JSCE Study Tour Grant 2004 Study Tour Report

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1. Background

To commemorate the 75th Anniversary of the JSCE, a fund was established in the name of "International Scientific Exchange Fund" to promote International Scientific Exchange among civil engineers to contribute in the advancement of civil engineering discipline and technology. JSCE study tour grant is one of its forms which are awarded to enhance mutual understanding and co-operation between JSCE and overseas societies of the civil engineering discipline. The JSCE study tour grant is offered in yearly basis to qualified civil engineers to support the travel and other necessary expenses during the stay in Japan since 1992. The JSCE Study Tour Grant has a 12-year history and civil engineers from different corner of the world have been privileged with this program. It was great honor for Nepal Engineers' Association to have been awarded this prestigious offer for the year 2004 and I would like to thank JSCE for granting me this esteemed honor on behalf of NEA as a first Nepali civil engineer.

I find myself a fortunate fellow to enlist my name as the youngest fellow to receive this glorious grant ship in the 12-year history of JSCE Study Tour Grant. The visit schedule was so fixed paying a genuine attention to my selective topics. Since disaster related organizations/institutions, Universities and other 20th century's most significant development achievement were my keen focus, the itinerary was fixed accordingly.

2. The Study Tour

The study tour was under taken for seventeen days starting from 30th August to 15th Sept 2004. There was an incredible support from JSCE staff in designing a perfect study tour schedule considering my subject of interest i.e. disaster related activities. I am very much thankful to Ms. Ryoko OKAMOTO and others. In this connection the overall study tour schedule that JSCE finalized for me helped me capture a general overview of Japanese expertise within the field of civil engineering. The study tour covered the visit of mega-city like Tokyo, Osaka, Nagoya, and Kobe. It was really a marvelous trip to visit Kansai International airport as one of the 10 great civil engineering achievements of the 20th century, a magnificent example of civil engineering construction. The eco-friendly approach applied in this construction can

lure anyone conscious of nature. Hanshin –Awaji earthquake Memorial Hall, located in Kobe is another beautiful civil creation which is adequate in itself to resemble Japanese pride, it also carries greater extent of human sentiments as it has been constructed in the memory of thousand of people who passed away in the decade's most horrible disaster .The another interesting part I absorbed during this visit was research oriented culture in construction activities. For every new construction project, there is found to be a separate research wing in order to ensure a superior output. This strikes me very much as we are quite distant from this culture in our country.

I can't forget a single moment of JSCE Roundtable Meeting held as a part of the JSCE annual Meeting 2004. I was offered an observer desk in this high level discussion in the theme of which was "How can civil engineers contribute to the society more effectively" .A genuine and profound opinion were presented in the changing role of civil engineering by the senior participant members of the roundtable meeting .In short, the study tour gave an impression that civil engineering advancement in Japan is actually a praiseworthy one and we can take much more advantage from their concrete experience.

3. Japan Society of Civil Engineers (JSCE)

Having more than 40,000 individual and corporate members, Japan Society of Civil Engineers is the leading and renowned professional organization in Japan. It includes scholars, managers, and engineers from all domains that refer to the civil engineering discipline. JSCE was incorporated in 1914 with a mission to "Contribute to the advancement of scientific culture and the development of society by promoting the field of civil engineering, developing civil engineering activities, and improving civil engineering skills." JSCE has supported and contributed greatly to the development of civil engineering in Japan and the improvement of the quality of life. It is also committed to facilitate exchange of information not only among members, but among academia and research institutes of various countries as well as to promote exchange of technical information. After Prof. Shigeru Morichi took over the charge of JSCE as its 92nd president, two specific missions of maintaining and developing civil engineering technologies and improving the social recognition/evaluation of civil engineers in the society are in progress. JSCE has a total of eight major committees comprising the very basic areas to the most advanced applied fields.

1. Research and Studies: There are 28 sub- committees under this umbrella Research and Studies which are formed to regulate the respective functions in JSCE.
2. Public relations, 3.Planning. 4.Publishing, 5.International Affairs, 6.Civil Engineering, 7. Membership, and 8. General Affairs.

With the aim of promotion of international scientific exchanges among civil engineers to contribute to the advancement of civil engineering discipline and civil engineering technologies, JSCE established the international scientific exchange fund in the commemoration of the JSCE's 75th anniversary. Study Tour Grant (STG) is one of the effective programs, which have been started since 1992. JSCE has three international sections and nine regional chapters namely, Taiwan Section, Korea Section, UK Section are international sections whereas Hokkaido, Tohoku, Kanto, Chubu, Kansai, Chugoku, and Shikoku are its regional chapters. It has agreement of co-operation with 23 national engineering societies and institutions including Nepal Engineers' Association (NEA). NEA is one of the professional societies, which have recently signed an agreement of cooperation with JSCE. JSCE publishes the following official journals in quarterly basis.

Division 1: Journal of structural Mechanics and Earthquake Engineering
Division 2: Journal of Hydraulic, Coastal and Environmental engineering
Division 3: Journal of Geotechnical Engineering
Division 4: Journal of Infrastructure Planning and Management
Division 5: Journal of Materials, Concrete Structures and Pavements
Division 6: Journal of Construction Management and Engineering
Division 7: Journal of Environmental Systems and Engineering.

JCSE has a full-fledged civil engineering library open to general public as well. It possess approximately 30000 books and hundreds of journals .it is reported to be one of the highly reputed libraries and it owns a film library to promote audio-visual education.

JSCE Annual meeting takes place every autumn followed with discussion on the problems and future goals of the society. This year's Annual meeting has been held in Aichi Institute of Technology (AIT), Toyota city in Nagoya.

