Executive Summary

W. Phillip Yen

Objectives

- Establish permanent technical exchange conduit among highway authorities and research institutes of Taiwan and the United States
- Initiate and manage cooperative research programs to address needs of all participating agencies
- Promote bridge technology training and educational programs
- Combine experience and data to develop advanced design, construction, and management methodologies

Historical Background

Among the highway authorities and academia of Taiwan and the United States, a significant amount of cooperation and technical exchange in bridge related research and practice have been uninterrupted for many years. In 1999, the Federal Highway Administration (FHWA) dispatched a group of engineers to Taiwan to join the post-earthquake reconnaissance effort and provided recommendations on recovery, repair, and research activities. The initiative of establishing a simpler and more efficient communication and cooperation conduit has been brewing ever since and finally, in 2005, the first US-Taiwan bridge workshop was held in Taipei as a result. This workshop emphasized maintenance issues. The topics presented and discussed included:

1. Maintenance, inspection, and instrumentation
2. Natural hazards and mitigation
3. Repair and retrofit techniques and strategy
4. Innovative bridge design and construction

The following resolutions were produced:

- A meeting or workshop will be hosted by either country every year
- Subjects to be included in the annual meeting and cooperative activities will include:
  - Bridge technology
  - Other transportation facilities
  - Multi-hazards and mitigation
  - Asset management

The Second US-Taiwan Bridge Engineering Workshop

With the mutual understanding and resolutions obtained from the first workshop, the Second US-Taiwan Bridge Engineering Workshop, San Francisco, Sept. 2006, is set up to explore in depth each topic of mutual interest. Themes of presentations included:

- Bridge operation/management
- Natural hazard and emergency response
- Corrosion and material degradation
- Scour problems and mitigation methods
- Advanced construction techniques
A tremendous attention was drawn to an initiative “Development of a Multi-Hazard Compendium of Extreme Events for Design and Evaluation of Highway Bridges” (G. C. Lee) as a suggested cooperative project. Rationale and potential framework of the project are outlined in the corresponding slides and paper.

Discussion
The conclusion of the Second US-Taiwan Bridge Engineering Workshop marks the completion of the first round of both countries hosting the event. It is a good time to review the objectives and accomplishments in order to make adequate adjustments for maximizing the impact of future activities.

The selection of presentations and discussion topics in the first two workshops had been purported to introduce the experience and current endeavors of both sides, and therefore to obtain mutual understanding and potential models of cooperation.

The US and Taiwan delegates gave vigorous discussion on various topics raised during the workshop. The topics included:
- Planning and operating of national bridge program
- Damage prevention and hazard mitigation (Earthquake, Scour, Multihazard Compendium of Extreme Events)
- Maintenance, inspection, and instrumentation
- Innovative technology

Resolutions
The mutual interests have been better defined as a result of the discussions. The following groups of mutual interests were identified and will be used for the planning of cooperative studies and organization of future meetings:
- Development of the road map of multi-hazard reduction study
- Exchanging experience on bridge maintenance and mitigation
- Implementation of innovative technologies

As final resolutions, it is recommended that joint work groups and programs be created for:
- Short-term and long-term collaborative program
  - Work group on high performance material
  - Work group on bridge construction and retrofit methods
  - Work group on multi-hazard reduction study
  - Professional Training Program
- Installation of channels of communication
  - Development of shared web site with data base function
  - Regular work group meeting / conference talk
  - Annual or bi-annual meeting on progress report of work group and case studies

Work plan will be developed while work groups are being assembled to accomplish the proposed programs. Recommendations were also made to the format of future meetings:
- Meeting will be organized annually
- Length of presentations will be reduced or length of meeting lengthened to allow more time for discussion.
• The Turner-Fairbank Highway Research Center (TFHRC), MCEER, and Taiwan Construction Research Institute (TCRI) will coordinate the preparation work for the next workshop

Prospect
Among the proposed short-term programs, details of the following tasks, which cover both the technology deployment and fundamental research arena, have been elaborated in various communications and are ready to start immediately:

Professional Training Program
The most effective and cost-efficient way to provide abundant professional training opportunities in the long run is to establish the instructor infrastructure and certification criteria tailored for Taiwanese highway authorities. In prior communications, the National Highway Institute (NHI) has agreed to contribute original training material and supporting documents, with a condition of receiving the translated documents in return to amend to the multilingual document collection of the NHI. Both the FHWA and the NHI will provide necessary coordination efforts to accomplish, upon request from Taiwanese highway authorities, training courses or instructor development programs deemed essential for the establishment of the training and certification system.

Extreme Event Database
With the abundant experience against natural hazards and with one of the most heavily instrumented infrastructure in the world, Taiwan can contribute significantly to the effort of composing an extreme event database for bridges in preparation for a rational risk-based multi-hazard bridge design methodology. The organization of the US-Taiwan Workshop can be used as a regular platform for a well coordinated joint effort between Taiwan and the United States in establishing the extreme event database.

MCEER (contact: Prof. G. C. Lee) and the Taiwan Highway Maintenance Work group (contact: Dr. Wei Lee) can be the primary contacts in coordination of the task work. MCEER will provide a work plan and necessary data sharing models as well as data analysis tools. The Maintenance Work group will coordinate the data collection and dissemination of the research product in Taiwan. The database produced in this task can become the basis of a New International Decade for Multihazard Reduction (IDMDR).

Other Task Proposal
As recommended, a joint workforce is being established, more task works deemed important or urgent to either or both countries can be proposed to or by the work groups. The corresponding work group will coordinate the progress of the task work at the approval of the committee.

Committee for the Second US-Taiwan Bridge Engineering Workshop

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<td>Jin-Yuan Chen, Taiwan Co-chair</td>
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<td>J. Jerry Shen, exec. secr.</td>
<td>Mei Wang, exec. secr</td>
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