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Japan Society of Civil Engineers

International Activities Center

IAC News No.144

The IAC News introduces significant and unique international projects, technologies, symposium, communication undertaken by JSCE IAC, International Section, ACECC, and Research & Development Section with over 30 committees, state-of-art- civil engineering technologies and projects, great and interesting achievements of civil engineer and researcher once a month.

First of all, our apology for delaying in delvering this issue.

This issue introduces 3 interesting articles. 1) Dr. Makoto Kimura（Prof. Emiritus at Kyoto Univ.）, IAC Senior Director's message: From his unique viewpoint with his extensive experince and knowledge in international projeccts, he raises a unique, worth-pusuing proposal for developing international projects to you: the IAC the members of which have extensive knowledge, sklls and expreicne in international proejcts, could offer technical advise and suggesions in the coures of desging and construcition managmenet, 2) a message from Mr. Yukihiro Koizumi a IAC Director; you find his wide and insightful perspective and sincere endeavour when he is engaged in internatinal porjects, 3) JICA's ODA project on road rehabilitation implemented in Cambodia and Laos, Part 1 of which you find in the issue 143, 4) the education program at Nitobe College, Hokkaido University, which has progressed singificantly since 2023 when it was introdcued in the IAC News No. 134, and 5) the introduction of the Committee on Geotechnical Engineering. Geotechnical engineering covers a wide range of areas in civil engineering, and because of that, its scinece, technology and approach is the essensial and indispencabls in the civil engneering field. This introducion gives you a glimpse of that disicipline.

You will find these articles interesting and informative.

We are looking forward to your comments, feedback, and requests anytime. Thank you

～Message from IAC Senior Director～
A Role of the JSCE International Activities Center

Makoto Kimura
(IAC Senior Director)

I first went overseas 45 years ago. On a budget bicycle trip in which I carried a tent, a sleeping bag, and simple cooking utensils around like a hermit crab, I went from the west coast of Canada all the way to the east coast. Ever since those days in my second year of university, I have been on just short of 300 trips overseas and visited Africa, in particular, close to 100 times. During these trips, I had many opportunities to visit construction sites overseas and observed numerous sites where construction conditions such as the construction environment, machinery, and personnel were challenging.

I hear there are many Japanese ODA construction projects overseas where trouble occurs because the designer and construction manager work for the same Japanese consultancy company. Some cases work out because the construction manager is clued up on inside information; however, there are also cases where things do not go smoothly even when the Japanese construction contractor points out design flaws. As the construction is designed by the construction manager, it means that he/she has to acknowledge their own mistakes. They end up failing to provide a proper explanation to the client and impose unreasonable demands on the construction contractor. At the very least, the designer

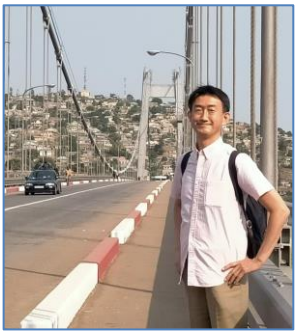
and construction manager should be from two different companies. It is hard to understand why this is the case. Somewhere overseas far from Japan, there are Japanese construction contractors and Japanese consultancy companies locking horns. Clients in project countries are noncommittal, unable to make technical decisions due to a lack of technical proficiency, and do not want to pay over the odds for billable projects. These conflicts are a misuse of time and engineering talent, working against Japan's national interest.

Regardless of whether the project is billable or not, in JICA projects and the like, it is common for a technical committee and so on to be set up beforehand. However, perhaps, for example, it would be a good idea to receive technical advice beforehand from experts in industry, government, and academia that belong to a third-party organization like JSCE. JSCE has 40,000 members and can point out concerns, etc. regarding a project's proper design and construction. I also often find myself upset when something goes wrong. It makes me want to scream, 'Why didn't you tell me earlier!?' There are many projects, such as in faraway places like Africa, planned without knowledge of the local construction environment. This seems reckless given the significant differences between Japan's construction environment. With this in mind, I feel many projects would benefit by knocking on the door of JSCE.