4. Earthquake Research Institute (ERI), University of Tokyo

On the 31st August, Ms Ryoko OKAMOTO guided me to Earthquake Research Institute (ERI), Tokyo University. It was established in 1925 and later recognized as a shared Institute of the University of Tokyo in 1994. Prof. Muneo HORI welcomed and gave a brief introduction about the major activities, the administration and the on-going projects of the ERI. ERI is conducting several research activities on earthquake, which includes researches on earthquake prediction, researches on predicting volcano eruption, ocean hemisphere network project and the like. The Ocean Hemisphere Network is a network of geophysical observatories including seismology, geoelectromagnetism and geodesy, which cover the western part of the pacific

region. Research project on Fuji volcano is one of the large-scale 3D simulation projects using earth simulator. Prof. HORI also briefed about the paper on Application and Accuracy (of real time kinematics global positioning system/RTK –GPS) prepared by Prof. HORI himself in association with Prof. Kenji OGUNI who was also present in the briefing session. Prof. HORI also compared about TS and RTK –GPS with stability point of view to measure large-scale ground deformation. Despite its low accuracy static measurement, RTK –GPS is also capable of carrying out the dynamic measurement with sampling rate of 10 HZ. ERI is also conducting especial projects for earthquake disaster mitigation in urban areas targeting prediction of strong ground motion and perform researches about 1. Deep seismic exploration 2.Deep drilling and 3. Characterizations of earthquake fault and crustal structure , in association with Disaster Prevention Research Institute, Kyoto University , National Research Institute for Earth Science and Disaster Prevention and so on.

Prof. Kenji OGUNI shed light on an optical –fiber-linked tilt meter, a highly sensitive instrument based on the optical techniques applied to observe earthquake and volcanoes developed by ERI. At the same time, ERI was found to be taking advantage of the fastest computer in the world to numerically simulate seismic wave prorogation in heterogeneous crust and upper mantle structures.

ERI has its full divisions alone with five centers, two utilities and sixteen observatories all over Japan. About a total of 70 faculty members work in the Institute together with graduate students, researchers and many other supporting staffs. The annual research budget in ERI exceeds 30 million US dollars. It was also informed that number of Nepalese students was pursuing higher education in this reputed institute.

5. Metropolitan Expressway Central Circular Shinjuku Route SJ51 to SJ53 Tunnel Construction (Outer Route), (Naka-Ochiai Shield Tunneling, Outer Route)

I was given the opportunity to visit some of the largest construction projects in the world and Metropolitan Expressway Central Circular Shinjuku Route SJ51 to SJ53 Tunnel Construction (Outer Route), (Naka-Ochiai Shield Tunneling, Outer Route) is one among them.

What I noticed about these projects was the fabulous level of safety standards on one hand and involvement of less number of workers in relatively larger construction sites on the other. The Japanese construction industry is renowned for lower incidents of construction accidents. Safety, one of the crucial aspects of the construction sites, is considered the fundamental one. I was always impressed by order, efficiency, esthetics, cleanliness which all bear witness to very good organization. Mr. Masaru NODA escorted me to this project site and I was received at Nishiike bukuro, Toshimaku, Tokyo by Mr. Masao Nakayama, project manager who took me to

the construction site on 1st of September

The Metropolitan Expressway Central Circular Shinjuku Route SJ51 to SJ53 tunnel construction is 2,020 meter long express way.The tunnel section of this route is from Rikkyo-dori Avenue shaft at chihaya 1-chome, Toshima-Ku, to Nakai Station of Toei Oedo line at Kamiochiai 2-chome Shinjuku-ku. The project has started on 14th March 2002 and scheduled to be completed by 2005 February.

Mr. Nakayama explained to me about the purpose of that expressway to be constructed as a subway. This central circular route aims to make Tokyo a Trans network more efficient and easier to use, keeping alive the flow of traffic on arterial Yamate Street between Kabukicho and Shinjuku while maintaining safety factor. Roads are built to achieve comfortable and smooth traffic flow. That is why a work is underway to minimize the influence of road construction on the activities on urban arterial roads. This construction site is a good example of the construction methods necessary to work in densely populated areas. It was a wonderful opportunity to visit literally crawls beneath the surface to witness this vast network of subsurface construction. This route is being constructed by Obayashi Corporation, Daiho Corporation and Tokyo construction as a joint venture. The tunneling work involves the construction by the rheological earth pressure balanced shield method and is the largest diameter (12.02m) rheological earth pressure balanced (foam) shield in the world. With the 12.02 m diameter, 11200mm length, cutter speed 0.456rpm and mucking capacity approximately 350m3/h (at 100%) efficiency), 0.7 x 0.7 rpm and an optimum gravel removing capacity(420 mm-size), it is the latest machine to ensure maximum efficiency for underground excavation. Excavation of shield tunneling and floor slab construction work is carried out concurrently in the application measures. Continuous belt conveyors and vertical belt conveyors are used to remove large volumes of excavated material continuously. The 800 millimeter wide belt conveyor system with a handling capacity of 560 ton/hour this is among the largest in Japan 1,200 millimeter wide vertical belt conveyor system has a handling capacity of 330 m3/h. There are three types of lining used in this tunnel project namely, concrete, ductile and steel. The estimated cost for concrete lining is 3500000 yen per 1.5 m construction and the same for ductile and steel lining are 4000000 Japanese yen/1.2 m construction and 8000000 Japanese yen/1.5m construction respectively. The average total construction cost of this expressway is estimated to be 8500000000 Japanese yen per kilometer upon completion where as the total estimated project cost is 160 million US dollar. The start point of this tunneling is enclosed by a Sound proof light structure in order to minimize adverse effects on the surroundings.

6. Kawasaki laboratory

Mr. Masuru Node guided me to Kawasaki Lab. Dr. GOTO. Vice Director, Earthquake Disaster Mitigation research center at Kawasaki Laboratory welcomed me on behalf of this institution. It is a National Research Institute for Earth Quake and Disaster prevention (NIED).Dr. GOTO briefed me about the research going under Kawasaki lab. Kawasaki Laboratory was established in 2002. Basically, Kawasaki Laboratory has been constructed to act as a center for Research and Development to devise rescue robots to mobilize in the time of disasters. I was overwhelmed by the chance to visit Kawasaki Lab where testing fields have been prepared to test, evaluate, and improve the developed prototypes of different facilities. One of the major testing fields that I observed was of 320 sq. m which simulate a real disaster site manufactured to verify the effectiveness of robots, sensors or information systems. Airship robot is an outstanding form of robots used to search for lives buried in three dimensionally piled rubbles.

Presently Kawasaki Laboratory is engaged on different research works in earthquake prevention.

7. J – Power

In the evening of 1st Sept, J-power headquarters was visited with Mr. Masaru Noda. A brief discussion was held with Dr. Masayuki HORI, Mr. Koji MISHIMA, and Mr. Koji TABATA. Since Mr. Koji MISHIMA was reported to have spent number of years in Nepal as an advisor to Nepal Electricity Authority, the discussion also focused upon the hydro potentiality of Nepal. Dr. HORI was found to have interested to work for Arun third project in Nepal and different ideas were shared in this regard.

