prioritize full performance and serviceability, not absolute strength.

Anyway, during the panel discussion led by Senior Director Kimura, together with Mr. Masatake Tokubuchi (ARUP), and Mr. Shogo Matsunaga (Infrastructure Lab), he raised a very interesting take that I actually agree with: that it should be the role of mass media to help engineers disseminate to the people the real essence and importance of infrastructure projects, that such are not just mere sources of inconvenience but are actually geared towards making the lives of the general public better and safer. Often, there is a tendency for some members of the media to just criticize most of the time. I was once a student journalist, and I believe that the main roles of journalists is to disseminate the "truth", not



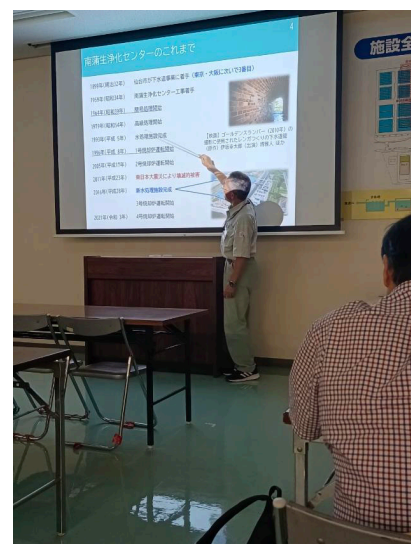
just criticize. I strongly agree and believe that mass media must help engineers in informing the people of the truth about infrastructure projects. We should all work hand-in-hand to make the general public more informed about engineering and infrastructure development.



Mr. Nakamura and the Panelists write their parting messages in the closing session of the IAC Discussion during the 2024 JSCE Annual Meeting.

After the IAC Discussion, all international delegates boarded the chartered bus for the next part of the International Program, which is the Technical Tour. Before proceeding to the target destinations for the tour, we first went to Kirin Brewery Sendai to have our lunch sponsored by the JSCE. After about 40 minutes, we headed to our first destination: the **Minami-Gamo Wastewater Treatment Plant**.

The Minami-Gamo Wastewater Treatment Plant was one of the major facilities that faced the brunt when Sendai was hit with a 10-meter high tsunami that immediately followed the Great East Japan Earthquake in 2011. During the lengthy presentation, we learned that the treatment plant was first conceptualized as early as 1899 and began construction in 1959. Operations first started in 1964, but only simple treatment processes were used. Several upgrades were done in the plant over the years, and eventually the activated sludge treatment method was implemented, with two (2) incinerators working prior to the earthquake. Now, the new rehabilitated plant has four (4) working incinerators, and handles about 70% of Sendai's sewage.



Technical resource person presents the history of the Minami-Gamo Wastewater Treatment Plant.

What truly astonishes me with Minami-Gamo Wastewater Treatment Plant is how quickly it was able to recover from the devastation brought by the Great East Japan Earthquake. After critical treatment facilities were damaged by the tsunami in March 2011, Incinerator 1 was already up and running by June 2012. Then in early 2013, the damaged plant facilities were demolished, and the reconstruction for the new and upgraded treatment plant commenced. In 2016, construction was finally completed, and later that year, Incinerator 3 has started operations. In 2021, Incinerator 4 was also commissioned. In only about 3.5 years, the treatment plant was not just rehabilitated, but also upgraded. The clever approach that the management of Minami-Gamo in strategizing the repair works for the treatment plant is definitely a great example that could be adopted with other countries, especially disaster-prone countries like the Philippines. We actually had a similar experience during the onslaught of Typhoon Haiyan in 2013, wherein a 7.5 meter-high storm surge struck Tacloban City in Leyte Province, and the restoration of basic utilities in the area took quite some time.



We also got to see an old warehouse building of the Minami-Gamo who was among the first structures hit by the tsunami in Sendai. The huge, almost perfectly-circular dent on one of its walls morbidly demonstrates the sheer strength of tsunami wave including all its debris. No wonder why everything that the tsunami hit was wiped away in seconds.



Structurally damaged wall of old warehouse building of Minami-Gamo Wastewater Treatment Plant.

Personally, I believe the tour would have been better if we were able to also visit the actual treatment facilities, such as the sedimentation tanks, reactions tanks, among others. It would have been easier for us to fully appreciate the magnitude and importance of rehabilitating such facilities urgently despite the extent of damages caused by the tsunami.