There are many roles that this new-age JSCE International Activities Center can fulfill. I look forward to continuing to benefit from the wisdom of our members.

【Reported by Makoto Kimura, IAC Senior Director (Senior Managing Director at Bond Engineering Co., Ltd. and Emeritus Professor at Kyoto University)】

～Message from IAC Director～
International Cooperation and Engineer Ethics



Koizumi Yukihiro
(IAC Director)

It has been 30 short years since I joined JICA. While I have visited many countries in Asia, Africa, and South America, the sights and sounds of Paraguay, the location of my first business trip, remain vivid in my mind.

One day I visited a village about seven hours from the capital to undertake a study to improve local roads connecting Japanese immigrant residential areas. One of the Japanese settlers said to me, "Once it rains, trucks would get stuck on the muddy roads, unable to move for several days." As unluck would have it, on our way back, a sudden tropical rain storm struck, with my car becoming well and truly stuck in the mud. I was frightened that we would end up stuck there for several days like the settler had said.

This road was later paved with asphalt based on our study for Japanese grant, and when I visited the area 20 or so years later, there was vast farmland stretching along the side of the road. "Thanks to the road being paved, I

can always travel along it with peace of mind." "I feel a connection with Japan every time I drive along this road." Hearing this feedback really gave me a sense that the project that I had led has proved useful to the community and helped build ties between Paraguay and Japan.

The job of a civil engineer is to improve people's lives, and likewise, the role of international cooperation is to improve the lives of the people who live in developing countries. International cooperation is no doubt an important tool in terms of Japanese diplomacy, and it is often asked how this cooperation benefits Japan. I believe, however, that we must remember the principle of international cooperation.

In the preface to the Code of Ethics for Professional Engineers, it says the following:

"Professional engineers should fully recognize the significant impact of science and technology on society and the environment and contribute to safeguarding the interests of the public by creating a safe and sustainable society through their work.

To build widespread trust and effectively fulfill this mission, professional engineers should adhere to this Code of Ethics, continuously enhance their professional integrity and skills, and act on their own initiative in a manner that is fair and honest while taking a multifaceted and international perspective."

I believe this message is also important for those involved in international cooperation.

That is why today, like any other, I find myself tackling the mountains of paperwork in front of me while picturing the lives of the people in the developing country that I am trying to cooperate.

【Reported by Koizumi Yukihiro, IAC Director (Japan International Cooperation Agency)】

ODA Road Rehabilitation Projects Stretching 253 Kilometers in Developing Countries (Part 2)

Since 1997, I have been involved in four national road rehabilitation projects totaling 253 kilometers of road in Cambodia and Laos. The following is a table summarizing the projects. This report covers the final project (4).

Hideaki Kamimura (Obayashi Corporation)

National Road Rehabilitation in Cambodia and Laos

	Name of Project	Finace	Distance (km)	Construction Period year from	Construction Period year till	No. of Road Lane	No. of Asphalt Layer	Bridge Construction	No. of Encountered UXO	Remarks
(1)	Cambodia National Road No.6&7	JICA Grant Aid	75.0	1997	1999	2	1 Layer (5cm x 1)	Newl constriction of 13 nos of Bridge (10m~159m)	118	Project suspended tentatively due to plotical unrest
(2)	Laos National Road No.9	JICA Grant Aid	72.9	2000	2002	2	2 Layer (5cm x 2)	only overlay	450	Construction with Detour along whole strech
(3)	Laos National Road No.9	JICA Grant Aid	58.1	2012	2015	2	2 Layer (5cm x 2)	None	103	2 section divided apart with distance 60km
(4)	Cambodia National Road No.5	JICA Loan	47.0	2019	2022	4	3 Layer (5cm x 3)	New constriction of 6 nos of Bridge (15m~100m)	160	Preventive measure for 3rd party traffic accidents.
		Total	253.0						831	

