

## Overview of Budget for Priority Researches in Fiscal 2013

Planning and Research Administration Department, Planning Division

The NILIM, as a research institute of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), is allocated its budget by the MLIT and conducts surveys and researches on the provision and improvement of housing and social infrastructure.

In addition, in fiscal 2013, the NILIM incorporated 20 research challenges (at total cost of 2.54 million yen) including the following four new ones as Priority Researches, which are implemented preferentially using budget requested by NILIM independently.

[New Priority Researches]

○ Research concerning safety and security

- Survey on strategic methods of assessing priority of earthquake resistance countermeasures of sewage treatment systems

- Research on technologies to maintain activities and active conditions in port areas against large tsunami

○ Research on strengthening international competitiveness and smoothing urban activities

- Research on methods of internationally deploying technologies and standards for the port and harbor field

○ Research on the environment

- Research on evaluation of energy saving techniques for local housing production engineering

**Details** ● NILIM web site (Press releases)

<http://www.nilim.go.jp/lab/bcg/kisya/journal/kisya20130131.pdf>

## Experiment on tsunami run-up in a river using the largest hydraulic model in Japan

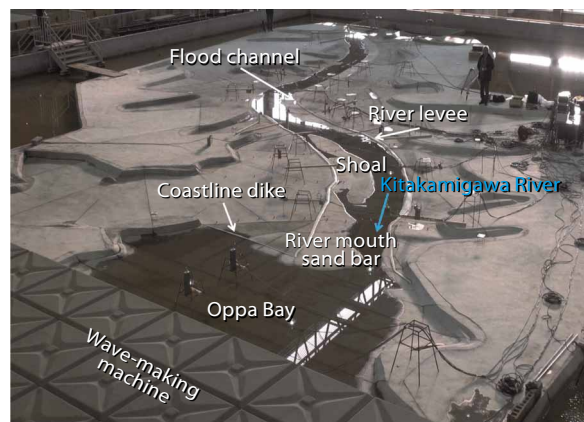
River Department, River Division

The water level of a tsunami run up a river greatly exceeded the crest heights of the river's levees for the first time since the beginning of modern observations of tsunami in Japan when tsunami triggered by the Great East Japan Earthquake struck the coast of Tohoku. In order to understand the runup phenomenon of this tsunami, the division has constructed a large hydraulic model encompassing a river mouth and 10km of the river course and is using it to conduct tsunami runup experiments.

This tsunami inflicted severe damage on levees in a section extending several kilometers from the river mouth, including breaching of the levees and scouring of their back slopes. To enact countermeasures to provide protection from such a river tsunami, it is essential to obtain basic information such as the distance the tsunami runs up from the river mouth and the maximum water level at each distance from the river mouth. When the maximum water levels obtained by the existing tsunami runup analysis method were compared with the water level traces which are observed values in river courses struck by this tsunami, scattering of reproducibility according to the river was found, revealing that the analysis method should be improved.

But it is not necessarily enough to reflect a tsunami runup phenomenon of such scale in the analysis method, so it is a situation in which the method will not be easily improved. To obtain such an understanding, a study was conducting using various types of data concerning the tsunami observed on the site, but it could not provide an adequate understanding of the phenomena.

So the large hydraulic model experiment was conducted to deepen understanding of river tsunami runup phenomena. The experiment reproduced a range of approximately 10km by 11 km of the topography around the mouth of the Shinkitakamigawa River with a 30m long by 35m wide horizontal water tank at a scale of 1/330 (photo). The experiment varied the scale of the tsunami, river course shape, and state of ground cover, analyzing their impact on the water level, flow velocity etc. of the runup of the tsunami.



**Details** ● Great East Japan Earthquake Disaster Report Committee —Two Years from the Earthquake Disaster—

Presentation documents: Tsunami Countermeasures for River Levees

<http://www.nilim.go.jp/lab/bbg/saigai/h23tohoku/houkoku3/happyou/130319-08.pdf>

## ■ Publication of “Guideline for Tsunami-Resistant Design of Breakwaters”

Port and Harbor Department, Port Facilities Division

The “Guideline for Tsunami-Resistant Design of Breakwaters”, which summarized basic concepts for the design of tough breakwaters resistant to tsunami was announced in January 2013.

The Great East Japan Earthquake damaged many breakwaters in ports and harbors. The major causes are presumed to be the powerful horizontal force of tsunami acting on them, and their destabilization by the scouring of foundation mounds behind the breakwaters by the tsunami as it overflowed them.

