Japan Society of Civil Engineers
International Activities Committee
Newsletter

No. 6 September 2001

Interview with President TAMBO

President TAMBO, JSCE

In the past, civil engineers did not see themselves as "environmentalists" since there was no need for such a sense with the nature so abundant. Nevertheless, in high-density, highly developed regions, serious consideration must be given to the environment and the people. Recently, civil engineers have realized that civil engineering is in fact, "environmentology." It is a people-centered discipline, but also linked to land. I think this is why there is a rising demand for peripheral fields of the civil engineering profession. This profession has achieved magnificent accomplishments, but has been criticized by those focusing only upon the distorted side of public works. In such circumstances, I wish to address my opinions in a fair and square manner, during my term in office.

The Japanese population is expected to drop from 120 million today to 70 million in Year 2100. It may not be a perfectly accurate figure, but there is no doubt that the population will be less.

In order to sustain decent living standards and maintain high-level civilization, we must determine how the social overhead capital built on taxes of the 120 million should be utilized by the 70 million in maintenance and renewal. There ought to be an adequate form of land use. What kind of capital would become necessary 100 years from now? What should civil engineers provide? JSCE cannot find answers to these alone, but as one of the missions of JSCE, I have initiated an ad hoc committee to express professional opinions.

In the post-war period, the urban regions have eaten away its outlying districts, creating a low, sprawling city. Tokyo, especially, spread in a dragging manner. It is difficult for such cities to cope with the needs of recycling, energy-saving, and information societies. There is a plan to connect Kagoshima and Hokkaido with the Shinkansen Line, with Tokyo in the middle. However, I think to create a social structure to maintain it would not be an easy task. Japan cannot afford to have 2 or 3 cities like Tokyo. I am aware of the need to clearly differentiate the roles of urban areas and the outlying districts. Tokyo may have developed into a more compact and more beautiful city, if it weren't for the restrictions enforced to protect the right to sunshine. There may not have been a need for such large-scale highway and subway networks. The big question is how the following regions should fit into national land planning: 1) consume-only regions, 2) regions engaged in agriculture, forestry and other organic business, and 3) regions outside of 1) and 2) where biodiversity is conserved. The new committee will also focus on these points.

Modern advanced technology has specialized and expanded in a vertical matter. It is possible to have more efficient technology by successfully combining the know-how acquired by our ancestors with those specialized technologies. For example, it may be possible to merge medical science, chemistry, and ecology, to consider an efficient integrated management technology for catchment basins. Also, we must emphasize efficiency in developing national land with limited funds. Agricultural water supply, which is the most simple, low-tech recycling supply, is bound by customary water rights, and hardly any recycling efforts can be seen. Therefore, the urban cities must pay high costs to recycle the dirty downstream waters through advanced wastewater treatment. There are still numerous things that can be achieved by straining ideas, to cope with the changes accompanying the decrease in population.

2nd CECAR

2nd CECAR Opening Ceremony

The Second Civil Engineering Conference in the Asian Region (2nd CECAR) was organized by The Asia Civil Engineering Coordinating Council (ACECC) in Tokyo from April 16th to 19th 2001. The conference enjoyed more than 700 participants from 14 countries, consisting of approximately 60 lectures, Student Essay Contest, Gala Dinner, Technical Visits, etc.

The conference provided an opportunity for participants to exchange views on various issues concerning infrastructures, environment and sustainable development, and IT. The ACECC Presidential Meeting was held to discuss the population growth in Asia and the need for more cost effective infrastructure development, and the role of ACECC and future collaboration among the ACECC members.

The 2nd CECAR closed with a promise to meet in the 3rd CECAR to be held in Seoul in 2004.

Session Report:
(http://www02.u-page.so-net.ne.jp/tg7/acecc/)
Presidential Meeting:
(http://www02.u-page.so-net.ne.jp/tg7/cecar/)

Monuments of the Millennium

Awarding Ceremony
(President Bein, ASCE & President Mikanagi, Kansai International Airport Co., Ltd.)

On April 19, 2001, President Mikanagi of Kansai International Airport Co., Ltd. was awarded a plaque from American Society of Civil Engineers for the construction of Kansai International Airport, which has been recognized by ASCE as one of the 10 "Millennium Monuments" of the 20th century under "airport design and development." There are 9 other projects selected under the categories of dams, highways, long-span bridges, rail transportation, sanitary waste disposal systems, skyscrapers, wastewater treatment and disposal, water supply & distribution, and water transportation. President Bein of ASCE noted that the Airport has made both technological and economical contributions with its sophisticated grading technologies, various access systems, and efforts toward conserving the natural environment. Mr. Suzuki, then JSCE President, commented that it was a great honor that "Japanese technology has been recognized globally." The plaque is exhibited in the Kansai International Airport construction office building.