J-power is established in 1952 as an Electric Power Development Co. Ltd responding to the current situation by drawing on its unique strength in the areas of energy and the environment. The company has been able to maintain its status as a major producer of electric power in a 50 year history in Japan. It has its 40 years of know how as a top consulting firm around the globe with the expertise of its 6000 strong team of professionals. J power has been involved in 60 power plants in Japan of which total power generation capacity is more than 16 giga watts. An examination of J-power's accumulated corporate resources reveals that the company's core competencies lie in energy and the environment. These two key words are the driving force behind J-power's five business domains i.e. electricity, energy resources, overseas energy investment, environmental business and engineering. Currently J-power is directing its efforts towards expanding its business operations both domestically and overseas. J-power's

cumulative overseas experiences include more than 200 projects in 58 countries and regions. J-power is champion for its high level technological competence in the area of power stations. In the construction of dams and large scale under ground structures, it possesses the highest level of technology in Japan. It performs a major role in terms of overall integrated operation of Japan's electric power systems by linking up different regions with its 2,400 kilometers of power transmission links and 8 substations. Its network of extra high voltage power transmission lines cover the whole of Japan, and its Sakuma frequency converter station makes it possible to link up electric power from regions with different hertz power systems. J-power is engaged in the development of new technology leading to a reduction of green house gases (GHG). With the study of nuclear power development since 1954, it is currently engaged in building the Omar Nuclear power station in Aomori Prefecture. As energy resources are scarce in Japan, J-power has formulated the basic nuclear power policy to launch a nuclear fuel cycle system in which the used up uranium and plutonium are recycled and reused. It is also engaged in the coal-fired power field. J power has also initiated Geothermal, a renewal, totally domestic – based energy and it emits almost no carbon dioxide. Geothermal power station has been in operation since 1975 at Miyagi premature in Kobe.

8. Obayashi Research Technical Institute

On the 2nd of September 2004, I was taken to Obayashi Research which was established in June 1948 as the research department. Mr. Masayuki Ishii, Deputy General Manager, Technology planning Department received me and briefed me about the research facilities in the institute. The Obayashi Research Institute is located in Shimokiyoto, Tokyo which is at a distance of 2 hour drive from Hotel Asian Center where I spent a total of 8 days. I visited and observed the overall facilities in research center including Concrete Research Center, Geotechnology Research Center, Structural Engineering Laboratory Dynamic Research Center, Environmental Research Center and Acoustics Testing Facility. This Institute has a total of 240 staffs. Among them, 40 are working under administrative division, 140 working as researchers in which 50% are from architecture domain, 30% are from civil background and 20% constitute material science specialists and other faculties. Carbon fiber reinforcement, underground rapid under pine test, multipurpose rock test, large 3 Axis Test Dynamic Test, Structural test, material concrete test, wind, sound, Bioremediation, 3 D shaking Table, Hybrid Truss bridge test, earthquake isolation system and long span wooden structure are the available facilities of this research institute.

Dynamic Research center, housing a tri-axial shaking table system, a geotechnical centrifuge system for earthquake engineering is one of the fascinating services on behalf of the

research institute. These testing facilities have the largest loading capacities and dimension in the world to investigate new technology in seismic design and earthquake counter measures. The tri-axial shaking table has capacity of 50 tons and is 5m x 5m flat table. It can drive at a maximum horizontal velocity of 200 cm/sec at its maximum loading. This facilitates full scale tests on individual building members to simulate earthquake forces on very large models. These amenities at the Obayashi Technical Research Institute were amazing. Mr. Ishii also explained about Obayashi technical research institute's innovative efforts to make significant contributions to the construction industry in Japan and abroad and he also shed light upon the expansion of human living space to its fullest potential while staying in harmony with nature in the basis of research. Millennium Tower is a futuristic Ultra high-rise building envisioned by Obayashi corporation as an elevated city of the 21st century. This institute is also researching for submerged floating tunnel and super deep underground structure.

The Geotechnical centrifuge, I visited in Obyashi Technical Research Institute, is the largest centrifuge testing machine in Japan which has outer diameter of arms 16.67 m, height of arms 3.0m, driving system is direct current motor with reduction gear system with radius to platform7.01m, maximum payload 700g- tons, pay load weight 7tons, platform space 2.2m x 2.2m with test model height 2.5m and number of plat forms are 2.Among them 1 stands for static and the other for dynamic experiment. I was shown a video of 3D shaking test of a prototype of building by Mr. Masayuki who described about the construction procedure of high rise building to protect from earthquake.

9. Japan Society of Mechanical Engineers (JSME)

It was beyond my schedule to visit Japan Society of Mechanical Engineers and was finalized after my arrival in Tokyo. Ms Ryoko Okamoto led me to JSME on the 3rd of Sept. where a courtesy talk was held with the secretary of JSME, Mr. FUKUZAWA Kiyokaza, Mr. Masahiko TAKAHASI, Asst. Manager, Engineering Activities & International Affairs, JSCE and Mr. Masahiko TAKAHASI, Asst. Manager, Engineering Activities & International Activities Dept.

Being an executive member of NEA, I was fond of initiating a friendly relationship with JSME, a very matured organization, established in 1897. It was found during the discussion that presently more than 47000 members were associated with this giant society. The prime concern of JSME is to "advance science and technology, and there by contribute to the development of industries". JMSE provides a platform to its members to acquire advanced technical knowledge and there by help flourish a unique research community to exchange technicalities and upgrade their capabilities to the optimum respective order. As I went through

multiple journals provided by JSME, I came to the conclusion that JSME's contribution can not be neglected in the context of the journey that Japanese society has undertaken from Modern Industrial Age to an Ultra High Tech Age. JSME, through its international journal, provides the opportunity to get acquaintance with latest advances in Scientific and technological information in mechanical sector regarded as the most valuable resource base for technicians as well as mechanical engineers in particular through out the world.

In reference to maintain a cordial relationship between our two organizations (NEA & JSME) an understanding was made to start proceedings through the co-coordinator, (NEA, Japan Sector). I was quite impressed by the JSME status and wished the same reputation for NEA in my home country as their level of institutionalization was really noteworthy.