(4) Rehabilitation Project of National Road 5 in Cambodia (2019 to 2022)

This project, which began in 2017, involves upgrading a 366-kilometer stretch of National Road 5 to a four-lane highway. This JICA section connects the capital city of Phnom Penh with the Thailand border. Of this 366 kilometers of road, Obayashi received an order for a 47-kilometer area that stretched from Pursat Province to Battambang Province. Work began in April 2019 and was finished in September 2022. After this a one-year warranty period was completed after the construction.

At the outset of the construction work, there were significant delays in the leading north and south sections. As a result, the Deputy Minister of the Ministry of Public Works and Transport (MPWT) summoned the JICA members, the Engineer, and contractors of all eight sections to hold frequent review meetings. The reasons for the delay to the work were the six difficulties faced in the long-distance road construction work in these developing countries: (1) Climate conditions (managing the earthwork in the tropical monsoon climate split between the rainy season and dry season), (2) geographic conditions (managing a construction across a long distance of 36 to 51 km), (3) ensuring embankment materials (delay to the construction schedule caused by a delay to finding borrowing pits, (4) difficulties in the maintenance of the long-distance construction detour road, (5) inexperienced construction schedule management by local subcontractors, and (6) delays due to flood damage in October 2020.

The Obayashi sections included eight bridge construction and 57 cross drainage works. A challenge of the construction work was starting with these structure tasks first and carrying out continuous construction efforts as much as possible without leaving any remaining areas. The embankment and subgrade, which are composed of soil, consist of approximately 10 layers (it is essential to replace soft soil at wide embankments in wetlands as work cannot be implemented when there is flooding during the rainy season). On top of these layers, two layers of crushed stone roadbed are laid before laying three layers of asphalt on top. While it is a steady and repetitive process of constructing layer by layer from the bottom on both sides of the existing road for 47 kilometers straight, the standard of the earthwork determines the quality of the road. As for the distance at which materials were transported, the crushed stones were transported about 100 kilometers, while the subgrade material for the earthwork was transported about 40 kilometers. The total area of the soil extraction sites required to extract 1,200,000 m3 of soil over the course of the project amounted to 61 hectares. This selection of borrow pits is within the contractor's scope and includes processes such as preliminary research, negotiations and contracts with landowners and detecting unexploded ordnances (UXO). As these efforts took over half a year until the start of soil extraction, we strived to reduce the lead time by conducting thorough soil investigations and tests in advance from when we made our bid proposal in 2018. We faced the harsh fact that if we did not improve our competitiveness by reducing transportation costs by selecting a borrowing pit that was as close as possible to the construction site, then our bid would not win in an international bidding competition involving Korean, Chinese, and Vietnamese contractors.

Other issues were ensuring the safety of third-party traffic and residents, as well as conserving the environment of the nearby areas. Unlike new installations, this construction work was conducted right next to general traffic. Therefore, it was essential to ensure the safety of the general traffic on the detour road during the day and night. The road accident fatality rate in Cambodia (2022 statistics) is about five times that of Japan, with one in every 10,000 people dying in a road accident. Most of these fatalities stem from factors such as speeding, drunk driving, and not wearing a helmet. The people of Cambodia have ridden motorcycles since they were children, and there

are constant accidents. If an accident occurs, it will directly lead to a delay in the construction schedule. Every day we conducted a 100-kilometer-plus patrol leading the safety team ourselves. This was to help prevent accidents on the national roads, which change daily. The access road used in the transportation of soil was also subject to our management, and so the total length reached 90 kilometers. As damage to the road surface worsened significantly during the rainy season, maintenance was undertaken by five teams. At the same time, we also made efforts to maintain alertness to our team by repeatedly conducting unannounced breathalyzer tests and speed and cargo sheet checks of 230 dump truck drivers during the peak season. Through daily risk management, we provided ongoing coaching to instill a mindset of 'avoiding and preventing accidents' in order to enhance safety awareness. This approach helped the Cambodian staff develop the ability to assess and respond to the work site with the same perspective as us.