After our visit to the Minami-Gamo Wastewater Treatment Plant, we headed straight to our next destination: the **Arahama Residential Foundation Ruins**. It was harrowing to see the several mangled concrete structures which used to be houses of the residents of Arahama district. As our guide would tell us, this used to be a very vibrant district of farmers and fisherfolks, and in mere minutes during that fateful day in March 2011, everything was swept away. Only the foundations of the houses remain in the scene, with the now-abandoned Arahama Elementary School, which served as an evacuation center when the tsunami hit, standing from afar.



The residential foundation ruins of Arahama District show the extent of damage caused by the tsunami during the Great East Japan Earthquake in March 2011.

Near the foundation ruins, there is also a small shrine commemorating the lives lost due to the tsunami, with a huge black granite tablet listing all names of the residents that perished. My experience in seeing the Arahama ruins really puts things into perspective, and underscored the importance of having a very sturdy and reliable coastline protection, comprehensive early warning system, and proper information dissemination to the general public to make them fully understand the threats and



consequences of tsunamis and other coastal hazards. Locally in the Philippines, the DPWH is also trying to understand and formulate such effective mechanisms to mitigate, if not prevent, such extent of human disaster experienced by the residents of Arahama, through the Capacity Development in Coastal Engineering for Disaster Resiliency, a technical cooperation project (TCP) funded by JICA.



A small shrine in Arahama commemorates the lives of the residents lost from the tsunami during the Great East Japan Earthquake.

After the tour, we went back to Sendai Kokusai Hotel to refresh ourselves and get ready for the Welcome Reception. At about 18:15, we left the hotel to go to the Hotel Metropolitan Sendai, where the reception will be held.

The atmosphere during the Welcome Reception was a pleasant surprise for me, and it was a drastic contrast, I would say, from how Filipinos usually hold these types of gatherings. For one, there were no chairs anywhere in the banquet hall, only cocktail tables where delegates could eat, and the same time, interact with each other. Another is that there are no heavy food served in the buffet table, only ‘finger food’. However, it was still surprisingly festive, and the entire hall was fully packed.

Perhaps the highlight of the entire Welcome Reception is the *Kagami Biraki*, which is the ceremonial opening of sake cask to mark a new beginning, and usher in good fortune and prosperity. Our National President-Elect, Engr. Frederick Francis M. Sison, represented the PICE in the ceremony, together with other heads of delegation from other foreign engineering organizations represented in the Annual Meeting. I cannot think of a better way to kick off the Annual Meeting than the Kagami Biraki, as quite literally, this also marks the “new beginning” for JSCE, as they have recently elected their very first woman president, President Yoh Sasaki.



New JSCE President Yoh Sasaki leads the ceremonial toast during the Kagami Biraki in the 2024 JSCE Annual Meeting Welcome Reception.



2.6. STG DAY 05 - 26TH INTERNATIONAL SUMMER SYMPOSIUM

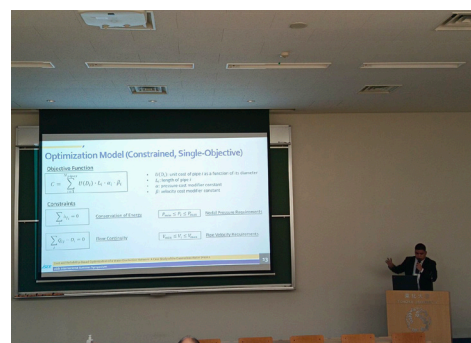
The day has finally come for my presentation in the 26th International Summer Symposium (ISS), as part of the requirements of my participation in the 2024 JSCE STG Program. Although I have given numerous presentations and speeches before in the Philippines, this is the first time that I will be presenting in an international conference, in front of an international audience.

We left the hotel at around 08:30 and boarded the subway up to the Kawauchi Station, which is located right inside the Tohoku University Kawauchi Campus. This is the first time that I have seen a public mass transit station be located inside a school, and is definitely an interesting approach to consider as we continue to upgrade our own mass transit system in the Philippines, including our very first subway. Anyway, after alighting at the Kawauchi Station, we walked for a few minutes and reached the College of Law building, where the ISS sessions are being held, at around 08:45 am.

I was scheduled to present my research entitled: “*Cost and Reliability-Based Optimization of a Water Distribution Network using Genetic Algorithm: A Case Study of the Dasmarias Water District*”. I first conducted this research five (5) years ago for my undergraduate thesis, and earned me the award of “Best in Research Implementation in Water Resources and Coastal Engineering” at the Institute of Civil Engineering, University of the Philippines Diliman.