10. Saitama University

It was a golden opportunity to visit one of the most reputed Japanese universities, Saitama University, Civil and Environmental Faculty of Engineering. Saitama University is one of the respected national universities for higher education and research in Japan. Saitama University is located in the newly born Saitama City, the capital of Saitama Prefecture. The Saitama City lies about 30 kilometers north of Tokyo. The university holds a total of five faculties: Faculty of Liberal Arts, Faculty of Education, Faculty of Economics, Faculty of Science and Faculty of Engineering. There are also five graduate schools in the university: Graduate School of Cultural Science, Graduate School of Education, Graduate School of Synthetic Science of Economy, Graduate School of Science and Engineering, and Graduate School of Policy Science. The total number of full time students as of May 1, 1999 was 7720, among which number of undergraduate students was 6768 whereas number of graduate students (master and doctor courses) was 952. I was very glad to find that currently five doctorate and three master degree students were pursuing their higher studies in this renowned university. University’s faculty members are currently engaged in a wide spectrum of research in the field of civil and environmental engineering. Major research topics being covered are geo-technology for disaster prevention, earthquake engineering and earthquake disaster mitigation engineering, structures and mechanics, concrete structures, strengthening and rehabilitation of civil infrastructures, planning and design of transportation infrastructures, environmental engineering, ecological engineering, etc.

Ms Ryoko from JSCE guided me to Soil Mechanics Lab and we were received by Prof. IWASHITA Kazuyoshi and Dr. Jishnu Subedi(from Nepal).Mr. IWASHITA briefed about the major ongoing activities on behalf of civil and environmental engineering of the university. The Soil Mechanics Lab falls under the umbrella of Geo Design Course. It was reported that

varieties of researches are being conducted through this lab namely, soil water dynamics in a forested soil at a land slide site under natural precipitation, determination of co seismic stress change histories on a fault plain, soil water repellency of a volcanic ash soil: effects of organic matter content and initial water content and the like. Prof. IWASHITA further explained about an integrated program of education and research in the forefront of geotechnical engineering through Soil Mechanics Laboratory. Prof. IWASHITA stressed upon the provision of extensive research and teaching facilities available in the faculty to access the latest developments of geotechnical engineering problems. The major research topics being covered are Soil mechanics; environmental soil science; Liquefaction; Engineering geology; and Rock mechanics.

11. Public Work Research Institute (PWRI)

On the 6th September 2004, I headed towards the public research Institute from Tokyo station at 9.30am in the guidance of Ms. Ryoko Okamoto. Public research institute, an independent administrative institution is the largest national institute in the field of Civil Engineering in Japan and is located one and half hour far from Tokyo station of Tsukuba science city. PWRI was established as the Road Material testing department in the ministry of Internal affairs in 1921. Since then its working area and organizational reform has been found to have shifted from time to time. It was renamed and established as the independent Administrative Institutions in 2001. Dr. Yasuo Ishii, Senior Researcher, Land Slide Research Team Erosion and sediment control research group received me at 11 A.M .on September 6th at his chamber and considerable amount of time was spent discussing on current and on going research on erosion and sediment control. Video Clips of different land slide was shown. Dr. Ishii briefed about the organization structure of PWRI. A total number of staffs in fiscal year 2004 were 219 from all disciplines. Among them 65 are Administrative staffs, 151are research staffs, 3 executives and 1 part time executive. Dr. Ishii showed the Budget status of PWRI for fiscal year 2004, which was about 5871 million Japanese yen. He took me to the road and traffic engineering which consists of a traffic collision test field, a full –scale test tunnel, a pavement test field and a 6,152m test track. We rode along the south loop at 120km/h balanced gravity and centrifugal force perfectly. I also visited Dam Hydraulic Model Test Facility and came to know about the fact that more than 300 multi purpose dams have been constructed after the war so far and 400 multi purpose dams are under construction. Mr.Toshiyuki SAKURAI, Senior researcher, Dam and Hydraulic Engineering Research Team, described about the types of dam used in construction i.e. Rock fill Dam, Concrete Gravity Dam. He also explained about some of the facilities to test Free overfill spillway of arch dam which are common in Japan. This Laboratory

provides three dimensional spillway mode test facility. Particularly for dam engineering, it is very important to realize the flow conditions through the observation of those physical models. This facility is used for these model studies on dam hydraulic structures design. It is also a good opportunity to see practical applications and analysis of the results of fundamental research and investigation in Dam Hydraulic Engineering Research. This Hydraulic Laboratory also comprises high velocity flow experiment equipment, Fish way model experiment, and Sediment release facility model experiment, and flow – induced vibration model experiment. After That Mr. Toshiyuki briefed me about the facilities in Hydraulic Lab. I was shown Large Scale Three Dimensional Shaking Table; it was designed to reproduce large strong motion.

12. Annual Meeting

In accordance to its regular course of action, JSCE held its Annual Meeting on the 8th of September, 2004. I was given an opportunity to participate in this occasion as an observer in Aichi Institute of Technology, Yagusa-cho, Toyota, Aichi, a 1 ½ hour drive from Nagoya JR Station. It was a large scale conference comprising 6000to 7000 participants from different corners of Japan. There was a participation of delegates from Korean Society of Civil Engineers, Thai Institute of Engineering, Chinese Institute of Civil and Hydraulic Engineers, JSCE Taiwan and Korea section and others. It was a remarkable experience for me to participate in round table meeting and English panel discussion. The discussions of the round table meeting were focused on the role and status of civil engineering discipline in the changing scenario in Asian region. In the mean time ideas were shared on promoting Civil engineers' contribution for the betterment of the society. The brainstorming during the round table discussion unanimously approved the triple role of civil engineers: as a member of a society, as a practicing civil engineer and as a member of professional society. The participants also envisioned civil engineers as social engineers in the changing pattern of civil engineering discipline. The development status of participating countries were presented and a conclusion was drawn stressing upon the recent need of developing countries like Nepal to learn so many things from the experience of Japan for the advancement of improved technologies in the course of infrastructure development. It was found that developed societies were more focused upon eco-friendly constructions in the later period.

