Ministry of Land, Infrastructure, Transport and Tourism

National Institute for Land and Infrastructure Management 2012

http://www.nilim.go.jp/
The National Institute for Land and Infrastructure Management (NILIM), an organ of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) established in April 2001, surveys, tests, researches, and develops technologies related to the provision of housing and public infrastructures.

The NILIM constantly performs its work in cooperation with the Headquarters of the Ministry of Land, Infrastructure, Transport and Tourism to provide technological support the Ministry requires to plan and propose its policies and to execute its projects.

**Ministry of Land, Infrastructure, Transport and Tourism Headquarters**

(Administrative division)
- Planning and proposing policies
- Setting new challenges
- Deciding survey guidelines
- Enacting technological standards
- Deciding standard preparation guidelines
- Supervising disaster countermeasures

**NILIM**

(Technological research departments)
- Establishing scientific and technological grounds and backing for the planning and proposal of policies
- Providing technical documents
- Proposing resolution methods

**Regional Development Bureaus etc.**

(Project implementation departments)
- Obtaining data concerning national land management
- Presenting challenges in the field

**Meeting of officials**
- Collecting and analyzing nationwide data
- Providing technical support and guidance

**Commissions of inquiry/Advisory committees**

- Preparing and presenting original drafts of technological standards based on laws etc. and preparing guidelines, manuals, etc.
- Surveying and reporting on conditions in the field
- Proposing new measures

**Surveys and research etc. to contribute to the planning, proposal, and implementation of policies**

Examples) Research on measures to promote the low-carbon society, and to smooth road traffic.

**Preparation of original drafts of technological standards based on laws etc.**

Examples) Preparation of proposals for the revision of approval standards for long-term superior housing and airport paving and repair rules.

**Technological indices concerning the provision of housing and public infrastructure**

Examples) Supporting trial distribution of rainfall information obtained by X-band MP radar and closure of river courses by Typhoon No. 12. Etc.
Establishment of NILIM

- As part of the reorganization of ministries and agencies in 2001, three research bodies were reestablished as independent administrative agencies.
- Unified as a single department which performs its work in close and inseparable cooperation with the Headquarters of the Ministry of Land, Infrastructure, Transport and Tourism.

Ministry of Land, Infrastructure, Transport and Tourism

- MLIT Headquarters
- Public Works Research Institute
- Building Research Institute
- Port and Harbor Research Institute

Independent administrative agencies

- MLIT Headquarters
- NILIM
- Public Works Research Institute
- Building Research Institute
- Port and Harbor Research Institute

Research budget

- The independently requesting budgets are those which the NILIM covers by making independent requests.
- Competitive investment (priority research) 261 million yen 2.6%
- General Technology Development Projects etc. 1,276 million yen 12.5%
- Sewerage system corrosion project account 2,745 million yen 27.0%
- Port account 1,334 million yen 13.1%
- Flood control account 1,166 million yen 11.4%
- Road improvement account 2,645 million yen 25.9%
- Independently requesting budgets (priority research) 334 million yen 3.3%
- Port account 1,334 million yen 13.1%
- Flood control account 1,166 million yen 11.4%
- Road improvement account 2,645 million yen 25.9%
- Independently requesting budgets (basic research) 261 million yen 2.6%

Structure of research budget (April 2012)

Employees

- Administration 113 31%
- Research 253 69%

Structure of employees (FY2012)
In order to create a sustainable national land and society which acts in accord with nature, the Environment Department is involved in research that has to do with the improvement of the environment of the atmosphere, reduction of noise, measures to counter global warming, and strategic environment assessment in order to improve the environment of roads.

Landscape and Ecology Division
The Landscape and Ecology Division is involved in research initiatives regarding CO2 fixation by trees, coexistence with nature, ensuring biodiversity, greening of parks and road space and the formation of high quality landscape.

Water Department
The Water Department is involved in research initiatives that have to do with technologies for protecting river basins and coastal areas from flooding and high tides, using river water required for human life in harmony with the total river basin environment and the integrated management of water basins and coastal areas.

River Division
The River Division is involved in research activities which have to do with the development of methods and accumulation of knowledge concerning river improvements to ensure and maintain higher quality of safety against floods and river environments and with the systematizing and standardizing of technologies which contribute to the proposal and implementation of policies based on these.

Coast Division
The Coast Division is involved in research initiatives that have to do with preservation of the coast in order to protect the coastal areas from high tides, tsunami and erosion with consideration given to the environment and use.

