aiming to internationalize Japan's technical standards.

In March 2014, the Ministry of Land, Infrastructure, Transport and Tourism and the Ministry of Transport of Vietnam signed the "Memorandum on Cooperation in Development of National Technical Standards for Port Facilities of Vietnam". Based on the Memorandum, with Vietnam as our partner, we have been developing new technical standards for Vietnam based on Japan's port design and construction standards in collaboration with the Institute of Transport Science and Technology (ITST) of the Ministry of Transport of Vietnam. To conduct this study, over a two-year period, port technologists from Japan and Vietnam gathered and held eight experts meetings. As a result, a partial draft of Vietnam's national standards based on Japan's port technical standards related to general design principles, loads and actions, breakwaters, construction and acceptance and other items, has been completed.

We will continue our work to complete the standards customization method. In Vietnam, the necessary steps to achieve national standards based on the draft will be taken. Past studies have been summarized in the technical notes of NILIM.

Details ☛ NILIM website (technical notes of NILIM)
http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0800.htm
http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0915.htm (planned)

● Schedule of Principal Events

Date	Event name
November 19	Open house "Public Works Day" (Tsukuba)
December 8	The Lecture Meeting of NILIM (2016)

● Publication (research achievements) < June, 2016-August, 2016 >

Download from here ☛ http://www.nilim.go.jp/lab/bcg/siryou/index.htm

TECHNICAL NOTE of NILIM

No.	Title of Paper	Names of Divisions
882	FY2014 Annual Report of Wastewater Management and Water Quality Control	Wastewater System Division Wastewater and Sludge Management Division
886	Data note for sediment discharge and hydrological observation at mountain rivers of Japan (FY2009-2013data-set)	SABO Department
887	Recent advances in sediment discharge and hydrological observation at mountain riveras of Japan	SABO Department
903	3D Data Exchange Standard Complies with the LandXML1.2 – ver.1.0	Maintenance Information Technology Division,
909	Technical documentation on the practical application of XRAIN (X-band polarimetric (multi parameter) radar information network) rainfall observation	Water Cycle Division, River department
911	Reinforcement Works for the Crown and the Toe of River Levees to Extend the Duration of Resisting Breach due to Overtopping	River Department
913	Study on new road traffic survey	Road Traffic Department, Road Structures Department, Research Center for Land and Construction Management
914	Vision for Landscape Planning in Future Society Research Report on the Landscape Planning Methodology Compatible with Population Decline and Urban Shrinkage in Japan	Landscape and Ecology Division

● We provide you with research information.

- 2016 Annual Report of NILIM
  This web site introduces NILIM activities throughout the year, including research activities and achievements, future initiatives, etc.
  Go to this web site: ☛ http://www.nilim.go.jp/english/annual/annual2016/ar2016e.html

National Institute for Land and Infrastructure Management
Ministry of Land, Infrastructure, Transport and Tourism
Asahi 1, Tsukuba, Ibaraki, 305-0804, Japan
(Tachihara) Tachihara 1, Tsukuba, Ibaraki, 305-0802, Japan
(Yokosuka) Nagase 3-1-1, Yokosuka, Kanagawa, 239-0826, Japan
TEL:+81-29-864-2754 FAX:+81-29-864-4322
http://www.nilim.go.jp/english/eindex.htm
国土交通省 Ministry of Land, Infrastructure, Transport and Tourism
No.57 Summer 2016
Edited and Published by National Institute for Land and Infrastructure Management

N I L I M
国総研ニューズレター
NILIM News Letter
No.57
Summer 2016

■ Activities of the NILIM after the 2016 Kumamoto Earthquake

We would like to offer our deepest sympathies to the victims of the Kumamoto Earthquake and wish for a rapid recovery from this disaster.

Technical support to regional development bureau and local governments

Planning and Research Administration Dept

In response to damage caused by the Kumamoto Earthquake of April 2016, the NILIM dispatched experts to the disaster region, where they provided technical support.

