

Development of function sustaining technologies for buildings used as Disaster Prevention Bases

Building Department

In response to damage caused by the Great East Japan Earthquake, the Building Department will develop technologies to be applied to sustain the functions of buildings that serve as bases for emergency and restoration activities by preventing damage caused by tsunamis, earthquakes and tornadoes.

The Great East Japan Earthquake destroyed the functions of buildings by causing damage of two kinds—[1] structural damage by tsunami and [2] damage to non-structural members (non-structural walls, ceilings etc.), and damage was also revealed in government buildings that must serve as disaster prevention bases. And due to tornadoes that occurred in May of last year in Tsukuba City, flying fragments seriously damaged windows, doors, etc. of reinforced concrete building structures. Those damages would make it difficult to continue the use of buildings.



Building damaged by a tsunami



Damaged non-structural wall

Therefore, the General Technology Development Project, “Development of function sustaining technologies for buildings used as Disaster Prevention Bases”, that is scheduled for 4 years beginning this year, will develop technologies and enact design guidelines, so that the functions of buildings that serve as bases for emergency and restoration activities will be sustained immediately after a disaster.

Specifically, as tsunami countermeasures, technology development will be conducted to reduce the tsunami wave force using break-away claddings and the blocking effects of surrounding buildings, etc.

As earthquake countermeasures, technologies will be developed to reduce damage to non-structural walls by, for example, forming proper located structural slits in reinforced concrete structures, and to prevent damage to suspended ceilings by not forming gaps between the ceilings and wall surfaces etc.

And as a tornado countermeasure, a method of evaluating the resistance of cladding materials to flying fragments will be developed.

In addition to developing these technologies, past research, existing knowledge etc. will be organized to prepare a design guideline for disaster prevention bases. And when considering sustaining the functions of buildings, it is important to also prepare for the breakage of lifelines carrying electric power, gas, water and so on, so equipment system function maintenance countermeasures will also be studied.

Details ● NILIM web page (Project Research)

http://www.nilim.go.jp/lab/bbg/project/ppdf/pro-h25_5.pdf

An Outline and Analysis of the low cost Carriers in Japan

Airport Department

Last year, three LCC companies began operating on domestic routes in Japan. This is an outline and analysis of service by Japanese LCC.

Low cost carriers (LCC) have greatly expanded their share in Europe, America and South-east Asia, but although foreign LCC have had access to the aviation market of Japan limited to international routes for several years, LCC service on domestic routes began in 2012. The first, Peach Aviation based at Kansai International Airport, began operating in March 2012, followed by two based at Narita: Jetstar Japan in July and AirAsia Japan in August. These three LCC later rapidly expanded their service at the same time as they engaged in fierce price competition. As a result, in October 2013, AirAsia Japan suspended operation and reemerged as Vanilla Air, a 100% owned subsidiary of ANA; the original purpose of the two airlines that originally established it.

Thanks to the entrance to the market by the LCC, the number of domestic air passengers, which had tended to fall in recent years, began to rise again. In particular, the number of domestic passengers using Narita Airport and Kansai International Airport, which are the home airports of the LCC, have increased sharply.

The in-service rate for the domestic operations of LCC in Japan is

the equal of that for the existing airlines, but their on-time arrival rate is a little inferior. Although their fare levels vary widely, their fares are far lower than those of the existing airlines, and their seat occupancy rates are generally higher than the average rates for the large airlines. But it is said that all are operating in the red, so there are factors which could lead to future destabilization of the operation of the three airlines. It is also predicted that the Chinese LCC, Spring Airlines, will enter

Table Japanese LCC Table (September 2013)

Airline	Peach Aviation	AirAsia Japan	Jetstar Japan
Base airport	Kansai International	Narita International	Narita International
Domestic routes	Kansai = Sapporo, Sendai, Fukuoka, Nagasaki, Kagoshima, Naha, Ishigaki Naha = Ishigaki	Narita = Sapporo, Fukuoka, Naha	Narita = Sapporo, Fukuoka, Naha, Kansai, Kagoshima, Oita, Matsuyama Kansai = Sapporo, Fukuoka, Naha Chubu = Sapporo, Fukuoka, Kagoshima
International routes	Kansai = Incheon, Hong Kong, Taoyuan	Narita = Incheon, Busan, Taoyuan	

Japan, serving Japanese domestic routes, so an intensified competitive environment is forecast. It is believed that full-scale activities of LCC will cause great changes in the aviation market and passenger travel in Japan, so we will continue to watch and analyze trends in the future.

■ To spread technologies to revolutionize sewerage systems – B-DASH Project –

Water Quality Control Department, Wastewater and Sludge Management Division

In order to lower the cost of sewerage systems and create renewable energy by verifying and spreading superior revolutionary technologies, and at the same time to provide support for the overseas expansion of Japanese water and wastewater industries, the Sewerage and Wastewater Management Department of the Ministry of Land, Infrastructure, Transport and Tourism began the B-DASH Project (**B**reakthrough by **D**ynamic **A**pproach in **S**ewage **H**igh Technology Project) in 2011, with the Water Quality Control Department of the NILIM performing the corroborative research.

