

CONTRIBUTIONS OF JSCE AT THE SUMMIT ON FUTURE OF CIVIL ENGINEERS

The JSCE group was assigned to Table 2 and the breakout meetings and discussions were held on June 22 and 23. This part of report summarizes the contributions of the JSCE team to the summit regarding three specific topics, namely, globalization, technology and leadership.

The group 2 or Table 2 group was consisted of the following members:

Facilitator: Thomas Lenox, Dr., ASCE, Senior Managing Director

Secretarial: Melissa Prelewicz, Director, Professional Practice, ASCE

Members

Masanori Hamada, Prof. Dr., JSCE President, Waseda University

Ömer Aydan, Prof. Dr., JSCE Member, Tokai University

Richard O. Anderson, Somat Engineering, Michigan

Ed Link, Prof. Dr., University of Maryland

Stephen Bechtel, Chairman Emeritus, Bechtel Company

Anne Canby, President, Surface Transportation Policy Project

Linda Katehi, Prof. Dr., Vice Chancellor, Illinois University

Michael Kupferman, Prof. Dr., Wentworth Institute of Technology

Buddy Cleveland, Bentley Software Systems

Deepal Eliatamby, Alliance Consulting Engineers.

Henry Hatch, Lt. Gen, Chair, Int. Activities Committee, ASCE

GLOBALIZATION

The breakout and discussions of Table 2 were mainly concentrated on the professional practice. Besides the main theme of the breakout, the JSCE distributed the document (Appendix) and explained how JSCE think about the globalization topic. The main points of the explanations were the definition and purpose of globalization. Although there are many issues regarding the globalization, it is explained that some of global roles of civil engineers of Japan beyond the borders were how to reduce the effects of natural disasters and how to protect the environment in Asia..

It is quantitatively shown that the number of damaging earthquakes and tsunamis with casualties more than 1000 during the last half-century in the world were increasing in all over the world. Particularly the damaging events have drastically increased in the last two decades and the number of damaging events in Asia is much higher than those in other regions. More than 60% events occurred in the Asian countries. The number of casualties by earthquakes and tsunamis in Asian countries is 90% of the total number of the world.

Furthermore, the numbers of event of damaging storms and floods in the world with more than 1000 casualties during the last half century are shown in each continent and it is quantitatively explained that the number of events in the world has also drastically increased in the last two decades in the world. About 80% of events of storms and floods occurred in Asian countries. The regional ratio of the number of casualties by storms and floods was about 95% in Asia.

As explained, the natural disasters have been drastically increasing in Asian countries and more than 90% of total casualties in the world was caused in the same region. It is pointed out that there may be various reasons for this high ratio, dense population in areas vulnerable to natural disasters, insufficient infrastructures and poverty. The conclusion was that a bad cycle is formed, which may be explained by the statement, that is, ***“Poverty is worsening disasters and disasters are worsening poverty”***.

Environmental problems in Asian countries are also pointed as another important and challenging issue in Asia is environment. Environmental destruction is caused by deforestation, desertification and the population increase. Furthermore, the waste has been increasing in volume due to population increase as well as life style changes.

It is shown that deforestation is also a serious problem in Asian countries. It is quantitatively shown that forests are particularly decreasing in Asian countries, such as Indonesia, Myanmar, Pakistan, and Nepal.

The desertification problem in Asian countries is pointed as another serious problem. It is shown that the 65% of the area under the threat of desertification is in Asia and Africa. About 40% of desertification in the world occurs in Asian countries.

It is also pointed out that the waste production rate was quite high in Asia, which is thought to be associated with the drastic increase of the population in the Asian region. According to extrapolation of the data up to 1992, it is indicated that the amount of

solid waste is expected to be doubled or tripled in 2010 with respect to that in 1992. This is one of the causes of environmental destruction.

The river erosion is also another important aspect in Asian region. It is quantitatively shown that the total volume of the soil eroded from rivers per one square km per year. This rate is particularly high in Asia region. River erosion is developing in soft ground and alluvial plains vulnerable to earthquakes, and affecting the environment. Furthermore, the pollution of sea is expanding.

Next, the roles and contributions of civil engineers of Japan for natural disaster mitigation and environmental protection at present and in the future were briefly explained. It is pointed out that one of primary roles and contributions of JSCE is to transfer technologies for natural disasters mitigation of Japan to the Asian region such as earthquake resistant technology, Tsunami warning system. The second item is to transfer Environmental Protection Technologies to Asian Countries for Waste disposal, measures against ground and water pollution. The third item is to implement education for natural disaster mitigation, and support for reconstruction and restoration from natural disasters through activities by JSCE's student members and NPO: engineers without borders-Japan. Some specific examples of the contributions of JSCE were shown. . Finally, the establishment of the NPO-Engineers without Borders-Japan by JSCE together with the collaboration of building engineers to contribute to the reduction of natural disasters in the world, particularly in Asian countries, is introduced. It is explained that the NPO is organized under the support from public sectors as ministry of foreign affairs and private sectors such as construction and consulting companies and many engineers from different disciplines. The main roles of this NPO are:

- Technical Supports for Restoration and Reconstruction to the Affected Area

- Continuous Education on Natural Disaster Mitigation

- Application and Spread of Technologies for Natural Disaster Mitigation

The goal of the NPO is reduce the casualties and damage by natural disasters in Asian region by half in the first half of the 21st century.