13. The Nagaragawa Barrage

The Nagaragawa Barrage is closely situated to the town of Nagshima about 1 ½ hour drive from Nagoya. I got an opportunity to visit Nicaragua estuary Barrage on the next day of Annual

meeting. Mr. NISHIMURA was a kind person who guided me along with all the delegates from Taiwan. Dr. Jenn-chuan chern, president of Chinese Institute of Civil and hydraulic engineering also joined the trip. Assistant project manger of Nagaragawa Estuary Barrage Operation and Maintenance office described about the barrage by showing video clips. He also explained about the chief purpose of construction of this Barrage:

1. It prevents the inflow of salt water and 2. It prevents upstream intrusion of saltwater thereby making it possible to make extra fresh water available as domestic water and industrial water supplies for Aichi prefecture.

This barrage supply the water to Mi prefecture and Nagoya city at rates of up to 22.5 m3/s. Preliminary survey of this barrage had started in the fiscal year 1960.Similarly, the construction of the main structure of this barrage began in March 1988 and all gates are brought into operation since 1995.

Negara River has area of river basin about 1985 km2 and length of main watercourse is about 166 km. I observed the movable barrage shell structure with two-stage roller gate of length 556 whereas a total length of the barrage is 661m. The construction of the main structure of Nagaragawa Estuary Barrage began in 1971 and was completed in 1994, which has proved its effectiveness in mitigating flood damage. The maximum discharge that had occurred since the barrage went into operation is about 5900 m3/sec at summate point (39.2km from the river mouth) which was caused by front and typhoon of September 14 & 15 in 1999.

Intake of the Nagara water supply system had started in April 1998 which has desalinized the water upstream of barge, making available a new source of domestic and industrial water of up to 22.5m3/sec. It was also reported that this barrage has followed WHO standard maintaining the quality of water providing adequate focus upon aquatic lives.

14. Origawa River Dam

The origawa river dam is situated in Thunder Tenrakuyama hill, about 1 ½ hour drive to north from Toyota City of Nagoya. I received by Mr. NAKAHIMA KAZUYOSHI, Bureau chief of Origawa river dam. He briefed me,about the site office before visiting the dam site by showing different projects activities taken during the construction as well as the operation and monitoring method adopted during operation . Thereafter we went to see the site, which is beautifully situated in thunder Tenrakuyama hill, Yamaoka-cha, in Gifu Prefecture. It was constructed to control the flood, to protect the environment, and to develop hydroelectricity. Ministry of land, Infrastructure and Transportation began to construct Oragiwa Dam in 1982 and was completed in 2004 March. Its total expenditure cost came to 98.1 billion Japanese yen. It has water storage capacity 15100000 cu.m.What I notice during the visit of this dam is a

extra high dam, height of 114m and 331.3m length. Hill slope are established using geofiber, geotextile and bioengineering method around the dam and Reservoir Mountains. The eco-friendly construction used in this dam is really an example of genuine commitment of Japan to protect the environment.

15. Asian Disaster Reduction Center (ADRC)

It was my special request to fix an appointment with ADRC official as I have a great interest in disaster related issues. Being an executive founder member of CEDIM, Nepal (Center for Environment & disaster Management) it made me more inquisitive to acknowledge some first hand information in this light as ADRC being the focal point of Asia in this regard. I am very thankful to Ms. Ryoko OKAMOTO for favoring me fix my appointment with ADRC official. On the 10th of Sept, Mr. Akihiro Teranishi, Senior Researcher of ADRC briefed about ADRC activities by showing video clips. At the same time a memorandum of understanding was made in sharing information about disaster related issues and a courtesy regard was paid to Mr. Masayaki Kitamoto, Executive Director of ADRC.

Asia has been suffering from about 38% of the major natural disasters of the world. Meanwhile, Asia region accounts for 57% of killed people by natural disasters and 88% of the effected people. The number of people killed and affected and the amount of damage tend to be higher compared to the number of disasters. Therefore the role of "Asian Disaster Reduction Center" cannot be neglected as Asian region accounts for one of the most vulnerable zones to natural disasters. There are 24 member countries including Nepal whereas France, Australia, New Zealand, Switzerland and United States of America fall under the category of advisory countries. The major activities of ADRC involve capacity building, gathering and sharing disaster management information, co-operative project with member countries, co-operation with international organization and many others. These activities are further elucidated as following.

15.1 Capacity Building

ADRC’s role in capacity building can be defined as augmenting the disaster reduction capacity of each member nation. To materialize these missions, numerous strategies are underway in collaboration with different countries. ADRC has implemented various building projects in its member countries which incorporate Disaster Management Training for local offices, urban research and rescue training for those engaged in search and rescue operation in member countries, school education program for disaster reduction in association with various

institutions, Public Awareness of disaster reduction in community level by mobilizing community leaders.

15.2 Gathering and Sharing Disaster Management Information

ADRC annually calls international meeting to disseminate a wide range of accurate and up-to-date information among participating countries and organization. Representatives from member countries and experts from UN and other international organizations take part in such conferences. ADRC has also proposed world wide unique disaster identification numbers to facilitate the sharing of disaster information archived by organizations around the world. At preset UNOCHA, CRED, ADRC and other internationally renowned organizations are practicing this.

15.3 Co-operation with international organization.

ADRC also acts as an Inter Agency Task Force member of United Nations International Strategy for Disaster Reduction and simultaneously it serves as a focal point of Asian NGO activity for disasters.

15.4 Co-operative Project with Member Countries

As its regular course of action, ADRC executes co-operative project for disaster reduction with its member countries. Public awareness project of Tsunami Reduction initiated in Papua New Guinea, Community based flood disaster mitigation Project in Indonesia are some of these examples.

16. The Great Hanshin-Awaji Earthquake Memorial Hall

The Great Hanshin-Awaji Earthquake Memorial Hall (Disaster Reduction and Human Renovation Institution) was visited on the same day. i.e. 10th September. Ms. Ryoko OKAMOTO escorted and Mr. Yoshinobu FUKASAWA, Deputy Executive Director of the institution briefed very interestingly about this great memory hall which is an emblem of Japanese holy sentiments to those who were killed and from suffered from the most ill-fated disaster of the decade. I found that this monstrous disaster in the form of earthquake left a terrible havoc on their lives claiming thousands of precious lives and billions of property away.