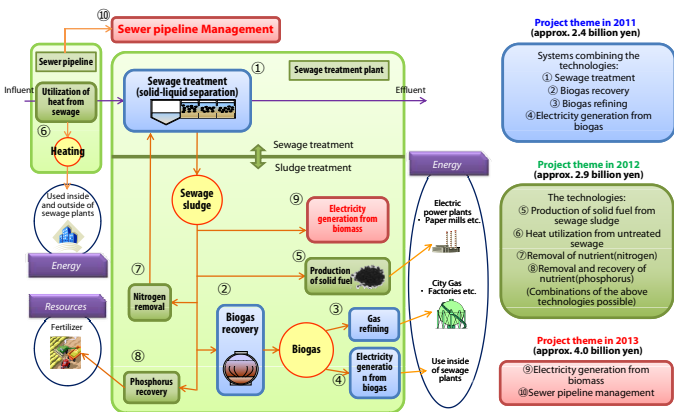
The B-DASH Project is implemented as follows. The Sewerage and Wastewater Management Department of the Ministry of Land, Infrastructure, Transport and Tourism calls for the submission of revolutionary sewerage technologies and B-DASH Project Evaluation Committee screens the submitted technologies. Based on research contracted to the NILIM, the cost reduction, greenhouse gas emission reduction effects, and other effects of each revolutionary technology selected are verified using a full size scale plant which the research organization (party undertaking the contract) installs in sewage treatment plants of local governments. And based on the results, the NILIM prepares guidelines to the introduction of each technology to promote its wide use.

Since FY2011, two technologies, water sewage treatment (solid-liquid separation) and biogas recovery, refining, and electricity generation have been the topic of corroborative research, and guidelines were enacted in July 2013.

Since 2012, five technologies have been the object of corroborative research. These are; [1] production of solid fuel from sewage sludge, [2] heat utilization from untreated sewage, [3] removal of nutrient(nitrogen) [4] removal and recovery of nutrient(phosphorus) (excluding technologies concerning water treatment [3] and [4]).

And in FY2013, we began corroborative research on two technologies related to electricity generation from biomass.

Details Wastewater and Sludge Management Division Web Page <http://www.nilim.go.jp/lab/ecg/index.htm>



Outline of the B-DASH Project

■ “Specification of Data Linkage for ASP Services” aimed at smooth sharing of information among different ASP services

Research Center for Advanced Information Technology, Information Technology Division

The following is an introduction to Specification of Data Linkage for ASP Services, for ASP services linking contractors and their clients during execution of construction work, and which was announced in September of 2013.

to master the operation of several systems to share information with all contractors. And a contractor can freely select and use an ASP system that cooperating companies can also use without being dependent on the system the client uses, and at the same time, ends the need to reenter data between ASP systems.

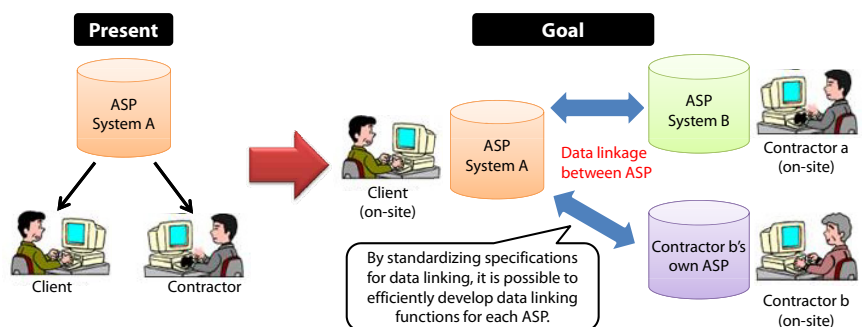
The NILIM has studied data linkage interfaces which can be used as a standard for ASP systems, and as specifications for standard interfaces to link data, it has enacted “Specification of Data Linkage for ASP Services” (referred to below as “the Specification”).

The Ministry of Land, Infrastructure, Transport and Tourism will add a function that links data between different ASP systems in 2014, with its goal spreading the use of ASP systems with a data linking system to cover all construction works.

The Specification stipulates format of linked data, sequence indicating timing of linkage, communication protocol used during a linkage, and security measures which should be taken to establish a linkage, for ASP systems equipped with the functions shown in “Essential Information Sharing System Functions Between Contractors and Clients during Construction”.

The merits of data linking between ASP systems include the fact that even in the case of an ASP system with many difference contractors, it allows a client and contractors to link data from a single information sharing system to different information systems. This lets a client specify one system for use as an ASP system, ending the need

Details Specification of Data Linkage for ASP Services (Draft) <http://www.nilim.go.jp/lab/qbg/bunya/cals/asp.html>



■ Opening facilities to the public

General Affairs Department, General Affairs Division
Planning and Research Administration Department, Planning Division

In order to introduce the contents of research conducted by the NILIM to prepare for large-scale disasters and deterioration of social infrastructure to many members of the general public, it plans to regularly accept visitors to tour its facilities at its Asahi site (Tsukuba City).