JSCE Signs Agreement of Cooperation with IEP

IEP 41st Annual Convention
(Engr.M.P. Gangwani, President of IEP & Prof. HANAMURA Tetsuya)

JSCE concluded an Agreement of Cooperation with The Institution of Engineers Pakistan (IEP). Prof. Hanamura of Okayama University attended the IEP 41st Annual Convention held in Karachi from May 26th to 28th 2001 as JSCE representative. After President Muhammad Rafiq Tarar gave his speech in the Plenary Session, a signing ceremony was held for the Agreement.

The people of Pakistan are eager to learn of new technologies in the civil engineering field from Japan. English is used as the official language. They are looking forward to receiving documents written in the English language, and JSCE needs to take this fact into consideration in future exchanges with IEP.

Earthquake Engineering Committee

Outline and Scope of the Activity

Japan is one of the countries with the world's highest earthquake risk. Many serious earthquake disasters occurred in the days of the industrial modernization that had started 130 years ago, and there has been a remarkable progress in the field of earthquake engineering in Japan based on bitter lessons that we learned from the past disasters. Nowadays, earthquake resistant designs are a must in almost all design procedures for structures in Japan. But in this technology-driven age, it is all too easy for us to change drastically our local and global environments, causing outlooks of earthquake impacts to be remarkably different from what we knew. We, earthquake professionals, are all the more responsible for providing clear and scientific evidence that we are still facing risky environments.

The JSCE Earthquake Engineering Committee was organized in 1955. Since then, the committee has been taking the lead in promoting researches, developing and providing new ideas and/or criterions for rational seismic designs, collaborating with overseas researchers and engineers, and contributed a lot to the worldwide development of earthquake disaster prevention measures.

Since the disaster of Kobe Earthquake in 1995, the committee reformed its organization, and more than 10 subcommittees covering various aspects of earthquake engineering have been organized under the committee, asking even non-member researchers and engineers to join to their activities. Almost 10 symposia and/or workshops are held every year by these subcommittees, and the committee itself holds a symposium every 2 years with several hundreds contributions.

Organization

The committee consists of about 100 members and 13 senior advisers. The present chairman is Dr. Yozo GOTO (Nishinippon Institute of Technology), the vice-chairman is Dr. Kazuo KONAGAI (University of Tokyo), and the secretary-general is Dr. Takumi TOSHINAWA (Meisei University). The managing board consists of the above three persons and of 8 secretaries.

The following 15 subcommittees have been organized so far: Seismic Design Standard (chairman: Akihiko NISHIMURA, TESS), Spreading Earthquake Disaster Mitigation Technology (Mitsuaki SAEKI, Japan Engineering Consultants), Earthquake Damage Investigation (Junji KIYONO, Kyoto University), Tunnel and Underground Structure Damage Investigation (Naohiro IWATATE, Tokyo Metropolitan University), Earthquake Resistant Design of Pile Foundation (Fusanori MIURA, Yamaguchi University), Real-time Earthquake Disaster Prevention (Shigeru NODA, Kagawa University), Seismic Isolation and Response Control (Hirokazu IEMURA, Kyoto University), Local Site Effect (Hirokazu TAKEMIYA, Okayama University), Ductility Design (Kazuhiko KAWASHIMA, Tokyo Institute of Technology), Pioneer the New Application of Mathematics and Physics for Earthquake Engineering (Hitoshi MORIKAWA, Tokyo Institute of Technology) , Seismic Strengthening Technology for Existing Structures (Ken-ichi TOKIDA, Public Works Research Institute), Liquefaction Design for L2 Seismic Motions (Takeji KOKUSHO, Chuo University), Faulting and Fault-Related Damage (Kazuo KONAGAI, University of Tokyo), Dynamic Design Method (Hisanori OTSUKA, Kyusyu University), International Affairs (Susumu IAI, Port and Airport Research Institute)

Latest International Activities

The Earthquake Damage Investigation Subcommittee took the lead in organizing JSCE reconnaissance survey teams, which were dispatched to Turkey (1999), Taiwan (1999), India (2001), El Salvador (2001) and Peru (2001). The team members have been collaborating enthusiastically with a number of experts and engineers in these affected countries for possible countermeasures. Their reconnaissance reports in English are all being put up on the JSCE website in chronological order. The International Affaires Subcommittee participated in activities of ISO and APEC-related international earthquake resistant regulation establishments. The Subcommittee for Spreading Earthquake Disaster Mitigation Technology held seminars for engineers in Taiwan and China. The taskforce for Ductility Design Research compared Japanese and Oversea earthquake-proof design codes and organized international workshops. Faulting and Fault-Related Damage Research Subcommittee co-sponsored an international workshop.