In 2020, flooding at a level seen once every few decades occurred, and we were forced to carry out construction in even harsher conditions along with the COVID-19 pandemic. In response to the flooding-induced construction delays, we hired 200 villagers and added a team of directly hired personnel. We minimized the delay of the earthwork, accelerated subbase/base course and paving work, and finished the construction about one month before the end of the contract period.

During my tenure on-site in this project to build a long-distance road in a developing country, I focused on on-the-job training as my mission to develop engineers who have a comprehensive understanding of and can carry out all aspects of the construction work, including earthwork, the management of crushed stone production, bridge construction and asphalt paving. Through continuous operation of the PDCA cycle, coupled with a strong emphasis on technical transfer and local workforce development, we facilitated high-quality road by the efforts of the Cambodian project members, successfully balancing project deadlines with quality assurance (including design changes of bridges).

Completed Road and Bridge (L = 100 m)

Road Converted into a New Four-lane System (rural area)

When the completion inspection was conducted in September 2022, the Deputy Minister of the Ministry of Public Works and Transport praised the achievement that Obayashi had successfully completed the difficult National Road 5 construction work on schedule.

After the construction work was completed, road maintenance was not carried out due to the local government's lack of financial resources. Obayashi conducted maintenance during the one-year defect period as a trade-off to ensure quality. Roads become deteriorate if they are not maintained. Given the severe experience up to this point of finally contractor's having to take full responsibility even if road was damaged by the external factor, we

demonstrated the contribution of maintenance to the local people, implementing the following preventive measures: removing sediment from surface of bridges to maintain drainage, preventing asphalt dissolution by cleaning oil leaks caused by vehicles with malfunctions or involved in accidents off road surfaces, preventing subgrade damage by cleaning garbage thrown away from drainage, and mowing grass at median strip and slope to improve visibility. While the outcome of this cannot be analyzed quantitatively, I asked myself daily, 'If there were an excellent project manager, how would he deal with this issue?' While nobody could have foreseen it, it was a regrettable phenomenon that the slope area of the new road (originally a rice field) was quickly backfilled by local residents to sell the land, causing malfunctions of the drainage facilities at the slope base.

To close, I would like to extend my sincere gratitude to the project clients (MPWT), Embassy of Japan, JICA, and the Engineer who provided warmful support and guidance in each country, as well as everyone else who was involved in the construction work.

*For information on projects (1) to (3), please see the IAC News No. 143.

【Reported by Hideaki Kamimura, Civil Engineering Construction Project Department,
Asia-Pacific Regional Head Quarters, Obayashi Corporation】

New Developments in Interdisciplinary Education Program at Nitobe College, Hokkaido University

Assoc. Prof. Katsufumi Hashimoto (Hokkaido University)

In addition to the specialist education and research available in each undergraduate and graduate school, Nitobe College of Hokkaido University aims to ensure its students learn the necessary mindset and skills to succeed in our global society. To achieve this goal, it has set up an Interdisciplinary Education Program for students at Hokkaido University.