I entered Lecture Hall 2 where I will be presenting in the **Global Projects** session from 09:00 - 10:20. I was the first presenter to be inside the lecture hall, but shortly after I entered, I saw Engr. Danielle Mirzi P. Sindo, my colleague in the DPWH and the first presenter in the session. She and her co-author, Engr. Minie Adarne, who is another colleague of mine from the DPWH, are currently studying at Shibaura Institute of Technology as JICA scholars. I talked with them for a little while, and asked them for advise on what to expect during the symposium.

It was also great to see that there are other Filipino researchers that are also scheduled to present in the session, such as Mr. Matthew Gapuz Chua from Shimizu, and Mr. Julian Marc Makilan from Yokohama National University. I just hope that in due time in the future, we will all be able to cascade everything that we learned from Japan, to our fellow professionals back at home, to help in the advancement of engineering research and development in the Philippines.



Presentation during the Global Projects session of the 26th International Summer Symposium, held on September 05, 2024 at Tohoku University Kawauchi Campus.



PICE-JSCE COORDINATION MEETING

One activity that I have partaken in, but is not actually part of the official STG itinerary, is the PICE - JSCE Coordination Meeting which we conducted right after the first ISS session. Thanks to the assistance from Ms. Shibuya, we were able to setup a meeting with the JSCE President Yoh Sasaki. Our PICE National President Emil K. Sadain was able to talk to JSCE President Sasaki via teleconference, congratulating her on being elected as the first woman president of the JSCE, and formally inviting her to the upcoming 50th PICE National Convention and Technical Conference, and 2nd International Engineering Expo on October 29 - 31, 2024. We also were able to give JSCE President Sasaki the official copy of the amended PICE-JSCE Agreement of Cooperation (AOC), which was signed last May 2024 at the tail-end of the term of her predecessor, former JSCE President Shigeyoshi Tanaka. Led by DPWH Project Director Benjamin A. Bautista and PICE National President-Elect Frederick Francis M. Sison, we briefed JSCE President Sasaki about the amendments in the new AOC.

After the meeting, we handed out special gift bags consisting of various Philippine delicacies, and a customized PICE jacket to JSCE President Sasaki, and other officials of the JSCE present in the meeting.



PICE National President Sadain greets JSCE President Sasaki via teleconferencing.



PICE National President-Elect Sison, DPWH Project Director Bautista, and PICE National Auditor Michael J. David hands JSCE President Sasaki a special gift basket courtesy of the DPWH and PICE.



PICE and JSCE Delegation for the PICE-JSCE Coordination Meeting.



STG MEETING

Shortly after having our lunch at the Sendai Station, I, together with our PICE National President-Elect Sison, went back to Tohoku University to attend the STG Meeting at about 14:30. The meeting intended to discuss among STG Ambassadors of AOC-countries of JSCE how to further implement the STG Program in the future, with a much more engaging and collaborative undertaking between various organizations. At the meeting venue, Ms. Mon Mon of Fed. MES, Dr. Amin of IEB, and our National President-Elect were present. Ahmed and I joined in the discussions as well.

During the meeting, Ms. Shibuya handed out to us copies of the draft STG implementation plan for 2025 onwards. I noticed that the main concern, or maybe clamor, that the participating countries are raising is to have more nominees from each country be accepted in the STG program, not just one. However, the biggest challenge with this would be obviously the funding source, since Ms. Shibuya and Assoc. Prof. Ishizaki mentioned that ISEF currently has very limited funds.

PICE National President-Elect Sison actually offered a possible solution to this, which is to identify areas in which participating countries could contribute in, to lessen the financial burden from the side of the JSCE. For instance, the participating organizations may be tapped to shoulder airfare and other incidental expenses while the STG Participant is transporting to Japan, and JSCE will just handle all other expenses that will be incurred while the participant is in Japanese soil. This also could potentially allow JSCE to accommodate more participants per country.

Another interesting initiative that JSCE is trying to implement in the next editions of the STG is to have other AOC countries host the program from time to time, and to have private companies sponsor or partner with the host to bolster the available financial resources, while also offering marketing opportunities for the company. I mentioned that this is ideally possible for the Philippines side, as for example, we in the DPWH have very good rapport with our Japanese contractors and consultants and we could endorse to them any potential request for support for the STG Program. But to be ideally able to do this, we would need to have a proof or a physical document that will state all the pertinent details about the program.