The NILIM conducts various kinds of research in order to prepare for large-scale disasters such as the Great East Japan Earthquake and deterioration of social infrastructure, as shown by the collapse of the ceiling panels in the Sasago Tunnel on the Chuo Expressway etc. In April 2013, the NILIM began providing facility tours to introduce such research projects to the general public while permitting them to see experimental facilities of the NILIM.

By the end of September, 9 groups consisting of a total of 133 visitors, both men and women and people of all ages, participated. They gained firsthand knowledge of the importance of preparing for disasters and the severity of the deterioration of social infrastructure.

We want many more people to participate in these tours in the future. So if you wish to take part in a tour, please apply to the e-mail address or phone number shown below.

Details ● NILIM web site (facility tour page)
<http://www.nilim.go.jp/lab/bbg/kohkai/index.html>

For inquiries and applications ● General Affairs Department
+81-29-864-2672

River tsunami model experiment tank



This facility reproduces the phenomenon called "run-up", which means a tsunami flowing upstream in a river course as occurred during the Great East Japan Earthquake. It is used for research to discover ways to reduce the damage which tsunamis cause.

Members of bridges removed because of deterioration etc.



Parts of bridges damaged under various environments including deterioration, salt damage, and fire etc. are collected and used for research on more appropriate maintenance and management of bridges.

Examples of facilities toured

● Schedule of Principal Events

Scheduled Dates	Event Name
November 13	The 11th Environmental Research Symposium http://www.nilim.go.jp/lab/bcg/kisya/journal/kisya20131010.pdf
November 16	Open House (Public Works Day) http://www.nilim.go.jp/lab/bcg/kisya/journal/kisya20131016.pdf
November 18	Port and Airport Technology Lecture 2013 http://www.ysk.nilim.go.jp/oshirase/20131011_01.pdf
November 23	14th Tokyo Bay Symposium http://www.ysk.nilim.go.jp/oshirase/20131018_01.pdf
November 28	Yokosuka Office Autumn Open House
December 3	2013 Conference of the National Institute for Land and Infrastructure Management http://www.nilim.go.jp/lab/bbg/kouenkai/kouenkai2013/kouenkai2013.htm
January 24, 2014	Technology Showcase 2014 (SCIENCE ACADEMY OF TSUKUBA) http://www.science-academy.jp/showcase2014.shtml

● Publication (research achievements) < August to October 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
53	Numerical estimation of inflow flux of floating natural macro-debris into Tokyo Bay	Coastal Zone Systems Division



● **Publication (research achievements) < August to October 2013> (to be continued)**

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

PROJECT RESEARCH REPORT of NILIM

No.	Title of Paper	Project Leaders
42	Development of Planning and Management Technologies for the Ultra-long-life Houses	Director of the Housing Department

TECHNICAL NOTE of NILIM

No.	Title of Paper	Names of Divisions
684	Research on partial repainting for steel bridges – Partial repainting manual for steel bridges (draft) –	Bridge and Structures Division
729	Disaster Recovery Activities by Construction Contractors at the Great East Japan Earthquake ~ Records of initial disaster response for restoration and relief of affected areas ~	Construction Economics Division
730	Urban Development Guidance for Urban Heat Island Countermeasures Utilizing "Kaze-no-Michi"	Urban Development Division, Environmental and Equipment Standards Division
731	FY2011 ANNUAL REPORT OF WASTEWATER MANAGEMENT AND WATER QUALITY CONTROL	Wastewater System Division, Wastewater and Sludge Management Division
732	Trends in Sabo Project Related Studies and Research (IX)	Erosion and Sediment Control Division
733	Seismometers installed in the dams under the jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism	Water Management and Dam Division
734	Acceleration records at dams under the jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism	Water Management and Dam Division
735	Report of the Evaluation Sub Committee of NILIM in FY 2012 Evaluation Committee of NILIM	Research Administration and Evaluation Division
738	Analysis of a beach as a linear input/output system of marine litter	Coastal Zone Systems Division
739	Influences of Integration Time on the Accuracy of Estimation of Initial Sea Surface Elevation Based on Inversion Method by Using Oceanographic Radars	Coastal Zone Systems Division
740	Study on community dynamics of index species (goby: <i>Acanthogobius flavimanus</i>) towards Comprehensive assessment of coastal area	Marine Environment Division
741	Study on Sustainable Management of Waste Disposal Sites in Coastal Area	Coastal Disaster Prevention Division
742	Applicability of Tsunami Evacuation Simulation for Evacuation Activity during the 2011 off the Pacific coast of Tohoku Earthquake Tsunami	Coastal, Marine and Disaster Prevention Department
743	A Study on the simple estimation method for residual deformation of quay walls considering the effect of ground liquefaction during earthquake	Port Facilities Division
744	Study on International Air-Passenger Traffic in East and Southeast Asia (2013)	Airport Planning Division
747	Tachnical Note on Distress of the Cement Concrete Pavements	Research Coordinator for Road Structures
748	Reference to MLIT's Bridge Inspection Manual (2013) – Photographs related to damage rating and maintenance urgency ratings –	Bridge and Structures Division

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

- 2013 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/annual2013/ar2013e.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>



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