Yozo Goto
Nishinippon Institute of Technology

The Iwate-Ichinohe Tunnel in the Tohoku Shinkansen Railway Line

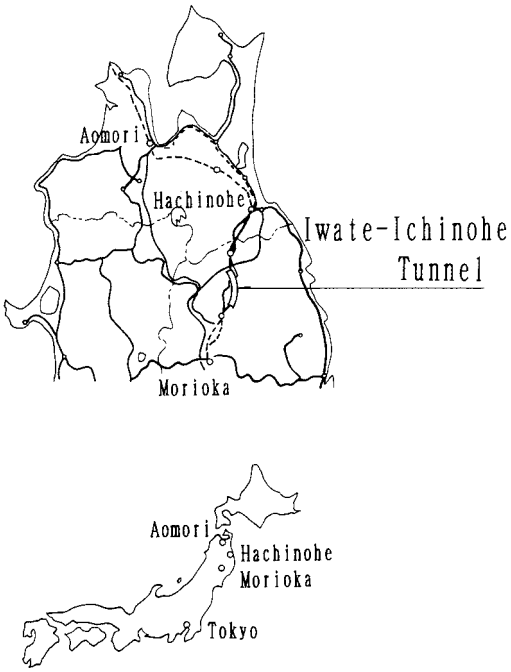
1. Outline of the Project

The Iwate-Ichinohe Tunnel is located in the area about 545km away from the starting point, Tokyo Station, midway between Morioka and Hachinohe in the Tohoku Shinkansen railway line. It is the longest of worldwide land tunnels with its extension length of 25.8km and excavated cross section of about 70 to 85 m^2.

From the geological viewpoint, the tunnel is broadly divided into three sections. The first 17km section at the tunnel entrance is composed of Mesozoic and Paleozoic slate, and the vicinity of the tunnel exit is covered with talus. The middle section of the tunnel, with the length of about 5km, consists of tuff with montmorillonite, which shows high swelling characteristics.

The tunnel of 25.8km was divided into seven contract sections. In August 1991, construction work started (in one segment after another), selecting either a full-face method with auxiliary bench cut by blasting or a short bench cut method by mechanical excavation according to the geology of each contract section.

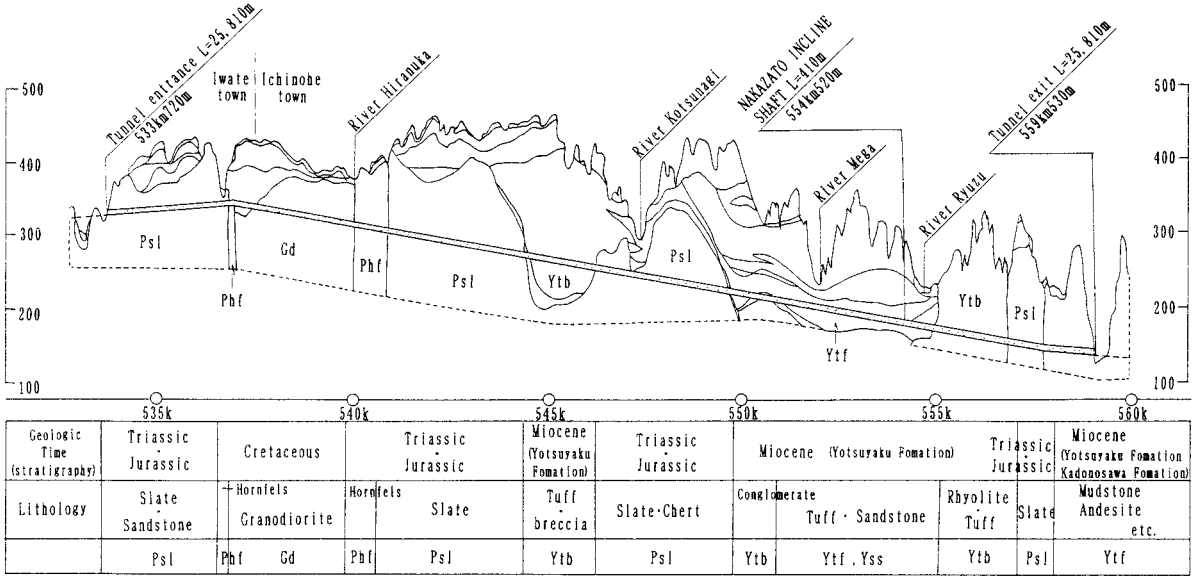
During the excavation, construction encountered a number of different difficulties such as swelling ground, water outburst, collapse on cutting face and so on. Eventually, in September 2000, the construction reached a successful breakthrough.