In fact, it shook the basis of life in the disaster occurred periphery. However, it is a great courage and strength of Japanese people bestowed by almighty that despite all these happenings they had taken it for granted cause this brought about changes in their way of living and their way of thinking as well. In short, they have accepted this reality as great lesson of the century by realizing that people could find the strength to live and that consideration and generosity were equally important. Mr. FUKASAWA also mentioned that they have been more conscious about their preparation to instantly reach in an emergency. It was a thrilling experience to hear the actual stories from the survivors of this mishap. I was quite impressed that the institution has almost institutionalized to brief the visitors from the survivors themselves. Approximately more than thirty survivors are found to have voluntarily involved in story telling of this great earthquake.

"The chief reason for the establishment of Disaster Renovation Institute is to pass on to the future generations the experiences and lessons of the great Hanshin- Awaji Earthquake, and at the same time to make them feel the preciousness of life and significance of coexistence." The DRI also intends to help reduce the damage and destruction to be caused by future disasters in Japan and elsewhere.

It was on April 27, 2002, after the occurrence of the Great Hanshin-Awaji Earthquake which dismantled the southern part of Hyogo prefecture, Disaster Reduction and Human Renovation Institution was opened at the HAT Kobe in Chuo-ku, Kobe city. The building is in the shape of the glass cube which lures people among other structures of the HAT Kobe building complex. The building stands as a symbol of restructured Kobe which endeavors to grow and disseminate information on disaster prevention unreservedly.

The completed DRI was opened to the public with the unveiling of the Human Renovation Museum in April 2003. A total of 8200 sq floor area of the phase 1 facilities are further upgraded by an additional 10200 sq floor area after the completion of the phase 2 facilities. In the 1st phase building, there is a provision of machinery room storage on the top of 7th floor whereas research division is situated in the sixth floor following human resource development division (Seminar room) in the fifth, display division (theater) in the 4th, display division (Status of damage and reconstruction) in the 3rd, Display division (Toward a bright future) in the 2nd and finally there exists guidance room in the 1st floor.

Like wise in the 2nd phase facilities, first three floors (1st 2nd and 3rd) are occupied by display division and the next three floors (4th, 5th and 6th) are covered by disaster mitigating organizations namely Asian Disaster Reduction Center, Earthquake Disaster Mitigation Research Center, United Nations Centre for Regional Development Disaster Management Planning Hyogo Office, and Unite Nations Office for the Co-ordination of Humanitarian Affairs etc. These organizations work as Network institutions of Human Renovation Museum and these

organizations along with other have formed a Disaster Reduction alliance (DRA) in line with efforts to share the experiences of the earthquake with the world and future generations.
The memories corner of the museum as quite heart touching. Varieties of earthquake related materials displayed in this corner have been possible due to great co-operation of citizens who provided these historical stuffs to the museum. There was pre-argument between the local citizens of Kobe who suffered and survived the destructive disaster regarding the establishment of this historical monument. Some locals were in belief that the constructions of such museum always remind them of the tragic mishap which continuously strike them and they feel mentally tortured if this sort of construction is made whereas others were in opinion that they should be mentally prepared for any challenges in life. They thought the future generations could be able to draw out many important lessons from this mishap and at the same time they could better equip themselves socially and technologically if they see the reality by their own eyes through this museum. The governmental as well as the societal responsibility also favors the version of the latter ones in my opinion. And what Japanese people have created after their restless effort is actually a miracle in my opinion. After the historical visit of this museum, I have come to a conclusion that the museum is not a sole property of Japanese people but it is equally a common platform for anyone who is full of human sentiment and who likes to do something concrete for the sake of mankind. In short it inspires us to maintain our social bond at first and divert our technicalities towards safer and reliable structures so as to counter the diverse menace of disasters.

17. United Nation Office for Coordination of Humanitarian Affairs (UNOCHA)

United Nations Office for the Co-ordination of Humanitarian Affairs (OCHA) Kobe was visited on the same date (10th Sept). Ms Ryoko OKAMOTO accompanied me to OCHA office and a courtesy meeting was held with Mr. Terje Skavdel and Ms. Takako Izumi.

Both of these officials were familiar with Nepal and presented themselves quite interestingly. They were found quite inquisitive about the on going insurgency in small Hindu Kingdom, Nepal. We discussed about one and half hour including various aspects of disasters and humanitarian crises as their bi-product.

Mr. Skavdel highlighted the major activities of OCHA being operated under General Assembly Resolution 46/182. It was found that OCHA has the mandate to mobilize and coordinate effective and principled humanitarian action by all the parties involved in order to minimize human agonies in the case of disasters and emergencies. The organization is also believed to advocate for the rights of the people in need, promote and reinforce preparedness and prevention tasks and simultaneously facilitate sustainable solutions. The chief four key

functions of UN OCHA include co-ordination of emergency response, policy development and coordination, advocacy and humanitarian issues and information management. OCHA is also expected to channel donor contributions through the UN Trust Fund for Disaster Relief and can flow emergency cash grants to governments of disaster stricken countries accordingly. I was very much impressed by one of the noble aspects of OCHA in working towards a common and harmonized humanitarian policy. OCHA is also found to concentrate its effort on developing and supporting the humanitarian agenda, supporting field action and coordination and improving effectiveness through evaluations and lessons learned. Moreover, OCHA's priority areas in relation to humanitarian agenda incorporate the fundamental key agendas mentioned as follows.

1. Protection of Civilians in armed conflict.
2. Humanitarian Impact of Sanctions
3. Peace building and terms of engagement with armed groups.

Advocating on behalf of the victims is also a praiseworthy initiation of UN OCHA. It is aimed at raising the profile of humanitarian crises as well as consolidating humanitarian response to the plight of victims of emergencies and disasters. I inquired Mr. Skavdel whether there was any future plan to initiate their efforts in Nepal to address the agonies of internally displaced people from conflict. He hinted a positive signal to my question clarifying their immediate response to address conflict related issues. OCHA's advocacy efforts involve following activities.

1. Promoting high esteem for international humanitarian principles.
2. Guaranteeing political and financial resource base for humanitarian action.
3. Draw public attentions towards humanitarian crises and at the same time raising public awareness in this connection.
4. Developing and promoting strategic partnerships among government's key humanitarian actors and civil society.
5. Enhancing coherence and complementarities in humanitarian action with governments, regional organizations and humanitarian partners.

OCHA office also manages up to date information services via various channel namely Relief web, OCHA on-line, Integrated Regional Networks (IRIN), Field-based Humanitarian Information Centers (HIC) and others to disseminate accurate information in the hands of key decision makers to start instant humanitarian actions.