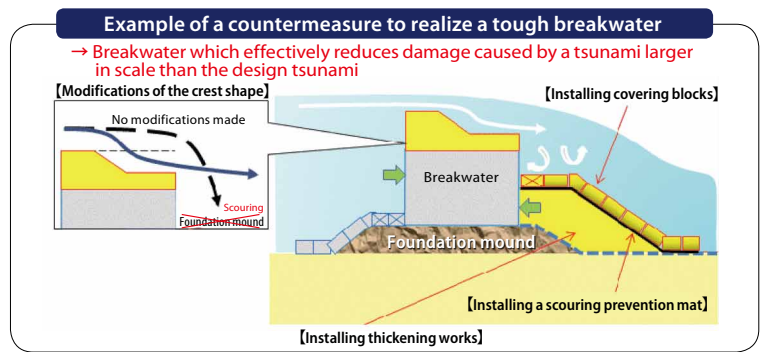
If breakwaters were “tough structures” which do not collapse even when deformed by a large-scale tsunami, damage behind breakwaters would be reduced by, for example, holding down the quantity of tsunami overflowing behind the breakwaters, delaying the time it strikes the ground behind them. So breakwaters should be tough structures that will be as resistant as possible to overturning by a tsunami exceeding the scale of the design tsunami.

Under these circumstances the Ports and Harbors Bureau of the Ministry of Land, Infrastructure, Transport and Tourism has, in cooperation with the National Institute for Land and Infrastructure Management and the Port and Airport Research Institute, comprehensively studied the

results of surveys of damage to breakwaters caused by the tsunami triggered by the Great East Japan Earthquake and the results of a series of hydraulic model experiments conducted after the earthquake disaster, to organize basic concepts for the study of tough breakwaters and announced their findings as the Guideline (January 2013).

**Details** ● “Guideline for Tsunami-Resistant Design of Breakwaters” web site

[http://www.mlit.go.jp/kowan/kowan\\_tk5\\_000018.html](http://www.mlit.go.jp/kowan/kowan_tk5_000018.html)



Example of a countermeasure to realize a tough breakwater

## ■ Developing the wall face running external wall diagnosis system

Housing Department, Housing Stock Division

The NILIM has built a prototype of a Wall Face Running External Wall Diagnosis System (Photo) that diagnoses spalling of tiles etc. as it travels vertically upwards and downwards on the external walls of residential and commercial buildings, and has conducted proving tests of this system.

The device is 1m long, 85cm wide, and weighs about 17kg, and it has three legs which adsorb it to the wall surface. These legs include two legs with adsorption surfaces of 45cm×20cm and one leg with an adsorption surface of 77cm×20cm.



A vacuum pump installed on the device (almost identical to pumps installed in ordinary household vacuum cleaners) permits the device to move while adsorbed to the wall surface. The device moves on the wall surface by ascending and descending like an inchworm as it alternately moves its two

small legs attached at the top and bottom of the device (45cm×20cm) then the single leg in the center of the device (77cm×20cm). And the device not only moves vertically; it can also move horizontally, so that it can work continually without it being necessary for a person to take it off and shift it sideways.

The device diagnoses the external wall using a hammering device attached to its front end. It strikes the wall surface with a metal weight, and a PC installed on the device analyzes the hammering sound to judge if a tile has spalled or is sound. It is reported that a person performing manual diagnoses can normally diagnose between 10 and 20m<sup>2</sup> per hour, and to develop this device, the device traveling speed or analysis method were studied in order that the quantity of work would be almost identical.

Using this prototype, we have confirmed that it ensures wall adsorption capability as effective as planned, but a challenge which remains to be overcome is the take countermeasures to deal with noise as it travels. In the future, improvements will be made to prepare for its practical application by adding technology to reduce noise during travel and improve the precision of the diagnosis and to verify its performance on actual buildings.

**Details** ● The prototype of the building wall face self-propelled traveling external wall diagnosis system

<http://www.nilim.go.jp/lab/ieg/gaiheki201303.pdf>

## ■ Revising data exchange standards of road centerline and data for as-build measurement utilizing total station system

Research Center for Advanced Information Technology, Information Technology Division

The following introduces the purposes, outlines, and recent revisions of two standards applied in April 2013.

The Japanese Geodetic Datum 2011 (JGD 2011) has been added to the public survey geodetic datum with earthquake deformation of the Great East Japan Earthquake. Therefore, the data exchange standards of road centerline and data exchange standards of data for as-build measurement utilizing TS (total station system) has been revised so that they can be selected for the JGD 2011 as a coordinate reference system.

Road centerline data can make various works more efficient because they can be reused without modification at the construction and maintenance stages. The data exchange standard of road centerline is the standard format for electronic deliveries made to reuse road centerline data. As a specific example of use, this data format is used to create data for as-build measurement utilizing TS at the construction stage.

For as-build measurement utilizing TS, three soft-wares for creating data, as-build measurement, and creating as-build ledger

sheets are needed. The data exchange standard of data for as-build measurement utilizing TS is the standard format for electronic deliveries made to smooth the exchange of data between these softwares and to ensure traceability of as-build results. They are now applied to earthwork and pavement work.

And, as-build measurement utilizing TS has been used in principle for earthwork of 10,000m<sup>3</sup> or higher in national government construction works since April.

In the future, we will advance the data circulation and utilization of data, for improving efficiency of works and ensuring quality.