This is why I suggested to the group that an official Framework Agreement may need to be drafted and signed by the heads of all participating organizations. The Framework shall layout the guidelines that will be followed by all in the implementation of the STG Program. This also ensures the continuity of the program, even if the participating organizations change leadership.

Thankfully, after the meeting, the group heeded the recommendation and decided to come up with a draft Framework Agreement, to be disseminated online to each participating organization, for comments, hopefully before the announcement of the new STG Program by December 2024. It was also agreed upon to have a regular online meeting every two (2) months or so to continue the discussion.

IAC NETWORKING RECEPTION

After the symposium, we were down to the last official itinerary of the 2024 JSCE STG Program - the IAC Networking Reception. The JSCE International Activities Center (IAC) hosted a welcoming dinner for all of the international delegates, as well as presenters during the ISS. I and my co-STG participants took advantage of this opportunity to bond more and also network with engineers not only from Japan, from other countries as well.

During the reception, we were also able to enjoy local dishes of Sendai, and the whole Miyagi Prefecture as well. One dish that I particularly liked is *gyūtan*, or grilled beef tongue, which I learned was a Sendai specialty. I have already had one too many *gyūtan*s even during the previous night, when I had dinner with my DPWH colleagues. Another specialty that I really liked was the Miyagi *sake*. I have tasted sake before about two (2) years ago during my first trip to Japan, but there is something unique in the Miyagi version that makes it special, but I just could not pinpoint it.

After the reception, we were able to get back to the hotel at about 20:00. We rested for about an hour, then at about 21:00, us, STG participants, decided to go out to hopefully do some local goods and souvenirs shopping. However, one thing about Japan is that probably outside of Tokyo, department stores and other big shops in other areas close relatively early, perhaps a little over 21:00. Luckily for us, there is still a Don Quijote store open, which is actually my go-to shop in Japan. I personally bought lots of chocolates, teas, and other snacks which I plan on giving to my family and officemates back in the Philippines. We went home to the hotel to spend our final night in Japan at around past 23:00.



I and my co-STG participants enjoying Miyagi sake and other Sendai specialties in the IAC Networking Reception.



Walking along the Clis Road in Sendai to do some night shopping.

2.7. STG DAY 06 - TRAVEL BACK TO THE PHILIPPINES

After what felt like a very short six (6) days, it was finally time for us to leave Japan and head back to our respective countries. Since our flights are scheduled at Narita Airport and we had to commute, we did not have ample time to do some last minute roaming around. I took my breakfast at around 07:00. At around 08:00, we finally checked out of Sendai Kokusai Hotel and walked straight to Sendai Station to catch the Yamabiko 210 Shinkansen bound for Tokyo. We departed at around 09:00 and after a two (2) hour trip, we reached Tokyo Station at a little past 11:00.

Due to the circumstances leading up to this year's STG Program, we (STG participants) have not had much time to bond with each other, aside from the brief walk that we took to the Sendai Museum (which was unfortunately closed) while waiting for the Networking Reception, and our night shopping



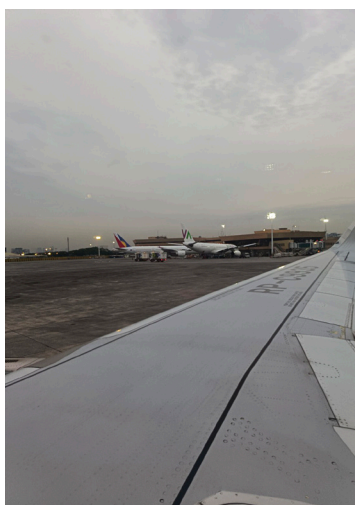
in Sendai's Clis Road. However, I still feel like we have been able to build a good bond, and that we were able to form new international friends in each other. After a week, it was unfortunately time to say goodbye.

After arriving at Tokyo Station, we bid our farewells with each other, since Uran, Satharat, and I have to go to Narita International Airport for our flights, while Ahmed and Moe will get to stay for a few more days in Tokyo before their return flight. The three of us, together with Ms. Morichika, boarded the Narita Express train, and after about 40 minutes of travel, Uran and I alighted at the Terminal 2 station, while Satharat headed to Terminal 1.