TECHNOLOGY

The society of civil engineers of Japan (JSCE) was established as one of academic societies with the purpose of developing technologies in civil engineering and to contribute the welfare of public. As said in the globalization session, the one of efforts of JSCE was to develop technologies in order to reduce the damage by natural disasters as well as for the protection and recovery of the environment in the next 20 years.

JSCE's is presently focusing on the following topics: (Appendix)

1. Technology for the reduction of natural disasters
2. Technology for the protection and recovery of natural and urban environment
3. Developing new energy alternatives
4. Technology for inspection, maintenance and repair of infra-structures and engineering structures
5. Technology for underground development for renewal of urban areas

The research themes carried out by JSCE for developing technologies with the purpose of natural disaster reduction are given below and these will be done for the next 20 years.

- (1) Inspection and reinforcement of existing infra-structures
- (2) Reinforcement of vulnerable residential houses and buildings
- (3) Prediction of earthquakes and damage assessment
- (4) Development of hazard maps by utilizing advanced technologies
- (5) Evacuation and emergency response system
- (6) Real time earthquake warning system

A brief explanation of a newly constructed large shaking table in the Hyogo-ken prefecture, which experienced a devastating earthquake in 1995, is given. The purpose of construction of this shaking table is to clarify the mechanism of failure process of structures through proto-type tests and to develop new methodologies for earthquake resistant design and construction. It is possible to test the full-scale wooden houses and RC buildings on this table as you see in these pictures. Many wooden houses, RC buildings, bridges were collapsed and/or heavily damaged by the 1995 Kobe earthquake. As a result, more than 6000 people were died. This shaking table will be used for investigating how to prevent the total collapse of buildings and structures if they are subjected to seismic loads exceeding the design loads.

The themes of technology development for assessment, protection and recovery of natural and urban environment, which are listed below, are briefly explained.

- (1) Water (River, lakes, underground water, sea)
- (2) Ground (Industrial areas)
- (3) Air (Heat island phenomena around mega cities)
- (4) Industrial and nuclear waste disposal
- (5) Construction of infrastructures with low energy consumption

In regard with technologies for inspection, maintenance and repair of infra-structures and engineering structures, the specific themes are explained to be:

- (1) Performance based design method by taking service lifetime into consideration
- (2) Technology for asset management
- (3) Development of sensors and systems for inspection of existing infrastructures
- (4) Methods for rehabilitation, reclamation and demolition

As for the redevelopment of highly congested urban areas, development of underground space is required. The technologies for underground space utilization. Are explained to be

- (1) Long distance tunneling technique
- (2) Rapid construction
- (3) Automation and safety construction
- (4) Design Construction of complex underground junctions

LEADERSHIP

The philosophy of JSCE on leadership of civil engineers is based on the statement of The 1st president of JSCE, Dr. K. Furuichi in 1914 that is “The civil engineers are required to take the leadership among all fields of engineering and technology (Appendix).

Therefore the JSCE, strongly require that the civil engineers must have broader knowledge and understanding of various fields including economics, politics, and must contribute to achievement of a sustainable, safe and comfortable living environment through leading technological developments and with the collaboration of people.

It is stated that the public reliability of civil engineers has been seriously damaged in recent years in Japan due to bribery scandals, bid-riggings and so on. In addition, the popularity of civil engineering among young people is drastically decreased and the young people choosing civil engineering departments of universities have been decreasing in recent years. Therefore, we have to re-gain the reliability of public on civil engineers for activating the leadership. Furthermore, we have to make best contributions to build safe, comfortable and sustainable society with strong participation of public. Therefore, we should always bear in mind the original principle is that the civil engineering is for public and for the welfare of people.

As for the leadership of civil engineers, civil engineers are required to have the following abilities:

1. Broad knowledge and understanding over various disciplines
2. Management and decision making ability
3. Communication ability
4. Internationally active and respect to the cultures of others
5. High morality and ethics

For this purpose it is explained that JSCE is doing its best to have civil engineers these abilities through

1. Accreditation of engineering education in universities and colleges
2. Certification system for civil engineers
3. Continuing professional education
4. Promotion and guidance of ethics in civil engineering

Aspirational Visions on Future of Civil Engineering stated at the breakout meeting in the morning session of June 23, 2006 by Japan Society of Civil Engineers (Appendix)

GLOBALIZATION

Civil engineers have a responsibility to create a sustainable world community through strong participation of public by utilizing best knowledge and achievements of civil engineering for the safe and comfortable living and welfare of people. For this purpose,

the civil engineers must act with the affection for mankind without being restricted by the circumstances imposed for various reasons.

TECHNOLOGY

The civil engineers are required to develop technologies for the reduction of natural disasters, the protection and recovery of natural and urban environment, new energy alternatives, sustainable infra-structures and re-development of urbanized areas.

LEADERSHIP

Civil engineers are required to have broad knowledge and understanding on various disciplines, the abilities of management decision making, communication international activities, and respect to the cultures of others, and high morality and ethics.

Civil engineering should re-gain the reliance and respect of public and should re-attract capable, diligent young people to the profession.