Location Map

2. Establishing a Rational and Cost-Effective Construction Technology for Long and Large Tunnels

In this project, a measurement control method was established so that measurements could be reflected in real time, by which the initial convergence was determined accurately on every excavation and the validity of support pattern was promptly evaluated. As a result, the adoption of adequate support and auxiliary method made it possible to complete the 25.8km construction, including the sections with swelling ground.



Geologic Time (stratigraphy)	Triassic - Jurassic	Cretaceous	Triassic - Jurassic	Miocene (Yotsuyaku Fomation)	Triassic - Jurassic	Miocene (Yotsuyaku Fomation)	Triassic - Jurassic	Miocene (Yotsuyaku Fomation Kadonosawa Fomation)
Lithology	Slate · Sandstone	Hornfels Granodiorite	Hornfels Slate	Tuff · breccia	Slate·Chert	Conglomerate Tuff · Sandstone	Rhyolite · Tuff	Slate / Mudstone Andesite etc.
	Psl	Phf Gd	Phf Psl	Ytb	Psl	Ytb / Ytf , Yss	Ytb	Psl / Ytf

Geological Profile of Iwate-Ichinohe Tunnel

3. Developed Technologies in Iwate-Ichinohe Tunnel

1) Establishment of excavation control standards
2) Development of high-strength shotcrete resistive to swelling pressure
3) Development of steel-fiber concrete suitable to swelling pressure was developed
4) Development of NATM general drill jumbo
5) Introduction of steel support with wing ribs and invert strut adequate for swelling pressure
6) Adoption of 14m-long face bolt as the countermeasure of face stabilization
7) Use of efficient muck conveying method
8) Adoption of mechanical rapid construction system for reinforced concrete of subbase road
9) Adoption of ventilation system installing electric precipitator

NATM General Drill Jumbo

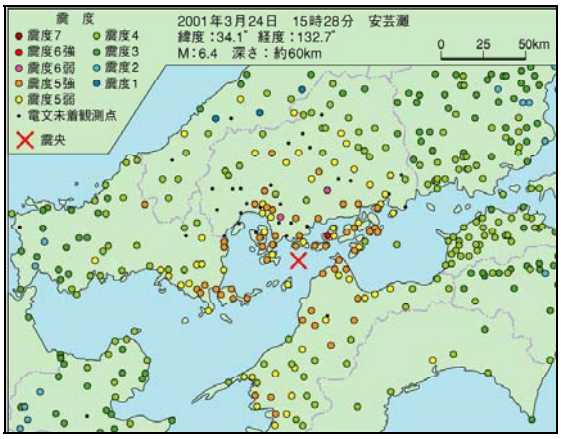
4. Final Report

Tunnel excavation has been finished successfully, by utilizing various construction methods that were developed for the purpose of rational and economical execution.

The works for rail placement and electricity are under construction at the moment in order to start railway service in December 2002.

Sumito Nagai
Japan Railroad Construction Public Corporation

Report of the 2001 Geiyo Earthquake



Epicenter (x) and Distribution of Seismic Intensities

On March 24th 2001 (15:28pm), an earthquake of magnitude 6.7 (M_J) hit the Chugoku and Shikoku districts. The epicenter was (34.1N, 132.7E) and the hypocenter was approximately 51km below the Inland Sea (Setonaikai). There were 2 lives lost, and over 200 injured; more than 400 houses collapsed. The findings by JSCE reconnaissance team are available in the JSCE website (http://www.jsce.or.jp/).