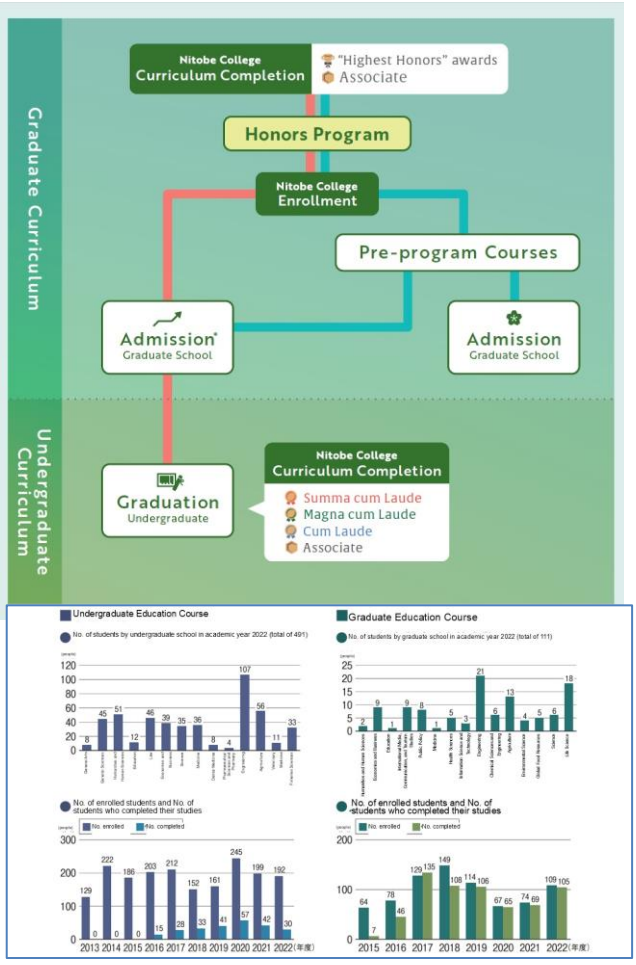
This report introduces details about the program reshuffle for the academic year 2024.

Up to the academic year 2023, the education programs at Nitobe College were, as introduced in IAC News (No. 134: December 2023), a "Foundation Program," covering basic contents, and an "Honors Program" that takes participants studies to the next level. The Undergraduate Education Course and Graduate School Education Course were set up as a part of these programs. From the academic year 2024, the Foundation Program has been abolished, with the Honors Program (Undergraduate Curriculum and Graduate Curriculum) becoming a single program.

The new program has two key courses: Global Advanced Course I (Basics of Team-Based Learning) and Global Advanced Course II (Practice of Team-based Learning). For example, in Global Advanced Course II, led by

myself, the students deepen their understanding of the social impact of their expertise when contributing to society with project outcomes, while also fostering a stronger sense of professional ethics. They achieve this by analyzing primary data collected on a given topic to identify problems to be solved and critiquing said problems. The goal is for the students to re-appreciate the importance of asking questions in the setting of issues through identifying problems and the planning and executing of projects, as well as for them to learn the necessary skills for setting meaningful problems.

The "Pre-Program Courses," which include courses offered in the Foundation Program up to the academic year 2023, are open to all students, and their completion is required for admission to the Honors Program. Students, however, who complete their undergraduate studies at Nitobe College with distinction will be able to apply to the Honors Program, Graduate Curriculum without having to take and complete graduate school's Pre-Program Courses. At the graduate schools, the Pre-program Courses are offered as regular courses for all students. In the first semester of the academic year 2024, there were about 70 students who declared their wish to enroll. Just under 60 students were selected and ultimately 54 students completed the two courses of the Pre-program Courses.



Reference: Nitobe College Graduate Curriculum Booklet (2024AY)

In the first semester of the academic year 2024, 420 students took the Pre-Program Course as part of the Undergraduate Curriculum. Of those who will complete the course, about 180 students will be granted permission to enroll in the Honors Program, Undergraduate Curriculum. On average, about 40 undergraduate students complete the Honors Program each year. As for the Graduate Curriculum, 16 students have completed the Honors Program.

By enhancing its curriculums and providing programs for students to learn the "3+1 competencies" (Ability to Attain Sustainable Personal Development, Skills of Team Organization and Management, Capability of Knowledge Sharing and Application for Social Benefit, and Professional Ethics), Nitobe College will continue to develop leaders that will succeed in our global society.