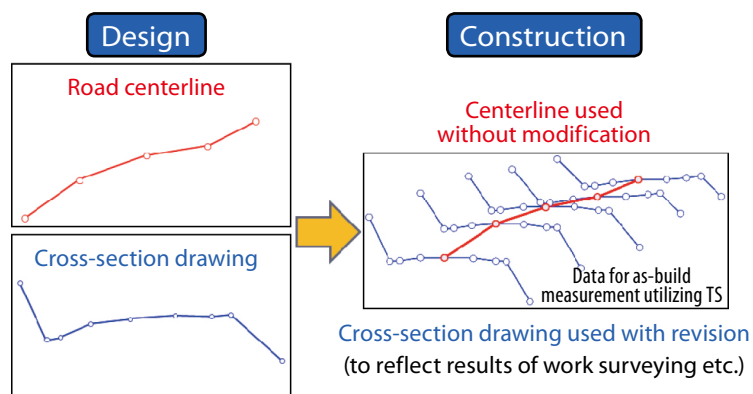
### Details

Data exchange standard of road centerline (Draft) Ver. 1.1.

[http://www.cals-ed.go.jp/crj\\_otherdoc/](http://www.cals-ed.go.jp/crj_otherdoc/)

Data exchange standard of data for as-build measurement utilizing total station system (Draft) Ver. 4.1

[http://www.nilim.go.jp/ts/info\\_exchange.html](http://www.nilim.go.jp/ts/info_exchange.html)



### ● Publication (research achievements) < February to April 2013 >

Download from here: <http://www.nilim.go.jp/lab/bcg/siryoku/index.htm>

#### RESEARCH REPORT of NILIM

No.	Title of Paper	Names of Divisions
51	Sequential monitoring of quantity of colored macro plastic debris using a new technique for detecting pixels of plastic debris from webcam images	Coastal Zone Systems Division
52	Emergency Responses and Engineering Contributions by NILIM for the Recovery from the 2011 Great East Japan Earthquake	National Institute for Land and Infrastructure Management

#### PROJECT RESEARCH REPORT of NILIM

No.	Title of Paper	Project Leaders
38	Research on River and Coast Management in response to Climate Changes	Director of River Department
41	Study on developing smarter mobility technology in the second stage ITS	Director of Research Center for Advanced Information Technology

● **Publication (research achievements) < February to April 2013 > (to be continued)**

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

TECHNICAL NOTE of NILIM

No.	Title of Paper	Names of Divisions
673	Practical Guide on Requirement for Structural Design of Tsunami Evacuation Buildings	Standards and Accreditation System Division
700	Technical Note on Seismic Retrofit Design of Existing Bridges	Bridge and Structures Division
703	Report on Field Surveys and Subsequent Investigations of Building Damage Following the May 6, 2012 Tornado in Tsukuba City, Ibaraki Prefecture, Japan	Building Department, Research Center for Land and Construction Management
704	Annual Report of Road-related Research in FY 2011	Road Department, Research Center for Advanced Information Technology
705	Report of Tokyo Bay Symposium (12th: Toward Integrated Bay Renaissance)	Research Coordinator for Coastal and Marine Affairs
706	Record of habitat creation project at Shibaura Island, Tokyo, Japan	Marine Environment Division
707	A Basic Analysis on Main Characteristics of Maritime Transport by International Ferry and RORO ship	Port Planning Division
708	A Study on Transport Mode Choice of Domestic Maritime Unit Load Cargo Transportation in View of Countermeasures against Global Warming	Port Systems Division
709	Study on the Flow of Japanese Long-Distance Passengers Focusing on Rail and Air	Airport Planning Division
710	The damage evaluation technique from the point appearance for the highway steel bridge heat affected by a fire	Bridge and Structures Division
711	Technical data for Countermeasure of salt damage on concrete bridge (The third survey) - examination about countermeasure of salt damage to concrete bridge based on result of close visual inspection -	Bridge and Structures Division
712	Technical Standards for River Works: Practical Guidelines for Methods of Investigation, and its Reference materials, June FY2012	River Department, Research Center for Disaster Risk Management, Environment Department
713	Joint Research Report on Distribution of Location Information about EV/PHV Charger Facility	Information Technology Division
714	Environment Impact Assessment Technique for Road Project (Edition of FY 2012)	Road Environment Division, Landscape and Ecology Division
720	The Technical Reference on Environment Impact Assessment Technique for Road Project Fauna, Flora and Ecosystem on 1. Planning Stage Consideration Items	Road Environment Division, Landscape and Ecology Division
721	The Technical Reference on Environment Impact Assessment Technique for Road Project Examples of Environmental Conservation Measures on 13. Fauna, Flora, and Ecosystem	Landscape and Ecology Division
722	Manual of the slope revegetation method for conservation of regional ecosystem	Landscape and Ecology Division
723	The Handbook for the Historic Preservation	Landscape and Ecology Division
724	Report of the 1st Evaluation Committee of NILIM in FY 2012	Research Administration and Evaluation Division
725	Landscape and Ecology Division, Annual Research Report (27th)	Landscape and Ecology Division
726	Strong-Motion Records from the 2011 Off the Pacific Coast of Tohoku Earthquake	Earthquake Disaster Prevention Division

● **We provide you with research information.**

- 2013 Annual Report of NILIM **NEW**

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/annual2013/ar2013e.html>



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