The seismic intensity of almost 6 was observed in 4 cities in Hiroshima Prefecture. Damage to port facilities and to roads was not very severe. The overhead bridge of the Sanyo Bullet Train sustained damage to the middle beams of two layered Rahmens (reinforced concrete frame) in Mishima City (Hiroshima). Liquefaction was observed in the coastal area along the Inland Sea. Despite the extensive reclaimed grounds, the occurrence of liquefaction was regional and slight in Hiroshima City. Many slope failures and landslides occurred in the damaged area. Kure City (Hiroshima) is one of the most damage-sustained cities with seismic intensity of a little more than 5. It is a coastal city, and surrounded by hills on the other three sides. The dwelling houses on the steep hillside received much damage. Water was suspended in Kure City and the neighboring islands. More than 50,000 households in Hiroshima, Okayama, Yamaguchi, Ehime, and Kochi Prefectures suffered from power failure. The newly installed real-time disaster prevention network system was effective in quickly gathering information to enable immediate response.

The results may be summarized as follows: 1) Damage was observed over a wide area, but not very severe despite the maximum seismic intensity exceeding 6. The depth of the hypocenter and the high frequency contents may be one of the reasons. 2) The liquefaction was restricted within a local area. 3) Damage to houses and walls were concentrated on steep slopes or hillsides. 4) Overhead bridges of a railway sustained damage. Local soil conditions strongly affect the behavior of the structures. 5) Damage to the port facilities was slighter than the 2000 Tottori-ken Seibu earthquake. 6) Water supply system must be robust especially for the isolated islands. 7) Newly developed earthquake disaster prevention system was operated. Various functions of the system must be investigated to improve many existing systems of local governments.

Cracks on a Wharf at Kusatsu Area, Hiroshima Port

Junji Kiyono
Kyoto University

New Programs of JSCE

The Organization for Promotion of Civil Engineering Technology (OPCET), JSCE has introduced the following new programs. The activities provided under each of the programs aim to create an environment where civil engineers receive fair recognition, and where they can take on an active role in the international community.

1. Continuing Professional Development (started April, 2001)
2. Registration & Recruiting System of Senior Civil Engineers (started May, 2001)
3. Civil Engineers' Qualification System of JSCE (started May, 2001)
4. Evaluation System of Newly Developed Technology (to start October, 2001)

1. Continuing Professional Development Program

JSCE revised its Constitution in 1999 to add "improving civil engineering skills" to its objectives. With the enforcement of the Agreement of Government Procurement in 1995, the liberalization of trade is accelerating for goods and services as well. In order for our country to enhance its international competitiveness and to contribute to the international society, up-skilling of human resources is indispensable.

It is civil engineers' mission to understand such factors as what is being demanded by the society and what is required, and to create things that will be desired by the future generation. To "improve one's specialized capabilities as an individual" is an ideal attitude toward achieving that goal. "Fostering human resources" will increase the social confidence toward civil engineers, and should be considered as an issue that should be actively embraced.

For the purpose of promoting effective exchange of civil engineers among countries, the certification of engineers' educational programs is progressing between countries in an effort to establish equality of qualifications in relation to the move toward mutual recognition.

Globalisation of the economic society makes it extremely vital for our country to secure international equalities in the levels of engineering qualifications and education. There are several conditions that must be met in relation to the above in becoming globally competitive engineer, but the "continuous development of specialized skills" is imperative for future engineers.

The aim of this program established by JSCE is to provide support to civil engineers in maintaining and advancing their qualifications (abilities / capabilities), in order for them to contribute to the society in a highly ethical and professional manner.

All records of participation in lectures, meetings, self-learning activities, etc. will be entered in the CPD "logbook" provided by JSCE. This will serve to certify the activities of individual civil engineers. OPCET will keep track of all these data and will issue a certification upon request. This may be used to certify one's educational records required under such systems as the Civil Engineers' Qualification System of JSCE (started

in May, 2001) and the governmental qualification system for Professional Engineers.

In addition to lecture meetings provided by the JSCE standing committees, OPCET will organize events of its own for a more enriched CPD program. Events organized by related institutions / societies may also be included in the CPD logbook records to provide opportunities for in-depth study.

JSCE's Original Mark Symbolizing the Initials of Continuing Professional Development and the Management Cycle.

2. Registration & Recruiting System of Senior Civil Engineers

This program is implemented to contribute to raise the mobility of civil engineers in this time of changing working environment. It is a registration system mainly for experienced engineers in their 50s or above.

JSCE will evaluate and register engineers, employers, outplacement service companies and temporary personnel service companies in aim to increase opportunities for employment of well-qualified civil engineers, thereby contributing to the society.

In principle, JSCE members who have reached the age of 50 will be able to register with a recommendation from another JSCE member and from a fellow member. Also, employers and outplacement service companies and temporary personnel service companies must register with JSCE.