At about 21:26 on April 14, 2016, a magnitude 6.5 earthquake (foreshock) struck the Kumamoto region of Kumamoto Prefecture, followed by an M7.3 earthquake (main quake) in the same region at 1:25 on April 16. During each earthquake, a maximum seismic intensity of 7 was observed in Kumamoto Prefecture, and the Meteorological Agency named this series of earthquakes the 2016 Kumamoto Earthquake.

Severe damage occurred centered in Kumamoto and Oita Prefectures, and according to a summary issued by the Fire and Disaster Management Agency by 9:00 on August 26, the earthquake had caused 95 deaths and 2,245 injuries; totally destroyed 8,147 homes, seriously damaged 29,008, and partially damaged 135,367; and started 16 fires.

The NILIM issued a warning when the foreshock occurred, and late that night, set up the Central Disaster Response Committee.

The NILIM shared damage information and requests for technical support from the disaster region and the MLITT headquarters with the Public Works Research Institute, Building Research Institute, and Port and Airport Research Institute, and in collaboration with each body, participated in the local response by sending various technical experts and dispatching TEC-FORCE, an emergency disaster response team formed by the MLITT. It also sent an independent team to carry out an on-site survey.

The following table shows the break-down of the NILIM personnel sent to the disaster region.

As a result of the survey in the disaster region, reports were submitted to relevant bodies in the disaster region and, based on the expert team's experience gained in responding to past disasters, technical support was provided with the aim of preventing secondary disasters and restoring facilities in the disaster region.

Details * State of NILIM disaster surveys and technical support activities in response to the Kumamoto Earthquake
http://www.nilim.go.jp/lab/bcg/kumamotojishin2016.html

Photo 1 View of a meeting of the Central Disaster Response Committee held concurrently with the MLITT Headquarters Emergency Disaster Countermeasure Committee (before dawn on April 15)

Photo 2 Reporting survey results, etc. to a local mayor (explaining the results of an emergency inspection of sediment disaster risk locations to Nishimura Hironari, the mayor of the town of Mashiki : April 28)

Table Dispatch of Personnel to the Disaster Region

Expertise	Number sent (Person-days)
(Person-days)	22
River levees, etc.	40
Sediment disasters	72
Roads, bridges, etc.	122
Buildings	47
Parks and green areas	8
Ports and airports	12
Total	323

(June 17, 2016)

Response to sediment disasters

Sabo Department

In response to sediment disasters caused by the Kumamoto Earthquake, the NILIM provided immediate support to the Kyushu Regional Development Bureau and local governments impacted by the disaster.

The earthquake caused sediment damage at 190 locations, resulting in the loss of many precious human lives.

The Sabo Department dispatched personnel to the region on April 15, immediately after the foreshock of April 14. As a result, after the main shock struck on the 16th, they were able to quickly confirm the state of many landslides, cracks, and large debris flows that occurred along the caldera wall and near the central volcanic cone of the outer rim of Mt. Aso.

Later, in cooperation with the Erosion and Sediment Control Research Group of the Public Works Research Institute, the Sabo Department sent its personnel to support the emergency measures and TEC-FORCE activities undertaken by the Kyushu Regional Development Bureau and emergency inspections of sediment disaster risk locations conducted by Kumamoto Prefecture until May 11. In districts where damage by sediment disasters was particularly severe, as part of support for damaged cities, towns, and villages, it carried out an emergency on-site inspection. It provided early reports of the results of these surveys to impacted local governments, and reflected the results in its decisions on locations requiring emergency countermeasures according to the degree of risk, the installation of emergency structures as emergency measures, and in warning and

evacuation decisions.

On slopes near Aso Bridge, where countermeasures using advanced technologies were necessary, large-scale collapsed ground, or where a national highway or railway track at the foot of a collapsed slope had to be restored, for example, they gave technical support by attending technology study meetings held by the Kyushu Regional Development Bureau.

In this season, the risk of a typhoon is high. Where the earthquake shaking had been particularly strong, they urged people to pay close attention to rainfall and prepare to evacuate quickly.