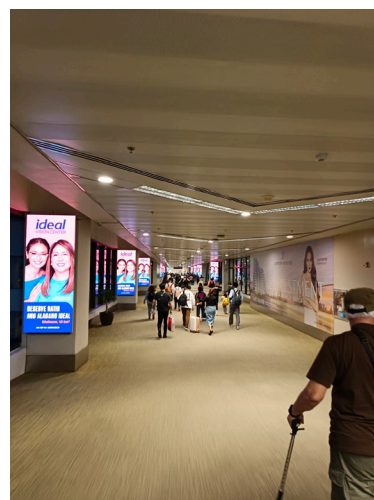
We reached Narita Terminal 2 at around 12:30. After going through several check-in procedures and immigration checks, I was able to board the Philippine Airlines Flight PR 427 back to the Philippines at about 13:30. A four (4) hour flight after and I finally landed back to Manila at around 18:00.



Waiting at the boarding gate in Narita Airport Terminal 2 for my flight back to the Philippines.



Aboard the Philippine Airlines Flight PR 427 after a safe landing at NAIA Terminal 1.



Walking inside the Arrival Area of Ninoy Aquino International Airport Terminal 1.



3. CONCLUSION

I truly believe that my six (6) - day experience in the STG Program has been not only career-defining, but more importantly, eye-opening.

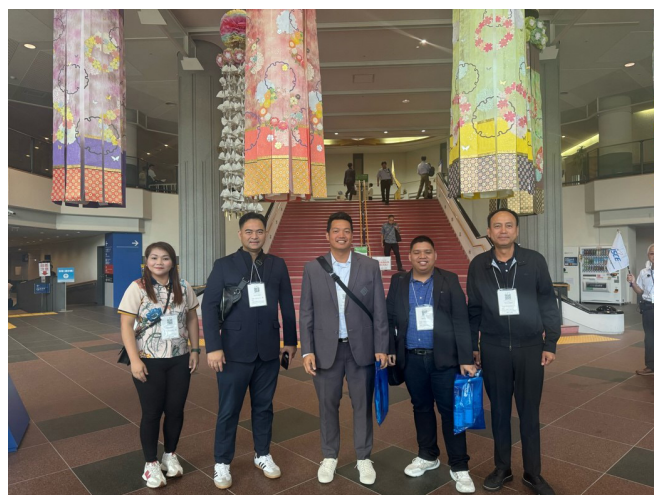
Career-defining, as this was my very first time not only attending, but even presenting at an international conference. Not everyone can say they have attended an international engineering conference, much less say they have presented their research in the same conference. This will not only boost my professional credentials, but also elevate my level of self-confidence moving forward.

Eye-opening, due to the realizations that I have made during this whole program. Firstly, the dedication of the Japanese people to upholding the standard of excellence in research and development is really commendable. It is not a surprise that Japan is a hotbed of modern technological advancements, with their advanced research facilities, and numerous research symposiums, just to name a few. Their engineering ingenuity is also unmatched, as showcased by how they have astonishingly resumed operations in their major facilities, such as the Minami-Gamo Wastewater Treatment Plant, in no time despite the major devastation caused by Great East Japan Earthquake in 2011.

Moreover, the problems engineers face in Japan are not at all too different from what we encounter in the Philippines, and I am sure that is also the case for the rest of the world. This is evidenced during the IAC Discussion, where the panel tackled issues such as negligent design, as well as social and environmental safeguard issues, in infrastructure projects. This not only brings a sense of commonality between us, engineers in the Philippines, and engineers in Japan, and that somehow, we could perhaps adopt their best practices in solving such problems and apply them in our own projects.

Finally, I realized first-hand how Japanese people are resilient. The stories and lessons that we have heard about the tragedy that was the Great East Japan Earthquake, as well as the ruins that we have visited, paint a somber picture of the past, but what can be seen now are Japanese communities, once overwhelmed by disaster, buzzing and as vibrant as ever before.

At the end of the program, I return to my home country hopefully as a better engineer, looking forward for opportunities to be able to apply my new learnings to my work in the DPWH, and contribute to the betterment of Filipino engineering in general.



PICE-DPWH Delegation during the IAC Discussion at Sendai International Center.



Awaiting for the lecture about the history of the Minami-Gamo Wastewater Treatment Plant.



PICE-DPWH delegation at the damaged wall of the old storage facility of the Minami-Gamo Wastewater Treatment Plant.



PICE-DPWH delegation at the 2024 JSCE Annual Meeting Welcome Reception at Hotel Metropolitan Sendai.