Water Management and Dam Division
The Water Management and Dam Division is involved in research initiatives that have to do with measures to improve safety of water use through the efficient and effective utilization of water resources that respond to climate change, comprehensive water resource management technologies related to river basin flood control and water use, dam technology standards and so on.
Urban Planning Department

The Urban Planning Department is involved in research initiatives that have to do with urban planning technologies, urban disaster countermeasures, and urban environmental countermeasures in order to build sustainable cities to respond to changes of social conditions including the falling birthrate and aging of society and expanding global environmental problems.

Urban Planning Division

The Urban Planning Division is involved in research initiatives on advanced administration standards of urban land planning such as performance zoning codes for quality of environment, to promote such land use patterns that compatible with functional activities and sound residential environment.

Urban Facilities Division

The Urban Facilities Division is involved in research on integrated urban facility management. We improve survey methods through new technologies, in urban traffic management for example.

Urban Disaster Mitigation Division

The Urban Disaster Mitigation Division is involved in research initiatives on disaster prevention measures in built-up areas by developing advanced technologies such as proactive mitigation methods of spreading fire, planning of disaster prevention programs in urban areas, and evaluation measures of greenery and open space planning in terms of disaster prevention performance.

Urban Development Division

The Urban Development Division is involved in research initiatives on urban improvement methods to form safe and comfortable urban environments and urban functions, such as the reorganization or renewal of existing urban areas including densely built-up areas and urban heat island countermeasures.

Coastal, Marine and Disaster Prevention Department

The Coastal, Marine and Disaster Prevention Department is involved in research initiatives that have to do with developing measures for monitoring the environment and the evaluation of damage and measures to mitigate damage by tsunami and storm surges, and so on, plus methods of using coastal areas that are in harmony with human activities in order to achieve sustainable use with integrated management of coastal and marine environments and to enhance disaster prevention.

Marine Environment Division

The Marine Environment Division is involved in research initiatives that have to do with the implementation and development of environment assessment, database archiving, ecosystem restoration techniques in coastal and marine environments with field observations, analytical modeling and numerical calculations.

Coastal Disaster Prevention Division

The Coastal Disaster Prevention Division is involved in research on evaluation of damage by tsunamis and storm surges and on measures to mitigate the damage based on both of hardwares and software technology, and in research to achieve safe evacuation for inhabitants from coastal disasters.

Disaster and Emergency Management Division

The Disaster and Emergency Management Division is involved in research on Business Continuity Plan (BCP) considering cooperation between neighboring ports from a broad-based viewpoint and in research on measures consistent with international transportation security as well as efficiency of distribution.

Coastal Zone Systems Division

The Coastal Zone Systems Division is involved in research initiatives which have to do with mitigation of the problem of floating debris on coastlines, and research on the activation of regions by taking advantage of the regional resources of coastline areas.

Research Coordinator for Coastal and Marine Affairs

Research Coordinator for Coastal and Marine Disaster Prevention

Port and Harbor Department

The Port and Harbor Department is involved in research initiatives that have to do with the use of the port as a whole, planning of port construction, the method of use of facilities and a more efficient method of construction given the increase in container transport particularly in Asia and the need for ports with enhanced structure, performance and international competitiveness in view of the increasing size of vessels.

Port Planning Division

The Port Planning Division is conducting research initiatives regarding planning standards and guidelines by analyzing the latest trends in ship size and ship movements around the world.

Port Systems Division

The Port Systems Division is involved in research initiatives that have to do with the development of models to estimate, by shipping route, the quantity of international marine unit loads handled of models to estimate, by shipping route, the quantity of international marine unit loads handled.

Port Facilities Division

The Port Facilities Division is involved in research initiatives that have to do with the technical standards for port structures such as breakwaters and quay walls.

Port Construction Systems Division

The Port Construction Systems Division researches to develop standards for rational and efficient port construction, and for procuring materials and construction services in port projects associated with less environmental loads.

Airport Department

The Airport Department is involved in research initiatives that have to do with support for policies to strengthen Japan’s international competitiveness and to stimulate regions, projects associated with less environmental loads.

Airport Planning Division

The Airport Planning Division is involved in research initiatives that have to do with air passengers and cargo demand forecasting methods and policy simulations, risk management of airline networks, the potential for advance to a Low Cost Carriers, and methods of calculating economic effects.

Airport Facilities Division

The Airport Facilities Division is involved in research initiatives that have to do with contributing to the enactment of airport facilities design and maintenance manual with considerations for life cycle costs for good quality airport operation which can ensure safe and on-time air transport.

Airport Construction Systems Division

The Airport Construction Systems Division is involved in research initiatives that have to do with construction management, such as the study of estimation and construction standards to rationalize and improve the construction concerning provision and maintenance of airports, and the development of facility inspection and maintenance support systems, and so on.