Photo 1. Surveying cracking caused by the earthquake

Photo 2. Large-scale collapsed slope near Aso Bridge

Response to road structure damage

Road Traffic Department and Road Structures Department

Immediately after the foreshock, in collaboration with the PWRI and other organizations as TEC-FORCE etc., the NILIM began efforts to grasp the damage to road structures and technical support to restore functions of roads needed to transport relief goods.

The Road Traffic Department and Road Structures Department began surveys to clarify the damage to road structures immediately after the foreshock, and confirmed the following.

- Regarding road bridges, deformation of the surrounding ground caused collapse and other damage that require advanced technologies for their restoration. Among expressway overpasses, those with unique pier structures suffered tilting of piers or collapse that required removal, etc.
- On road embankments, collapses were detected at locations adjacent to wetland, the edges of terraces, or bodies of water. In addition, large-scale sediment collapse caused by strong earthquake motion, as well as bedrock collapse and fallen rocks were recognized at many locations on both natural- and cut slopes.
- In the Tawarayama Tunnel on Prefectural Highway 28, swelling occurred, accompanied by the collapse of lining concrete.
- In the section of the emergency transport road, Prefectural Highway 28, inside Mashiki Town, many power poles tilted. In Mashiki Town and in Minami Ward of Kumamoto City where liquefaction was detected, power poles sunk into the ground by several tens of centimeters.

Following this earthquake, in addition to surveys to clarify damage to road structures, the NILIM provided technical support for the emergency restoration of roads. For example, on National Highway 443, which was damaged by both the foreshock and the main shock, we provided technical guidance on emergency restoration, and the road was reopened to traffic in one week. We will continue to provide technical support during the phase of full recovery, and also carry out detailed surveys and analysis of the damage, including examination of technical challenges based on the state of damage caused by the earthquake.

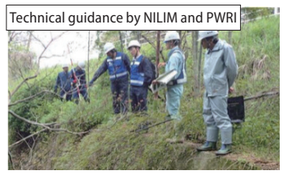


Photo Technical guidance with emergency restoration
(From a Road Bureau press release)

Contribution to smooth transport of relief goods from the Mashiki-Kumamotokuko IC to the disaster districts in the center of Mashiki Town and elsewhere

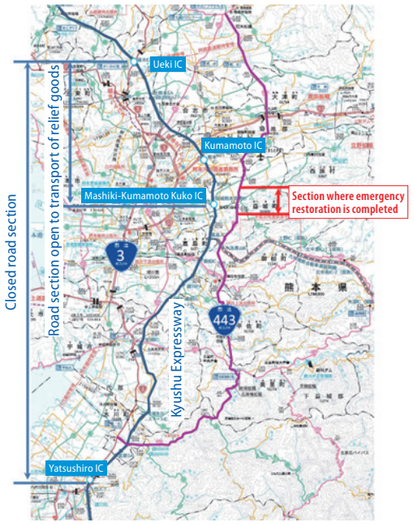


Figure Smooth transport ensured by emergency restoration
(From a Road Bureau press release)

Details ☛ State of NILIM disaster surveys and technical support activities in response to the Kumamoto Earthquake
http://www.nilim.go.jp/lab/bcg/kumamotojishin2016/katsudoujokyou/douro.pdf

Building damage and response

Building Department

The NILIM carried out an on-site survey jointly with the Building Research Institute immediately after the Kumamoto Earthquake, and based on the results, a committee of academic experts analyzed the causes of building damage.

After the Kumamoto Earthquake, the Building Department carried surveys 1 to 13 centered on Kumamoto City and Mashiki Town, etc. in Kumamoto Prefecture where many buildings had been damaged, in collaboration with the Building Research Institute (at the end of July 2016). To carry out the survey, experts on wooden construction, steel frame construction, reinforced concrete construction, non-structural members, fire prevention, equipment, ground and foundations and other fields were sent to survey the state of major damage to buildings, and phenomena assumed to have caused the damage. In addition to detailed surveys and interviews in the region, in cooperation with the Architectural Institute of Japan, they analyzed the results of the survey, paying particular attention to wooden buildings.