This program will provide opportunities for seasoned civil engineers to contribute to the society, and at the same time, will provide opportunities for employers to employ highly experienced and well-qualified engineers ensured by JSCE in the desired line of work, under the desired employment system.

3. Civil Engineers' Qualification System of JSCE

This program is JSCE's independent qualification system for civil engineers. A number of qualification systems exist in the civil engineering field, such as the governmental qualification system for Professional Engineers. However, the objective of this system is to evaluate civil engineers with high ethical values and high professional skills, and to clearly express this to the society.

Also, by clearly defining one's career as a "civil engineer" through acquired "qualifications," we believe that it will serve to clarify one's career path as "civil engineer" as well as to give society a clear recognition.

There are 4 levels of civil engineering qualifications after graduation from higher education institutions. In order from lower to higher levels, they are: "Associate Professional Civil Engineer," "Professional Civil Engineer," "Senior Professional Civil Engineer," and "Executive Professional Civil Engineer." Exams (documentary examination, written examination, and interview) will be given to determine the appropriate levels. We will be starting with the accreditation of Executive Professional Civil Engineers this year. Accreditation of Professional Civil Engineer level or higher will be conducted in 11 engineering categories, including research / planning, design, construction / management, maintenance, etc.

We hope that this will become a reliable and widely accepted qualification both in and outside of Japan.

4. Evaluation System of Newly Developed Technology

Under this program, JSCE will evaluate and aim to promote the use of newly developed technologies related to the civil engineering field. The technologies to be evaluated are those belonging to the following 4 categories:

① New technologies for or from overseas
② Computer software
③ Newly developed technologies in research level
④ Proposed alternative technologies in bidding

The technologies under ① include domestic new technologies to be applied overseas, and technologies introduced into Japan from overseas. Also, JSCE will introduce those technologies to Agreement of Cooperation Societies / Institutions if requested. ④ will be conducted in place of local authorities when there is a lack specialized engineers.

In any case, after review is completed for the acceptance of application forms, an evaluation committee will be formed with knowledgeable members, and technologies will be evaluated according to the evaluation standards. An evaluation certificate will be issued upon completion.

Voice from the Graduates

Dr. Nguyen The Duy, Lecturer of Ho Chi Minh City University of Technology, Vietnam

In 1996, I completed the Doctoral Program at the Civil Engineering Department of Yokohama National University. Many years have passed since then, however, I still remember the small international society there. My friends who studied in the Program came from all over the world: Egypt, Indonesia, Thailand, Nepal, Vietnam, Philippines, Romania, Sri Lanka, etc. We are from different countries with various cultures but we all got invaluable outcomes from the years studying in Japan: advanced knowledge in our specialized fields, friendship between nations, and logical ways of analyzing, synthesizing and solving problems. In addition, after witnessing the high-developed aspects of Japan, my friends and I have been better aware of our duties as educated people in the contribution to the development of our countries. After graduation, most of my friends are now holding key positions in their home universities such as Cairo University (Egypt), Iasi University (Romania), Thammasat University (Thailand), Philippine University (Philippines). I myself have been doing teaching and research work at the Department of Civil Engineering, Ho Chi Minh City University of Technology, Vietnam. I still keep contact with my former academic advisor in Japan. Whenever having difficulties or unsolved problems in doing research, I have often asked for his helpful opinions. For all of us, who graduate from the Doctoral Program at the Civil Engineering Department of Yokohama National University, the years living and studying in Japan always remain in our memories as the most fruitful and productive years of our lives.

English Publications

ARTICLES (From January 2001 to June 2001)

Japanese Standard for Mountain Tunneling -1996-,
The Fifth Edition, JSCE, January 2001, 162 Pages,
Price: ¥3,000 (US$38.00), ISBN 4-8106-0273-7

Japanese Standard for Shield Tunneling -1996-,
The Third Edition, JSCE, January 2001, 218 Pages,
Price: ¥3,000 (US$38.00), ISBN 4-8106-0274-5

Recommendations for Upgrading of Concrete Structures with Use of Continuous Fiber Sheets,
JSCE, April 2001, 250 Pages,
Price: ¥5,000 (US$56.00), ISBN 4-8106-0355-5

Concrete Library International No.37,
JSCE, June 2001, 189 Pages,
Price: ¥2,625 (US$35.00), ISSN 0913-4913

Journal of Hydroscience & Hydraulic Engineering
Vol. 18, No.1,
JSCE, 2001, 162 Pages,
Price: ¥3,150 (US$41.00), ISSN 0912-2508

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