Construction System Division

The Construction System Division is involved in research initiatives that have to do with the enhancement of design, costing, monitoring, inspection and the evaluation and reduction of construction costs.

Construction Economics Division

The Construction Economics Division is involved in research initiatives that have to do with the use, development and preservation of the national land given changes in the social circumstances and the future state of the development of housing and social infrastructure.

Evaluation System Division

The Evaluation System Division is involved in survey and research initiatives that have to do with technologies for evaluating the performance of buildings etc., assessing research, and evaluating policies for building projects.

Construction Management Division

The Construction Management Division is involved in research initiatives that have to do with the system of public procurement such as the tender contract system that focuses on technical capabilities in order to ensure the quality of construction, investigation and design of public works.

Information Technology Division

The Information Technology Division is involved in research initiatives that have to do with technological development utilizing ICT (information communication technology) as a technology to efficiently collect, processes, and provide a diversity of information regarding the national land and transportation, in order that the people can receive safer and more convenient services.

Research Coordinator for Green – Innovation

Research Coordinator for Advanced Information Technology

Research Coordinator for Housing Information System

Research Center for Disaster Risk Management

The Research Center for Disaster Risk Management is involved in research initiatives that have to do with disaster forecasting and prevention planning to prevent disaster as a result of water or gravel, prevention of such natural disasters as earthquakes and mitigation of damage to the extent possible and the timely response, conveyance of information and evacuation in the event of a disaster.

Erosion and Sediment Control Division

The Erosion and Sediment Control Division is involved in research initiatives that have to do with the integrated sediment management, landuse prevention countermeasures, and sediment disaster risk management etc. in order to mitigate sediment disasters and resolve problems accompanying the movement of sediment.

Flood Disaster Prevention Division

The Flood Disaster Prevention Division is involved in research initiatives that have to do with flood risk evaluation technologies, methods of reflecting these in disaster prevention planning, structural countermeasures, the use of hazard maps and information boards, etc., and flood mitigation countermeasures which integrate hard and soft measures based on self help and mutual cooperation.

Earthquake Disaster Prevention Division

The Earthquake Disaster Prevention Division is involved in research initiatives that have to do with structural damage caused by earthquakes and earthquake disaster prevention planning and post earthquake measures aimed at mitigating the impact of structural damage, design earthquake motion in the seismic design of structures, and the observation, management, and use etc. of earthquake motion records.
1 Surveying and research contributing to the planning, proposal, and implementing of policies

--- Supporting new tsunami disaster prevention policies in response to the Great East Japan Earthquake ---

In response to the Great East Japan Earthquake, the MLIT enacted the policy, “Protecting human life whatever it takes”, calling for the construction of structures such as coastal dikes to prepare for tsunami which occur with relative high frequency, and for multi-layered protection through the general mobilization of hard and soft countermeasures to prepare for the largest class of tsunami.

The NILIM is technologically supporting the above tsunami disaster protection policy by establishing a method of setting the water level of tsunami which occur with relative high frequency (design tsunami) in order to decide the height of coastal dikes, and a standard method of performing tsunami inundation simulations hypothesizing the largest class of tsunami. [River Department]

--- Supporting the formulation of densely built-up area improvement policy ---

Densely built-up areas, which are seriously endangered when a large earthquake occurs, still exist over a wide area of Japan, so we research measures to improve the disaster prevention performance in such areas. The revision to the Basic Plan for Housing (National Plan), which is the foundation of the government’s housing policies (Cabinet decision in March 2011), has positioned the need to take finely detailed countermeasures according to urban district characteristics as basic measures. Examples of such measures include using relaxed restrictions related to road width under the Building Standard Law, based on results of analysis by NILIM on the state of rebuilding in densely built-up areas by urban district characteristics such as the narrow street ratio. [Urban Planning Department]

--- Sustainable disposal of waste material as landfill on waterfronts ---

Administrations, such as port administrators, face many difficulties ensuring sites for waste disposal on waterfronts, including utilization of the land after completion of waste disposal. To resolve these problems, the NILIM conducts research on technologies to reduce life-cycle cost from the construction stage to the land-use stage after completion of waste disposal and on systems which allow appropriate sharing of the expense of construction and maintenance with other parties, including beneficiaries. Providing the analytical tools to evaluate effective methods of maintaining facilities and to improve the management of offshore waste disposal sites, the NILIM supports the proposal of waste disposal policy on waterfronts. [Coastal, Marine and Disaster Prevention Department]