In conjunction with these surveys, jointly with the Building Structure Standards Committee at the NILIM and the Kumamoto Earthquake Building Damage Survey Study Committee at the Building Research Institute, the Committee on Factor Analysis of Kumamoto Earthquake Building Damage consisting of academic experts held a meeting and analyzed the causes of toppling and destruction of buildings based on the survey results, including the contents of the building damage survey that had been carried out by the Architectural Institute of Japan. As they clarify the relationship with present building standards by taking advantage of specialized practical knowledge, they are performing an analysis which they are scheduled to complete in mid September.

Details ☛ State of NILIM disaster surveys and technical support activities in response to the Kumamoto Earthquake Building
http://www.nilim.go.jp/lab/bcg/kumamotojishin2016/katsudoujokyou/kenchiku.pdf

Photo State of damage to buildings (left: wooden, right: RC)

■ To improve construction site productivity – Transforming constructions sites with i-Construction

Research Center for Infrastructure Management

The NILIM is conducting research, disseminating information, and providing technical support for the widespread adoption of i-Construction, which the Ministry of Land, Infrastructure, Transport and Tourism is promoting to improve productivity at construction sites.

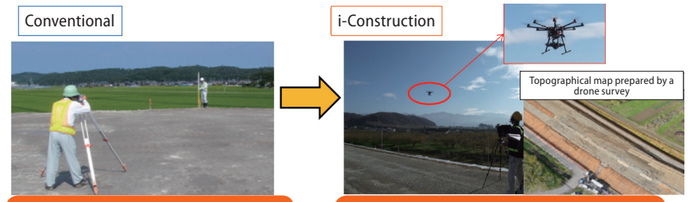
As the working-age population shrinks, it is becoming increasingly difficult for the building construction industry to obtain new workers. Meanwhile, in the construction industry, efforts to improve the productivity of building construction have been slow, whereas the advance of satellite positioning technology and the introduction of ICT have led to quality control and process control based on robotics and information.

Accordingly, the Ministry of Land, Infrastructure, Transport and Tourism is promoting i-Construction in order to ensure that holidays can be taken and construction sites are safe, thus making construction sites more attractive by improving productivity. It is also promoting greater use of ICT, optimized introduction, and leveling of construction period as principal measures.

When the integrated use of ICT started in earthworks in MLITT projects in 2016, the NILIM carried out the necessary technical studies to prepare drafts of new standards and techniques for construction management, supervision and inspections. These standards and techniques permit sites to be managed by 3D data using new devices such as UAV (drones) or laser scanners. These devices will reduce the time required for initial surveying prior to construction from about one week to two days, and will reduce the volume of inspection documentation when the work is completed to a few tenths that of the present volume. In order to introduce ICT throughout a construction site and thus obtain the full effects, new machinery, technologies, information and an understanding of appropriate standards and techniques are essential. These types of information are now being provided by the NILIM through its website.

The NILIM will continue to carry out research to improve productivity at construction sites.

Details☛ i-Construction Promotion Headquarters website
http://www.nilim.go.jp/japanese/organization/ic_honbu/indexicon.htm



■ Activities to customize Japan's port and harbor technical standards to Vietnam's needs

Administrative Coordination Department, Director for Port Engineering Policy Analysis, Port and Harbor Department, Port Facilities Division

We are researching methods of customizing Japan's port technical standards to suit conditions in other countries, and making efforts to reflect our standards in Vietnam's national standards.

To support the provision of infrastructure in developing countries, including those in Asia where robust demand for infrastructure is predicted, and to assist Japanese companies to expand overseas, we are developing methods that can be used to customize Japan's port and harbor technical standards to suit the natural conditions as well as the technological and economic level of each country, and are

Photo: Experts meeting (Hanoi in Feb. 2016)