18. Kansai International Airport

Mr. Shigeo NISHIMURA, International Affairs Division, JSCE and Mr. Bishnu Hari Pandey, Researcher, UNCRD gave their valuable company during my field visit to Kansai International Airport on the 11th of September. It took a two hour drive to reach the project site (second phase) from Kobe. I would like to express my hearty gratitude to Mr. NISHIMURA for his assistance to make this trip a memorable one despite the official closure of this very day. He helped me arrange necessary brochures/documents of the project. My particular observation was focused in the second phase construction of Kansai International Airport.

Conveniently located to the east of Eurasia and blessed with land and sea traffic contacting the Sea of Japan, the Seto inland Sea and the Pacific Ocean, the Kansai Region has long flourished as the economic and cultural hub of Japan. Kansai abounds in enterprising spirit leading the nine-prefecture. Kansai Region is inhabited by some 24 million individuals. Its economy ranks second in Japan next to Tokyo Metropolitan Area and at the same time the region's gross product is about 839 billion US dollar which is more than the total gross product of Canada as a whole.

The kansai Airport is the first offshore airport and has received much International attention, especially in the area of foreign access to Japan construction market and is situated virtually in the center of the Japanese archipelago.

The noise and safety problems of Itami Airport, such as flying low over urban areas, prompted the idea of building Kansai International Airport. As Japan needed another proper international airport, it was decided that Kansai International Airport be constructed as a marine airport 5km offshore in Osaka bay so as to not burden urban dwellers with noise pollution. It is estimated to complete the Second phase total construction work within ¥1560 billion which began in 2001 and the airport is scheduled to open in 2007.

The second phase of Kansai airport works being performed even farther offshore than in the first phase wherein water depth is approximately 20m with a reclaim area of 545 ha. The ground under the seabed of the 2nd phase airport island consists of soft alluvial clay of 25m average thickness and the diluvium underneath. A total of 250 million m3 mountain soil is required for land development of Kansai International Airport and the very interesting thing in this connection is that some quantity of reclaimed sand is even brought from Qiugdao, Zhoushan, and Ningbo of China via shipment. Total length of sea wall in second phase is 13km where as the same for the first phase is 11.2km. As of September 18, 2004, a total of 482 ha. Area has successfully been reclaimed using 223.8million m3 of sand mass. Hence, considering the work progress in material quantity basis approximately some 86% of the work has been completed by this date.

Ground improvement task is one of the vital factors in the sensitive construction works like Kansai International airport. Basically two methods namely, spreading of sand blanket and sand drain method has been applied so far.

In 2nd-phase Airport Island settlement prediction, it is fully utilized the observed settlement over the 10-odd years of the 1st-phase Airport Island. A thorough analysis is also made by the application of 400-m-deep boring exploration and state-of-the-art soil test method. A group of geo-technical experts were profoundly consulted in connection to this research. Based on these efforts, it is predicted that the mean amount of seabed settlement from commencement of reclamation work till semi-completion of subsidence about 50 years after the airport's opening will be about 18 m where as only a 11.5 m settlement is considered during the first phase construction which itself is a revised version of a 8m previously estimated settlement. This shows that a very meticulous and more reliable technique has been applied in the second phase construction. This prediction method has been attained using the latest technology.

However, settlement is a phenomenon that takes place over a long period of time. For this reason, settlement for the 2nd-phase Airport Island will be observed with a fully arranged organization. The observation results will also be reflected in reclamation work and maintenance.

The American Society of Civil Engineers designated KIX as one of the ten great CIVIL ENGINEERING achievements of the twentieth century for its construction technologies as well as environmental conservation efforts and social and economical contributions .Weighted Equivalent Continuous Perceived Noise Level(WECPNL) 70 is kept within the sea area, which meets the environmental standards of surrounding areas .Kansai International Airport Land Development Co. Ltd. has been certified ISO 14001 --an international standard for environmental management -- for its "Project activity on the Second Phase land development work of KIA" on the 20th of December, 1999.

The airport will have one 4000 meter runway but plan has already been resented to expand the island for one more runway. The total estimated cost for the airport facilities is about 420 billion yen where as the total approximate cost for land reclamation work is 1 trillion yen.

Approximately 160000 take- off / landings are made through the first phase airport and this rate is expected to reach a level of 230000 take-off/landings after the completion of second phase construction.

19. Acknowledgements

My sincere thank goes to Japan Society of Civil Engineers for its JSCE-2004 study tour grant. In the mean time I would like to express my profound gratitude to Nepal Engineers'

Association and all those dignitaries who were very kind enough to make this visit a fruitful one. I would like to enlist some of the names which include:

Dr.Eng. Shigeru MORICHI (President of JSCE), Suzuki MOTOHIRO (Secretary-General, JSCE), Dr. Masayuki HORI (Chairman of STG), Mr. Shigeo NISHIMURA (Manager, IAS-JSCE), MR. Royuki YANAGAWA, Ms. Ryoko OKAMOTO (International Affairs Section,JSCE), Mr. Masaru NODA(P.E), Prof.Menuo HORI (ERI-University of Tokyo), Mr. Masao Nakayama (Project Manager Central Circular Shinjuku, Route Construction Project), Dr. Eng. YOZO GOTO (Vice Director, General Manager, Edm, NIED Kawasaki Laboratory), Mr. Masayuki Ishii (Deputy General Manager Technology planning Department of Technical Research Institute Obayashi Corporation), Prof. IWASHITA Kazuyoshi (Saitama University), Dr. Jishnu Subedi (Saitama University), Dr. Yasuo Ishii(Senior Researcher Land Slide Research Team PWRI), Mr. Nakajima KAZUYOSHI(Bureau Chief Origawa River Dam),Mr. Terje Skavdal(Regional Disaster Response Advisor UNOCHA, Kobe), Ms. Takako IZUMI (UNOCHA,Kobe),Mr. Bishnu Hari Pandey(UNCRD), Mr. Akihiro TERANISHI(ADRC –Senior Researcher), Mr. MASAYUKI KITAMOTO (Executive Director, ADRC),Mr. Yoshinobu FUKASAWA (Deputy Exeecutive Director, DRI)

20. Conclusion

The JSCE Study Tour is extremely inspiring and marvelous in terms of the opportunity to view Japanese high technology. I am quite hopeful from my part that these study tour grants laid some foundation stones to contribute develop a closer and amicable relation between our two professional organizations i.e. JSCE and NEA. I am very much obliged to JSCE for this favor.