【Reported by Assoc. Prof. Katsufumi Hashimoto (Hokkaido University)】

Introduction to the Activities of the Committee on Geotechnical Engineering

1. Overview of the Committee

Assoc. Prof.
Atsushi Takai
(Kyoto University)

The Committee on Geotechnical Engineering was set up in September 1976 as a forum for interdisciplinary discussions on geotechnical issues in cooperation with related committees such as hydraulics, coastal engineering, rock mechanics, structures, and earthquake resistance. The Committee on Geotechnical Engineering collaborates with the Japanese Geotechnical Society while mainly investigating technological and research trends related to geotechnical engineering, planning and holding seminars on the topics of geotechnical engineering, conducting and supporting surveys of geo-disasters, and promoting and assessing new technologies. As of June 2024, the committee consists of 33 members including Chairperson Masaki Nakano (Nagoya University), Vice Chairperson Yoichi Watabe (Hokkaido University), and Secretary-General Atsushi Takai (Kyoto University) (Photo 1).

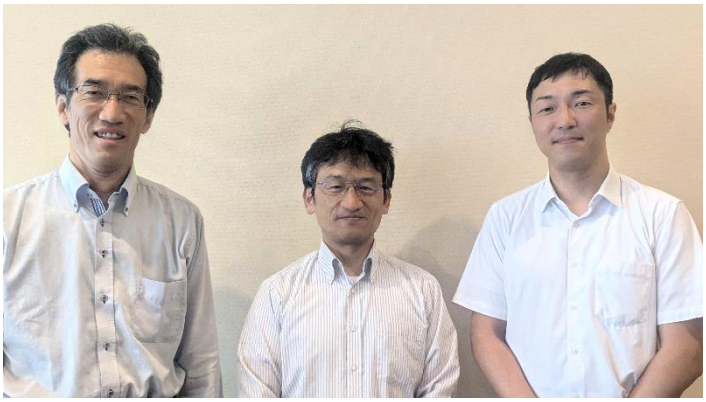


Photo 1 Chairperson Nakano (center), Vice Chairperson Watabe (left), Secretary-General Takai (right)

2. Activities of the Committee

Since fiscal 2007, the committee has held a series of geotechnical engineering seminar every year, providing the latest scientific and practical knowledge and engaging in discussions on hot topics. In recent years, the seminar has covered the following themes: “What Can Volcanic Engineering Do in Response to Sudden Eruptions?” (fiscal 2019), “Case Studies of Cavities and Sinkholes Caused by Various Factors and How to Stop Them” (fiscal 2020), “Slope Disasters and Related Laws and Litigation” (fiscal 2021), “Visualization, Modeling, and Displaying of the Ground” (fiscal 2022), and “Geotechnical Engineering in Offshore Wind Power Projects” (fiscal 2023). With over 200 attendees, the seminar is one of the committee’s main events.

Furthermore, since fiscal 2023, the committee set up three working groups (WG), which operate with the goal of deepening ties and interactions between members. The hope is that, by working in relatively small groups, members will engage more passionately in discussions, sparking new projects and activities.

3. Activities of Subcommittees

As of 2024, the following subcommittees undertake research activities under the umbrella of the Committee on Geotechnical Engineering: the Volcanic Engineering Research Subcommittee (Chairperson: Tatsuro Chiba of Asia Air Survey Co., Ltd.), the Slope Engineering Research Subcommittee (Chairperson: Kazuya Ito of Tokyo City University), and the Embankment Research Subcommittee (Chairperson: Kenichi Maeda of the Nagoya Institute of Technology). The Volcanic Engineering Research Subcommittee has researched volcanoes in Japan such as those in Kirishima, and held seminars and written books regarding disaster surveys and prevention (Photo 2). The Slope Engineering Research Subcommittee works on major research challenges in JSCE together with the Committee on Earthquake Engineering and the Committee on Safety Problems. This subcommittee also contributes to efforts to promote JSCE, such as manning a booth at the JSCE Open Campus event (Photo 3). The Embankment Research Subcommittee helps to improve the technical proficiency of embankment engineers by holding a river embankment technology symposium every year and conducting surveys of disaster-stricken areas together with experts from industry, government, and academia (Photo 4). Elsewhere, the Soil Testing Guide Revision Subcommittee (Chairperson: Hirofumi Toyota of the Nagaoka University of Technology) revises “A Guide to Soil Testing,” which is a book published by JSCE. With many of the test methods covered in this book revised in 2020, a fourth edition (ISBN 978-4-8106-1066-6) of the book was published in March 2024 in which the content of the book was updated to conform to the latest criteria and standards. We will continue forming new subcommittees in response to societal trends and needs, maintaining our commitment to making a strong impact in what we do.