One of the remarkable features of Japan is its unique geographic situation, which is manifested by its dynamic tectonic activities. Japan has been involved in the war against natural disasters for hundreds of years in the name of floods, typhoons, earthquakes, landslides and the like. These sorts of disasters have also taught Japanese people to cope up with such adverse situations. Moreover, a high seismic activity, poor topography coupled with complicated soil conditions and high population density have coerced Japanese people to develop advanced civil engineering and most comprehensive construction technologies to adapt accordingly.

Japan comes under a few highly developed countries which does not only emphasize upon economic prosperity but equally gives importance to its fascinating culture, social norms and values. It was a great pleasure to meet so many interesting and kind people during my stay in Japan who really have a genuine mutual respect for others.

The most lucrative part observed in modern Japan is its research-oriented culture. It was

found that majority of universities, construction companies, consultancies, have research wings of their own which enhance the standard of civil engineering and construction technology in Japan.

The civil engineering profession is becoming more challenging in the context of Japan as their major constructions are oriented either towards space or underneath the water. Similarly there are equally critical challenges in underground construction measures. In the mean time Japanese technocrats are found to be more serious towards environment friendly constructions along with disaster protective schemes owing to the need of the 21st century.

Despite our geographical distant, our two countries (Nepal and Japan) bear similar geographical features i.e. both fall under the active tectonic zones, both suffer flood, landslides like disasters, both hold young and very fragile mountains and so on. Nepal can learn scores of things from Japan in this connection as Japan has been able to counter much of these ill-fates by its self introduced technology and much more could be learnt from its experience.

It was a unique and exclusive opportunity not only to get closer view of Japanese fashion in the field of civil engineering and have industrious discussions with erudite colleagues but also to see wonderful country and get familiar with more about the affluent culture and custom of Japan. I believe my visit to Japan will further consolidate our mutual collaboration between members of the engineering profession in both Nepal and Japan and in between Nepal Engineers' Association and Japan Society of Civil engineers.

Appendix

Schedule of organization visited and key personnel met.

Date	Time	Organization	Location	Key personnel
Aug. 30	19.30	Arrival at Narita Airport (TG640 From Bangkok)	Narita	Mr.Shigeo NISHIMURA
Aug. 31	10.0 16.0	The University of Tokyo JSCE headquarter	Yayoi 1-1-1,Bunkyo-ku,Tokyo Yotsuya 1-chome Shinjuku,Tokyo	Ms. Ryoko OKAMOTO Prof. Muneo HORI Prof. Kenji OGUNI Dr.Masayuki Hori Mr.Shigeo NISHIMUR Mr.Hideki Kawamura Mr.Hiroyuki YANAGAWA
Sep.1	10.0 15.0 18.0	Metropolitan Expressway Kawasaki Laboratory J-Power	Nishiike bukuro, Toshimaku,Tokyo Kawasaki- shi Kanagawa Ginza 6-Chome,chu-ku,Tokyo	Mr. Masao Nakayama Mr. Masaru Noda Dr. Eng . YOZO GOTO Dr. Masayuki HORI Mr.Koji Mishima Mr.Koji Tabata
Sep. 2	10.0 4.30	Obayashi Technical Research Institute Obayashi Headquarters	Shimokiyoto 4-chome,kiyose-shi Shinagawa Intercity Tower B	Mr. Hideki KAWAMURA Mr.Masayuki Ishii Mr.Tak Mizumaki Mr.kunio Tsujimoto Mr.Tanabe Katsuyoshi
Sep.3	12.0 15.30	Japan society of Mechanical Engineers Saitama University	Shinanomachi-Rengakan Bldg Shonanomachi 35 Saitama City	Mr. Fukuzawa Kiyokazu Mr.Masahiko KASHASHI Mr. Masahiro SUYAMA Prof.IWASHITA Kazuyoshi Dr. Jishnu Subedi
Sep.4		Visit tokyo	Around Tokyo	
Sep.5		Visit tokyo	Around Tokyo	Mr. Atma Bhandari
Sep.6 Sep.6	10.0 16.0	Public work Research Institute JSCE Headquarter	1-6,Minamihara Tsukuba city Yotsuya 1-chome Shinjuku,Tokyo	Dr. Yasuo Ishii Mr.FURUKI Moriyasu
Sep.7	12.0-	Travel from Tokyo to Nagoya		Ms. Ryoko OKAMOTO
Sep.8	11.30	JSCE'S Annual meeting	AIT ,Toyota city	Dr.Eng.Shigeru MORICHI
Sep.9	10.20 15.30	Nagaragawa Estuary Barrage Origawa River Dam	Aqua Plaza Nagara	Mr. Koji Tsukamoto Dr. Yasuo Ishii

Sep.10	10.0 12.0 14:30 16.10	Asian Disaster Reduction Center United Nation Office of UNOCHA UNCRD Hanshin-Awaji Earthquake Memorial	Hitomiraikan 5F Kobe Hitomiraikan 5F Kobe Hitomiraikan 5F Kobe Wakinohamakaigan-Dori,Kobe	Mr.Akihiro Teranishi Mr.Masayuki KITAMOTO Mr. Terje Skavdal Ms. Takako IZUMI Dr. Kenji Okazaki Mr. Bishnu Hari Pandey Mr. Yoshinobu FUKASAWA
Sep.11	10.30	Kansai International Airport	Osaka Bay	Mr. Shiego NISHIMURA Mr. Bishnuhari Pandey
Sep.12		Visit Nagoya City	Nagoya	Mr. Cholendra Adhikari Mr. Bisonath Khanal
Sep.13	10.0	Visit Chubu University	Matsumoto-cho Kasugai-shi	Dr. Sunil Adhikari Mr.Kishor Khanal Mr. Sudeep Adhikari Mr.Cholendra Adhikari Mr.Hare Ram Aryal
Sep.14	12.0	Travel from Nagoya to Tokyo		Mr. Cholendra Adhikari
Sep.15	11.0	Departure From Narita Airport TG 641 to Bangkok	Narita	Mr. Cholendra Adhikari Ms. Ryoko OKAMOTO