Photo 2 Volcanic Engineering Research Subcommittee’s Seminar in Kirishima City, Kagoshima Pref.

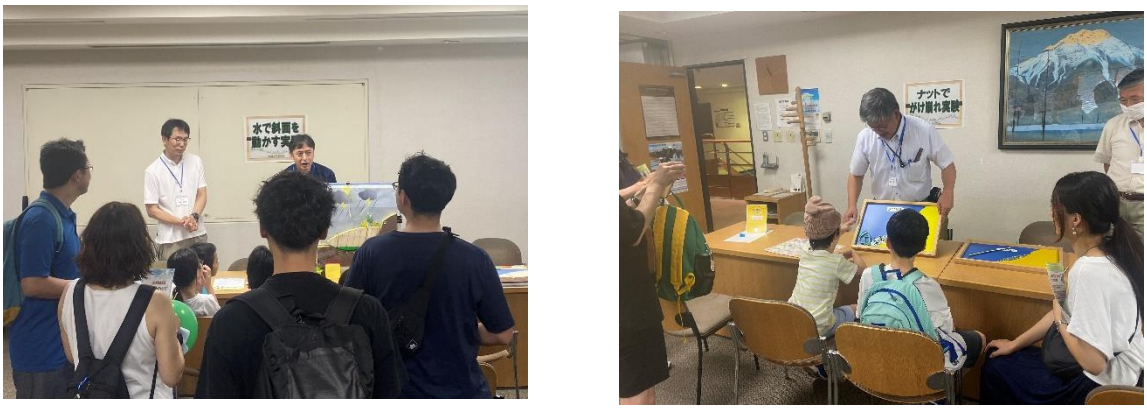


Photo 3 Demonstrations at JSCE Open Campus 2024


Photo 4 Joint Survey of Disaster-hit Area Involving Experts from Industry, Government, and Academia

Updates

◆In response to 2024 Noto Peninsula Earthquake
https://www.jsce-int.org/node/873

◆The International Infrastructure Archives
– A Compilation of Japan's Greatest Projects in Transfer of Civil Engineering Technology in Service –
http://www.jsce.or.jp/e/archive/

◆IAC "News Pick Up!!" on the JSCE Japanese website
https://committees.jsce.or.jp/kokusai/iac_dayori_2024

◆Summary of featured articles in JSCE Magazine Vol. 109, No. 11, November 2024
http://www.jsce-int.org/pub/magazine

◆Journal of JSCE
https://www.jstage.jst.go.jp/browse/journalofjsce

◆Safe and Healthy Work in the Digital Age 2023-2025 Campaign
https://healthy-workplaces.osha.europa.eu/en/media-centre/events/launch-ceremony-healthy-workplaces-campaign-safe-and-healthy-work-digital-age-2023-2025

◆【Abstract Deadline: December 20, 2024】CECAR10：http://www.cecar10.org/

◆ECCE: Construction 2050 Alliance
Construction 2050 Alliance sends letter to President von der Leyen ahead of Commissioner-designates hearings – Construction 2050 Alliance

◆IABSE Symposium Tokyo 2025
https://www.iabse.org/Tokyo2025/

◆16th International Workshop on Micropiles
https://www.ismicropiles.org/workshops.asp

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