--- Supporting the prediction of port cargo volume in the Basic Policy for Ports ---

The Minister of Land, Infrastructure, Transport and Tourism has enacted the “Basic Policy for the Development, Use and Maintenance of Ports and Harbors and Development of Sea Routes Designated to be Developed and Maintained”, which is a guideline which must be complied with when enacting individual port plans, and it includes the outlook for port cargo volume throughout Japan between 10 and 15 years in the future. The NILIM has developed and updated its export/import port cargo volume estimation model used to predict the value of trade between Japan and major countries and regions and to calculate port cargo volume and container cargo volume based on the value of trade. It’s used as a prediction tool to calculate the outlook for port cargo volume in the above Basic Policy (revised September 2011). [Port and Harbor Department]

--- Initiatives to implement ITS Spot services ---

ITS technology would contribute to the resolution of traffic issues, such as traffic safety, congestion mitigation and environmental countermeasure initiation. Therefore NILIM has been studying about ITS Spot Services, which is a new Infrastructure to Vehicle (I2V) cooperation system, to enact technical specifications. Approximately 1,600 ITS Spots have been installed throughout Japan and the services have just begun. ITS Spot services enable several services: 1) dynamic route guidance that provides wide-area road traffic information, 2) safety driving support that alerts drivers about accident-prone spots, and 3) probe information are collected through on-board-units. Those three services are offered by a single on-board unit. [Research Center for Advanced Information Technology]
2 Preparation of Drafts of Technology Standards Based on Laws and other Government Ordinances

— Revision of “Specifications for Highway Bridges” —
Design Standards for Bridges and Elevated Roads Etc. (Notification by the Director–general, City Bureau and Director–general, Road Bureau of the Ministry of Land, Infrastructure, Transport and Tourism), which is a design standard for highway bridges, was revised in February 2012. The NILIM has, based on recent disasters such as the Great East Japan Earthquake of 2011 and on the state of existing highway bridges, which are steadily aging, reflected the achievements of survey and research work clarified since the previous revision to propose design standards by, for example, completing maintenance-related provisions and stipulating high strength reinforcing steel bars, and so on.

[Building Department]

— Preparing a Draft of Technology Standards Concerning Essential Structural Conditions for Tsunami Evacuation Buildings Etc. —
Structural design methods for tsunami evacuation buildings, which are temporary evacuation locations used when a tsunami strikes, have been revised in response to building damage caused by the Great East Japan Earthquake, and technology standards have been enacted under new guidelines and the Tsunami Prevention Region Development Law.
The NILIM has prepared a draft of these technological standards at the same time as it prepared and published explanations of the contents of the technology standards and design examples. http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0673.htm

[Building Department]

— Operating Guideline for the Use of Civil Engineering Consultants for the Design-Build System —
Outside Japan, design-build construction using a consortium of civil engineering consultants and construction companies is often performed. As reference material specifying procedures etc. permitting the participation in work based on the design-build system inside Japan of a consortium including civil engineering consultants, the NILIM prepared the draft of the operating guideline enacted by the Round-table Conference on the Use of International Ordering and Contracting Methods (Chairman: Professor Ozawa Kazumasa of the Graduate School of Engineering of the University of Tokyo).

[Research Center for Land and Construction Management]

— Revision of the Automobile Emission Factors to Evaluate Road Environment Impact —
Automobile emissions factors are used by road managers to predict change of NOx, PM, CO2 emissions accompanying road projects and policies. As a result of the strengthening of automobile emission gas regulations, improvement of fuel consumption standards, and spreading use of hybrid automobiles, etc. which have occurred in recent years, it became necessary to revise automobile emission factors so they conform more closely to reality. So the quantity of gasses emitted by automobiles in recent years has been tested and the percentages of automobiles of different classes running on actual roads have been surveyed to calculate new automobile emission factors for NOx, PM, CO2, and so on.

[Environment Department]

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Example of a structure whose maintenance is not considered (example of a structure where it is difficult to discover steel corrosion)

Survey of damage to buildings caused by a tsunami

Form of the consortium

Revised Values of Automobile Emission Factor (Example)
3 Technology Guidance with Housing and Public Infrastructure Improvement

— Supporting the Introduction of Innovative Sewage System Technologies —
In order to achieve sharp reductions of the cost of sewerage system projects, cut their energy consumption, and produce new energy, the B-DASH (Breakthrough by Dynamic Approach in Sewage High Technology) Project is being implemented. In FY2012, in addition to research on energy recovery systems etc., which started the previous year, demonstration research on technologies to convert sludge into solid fuel, use heat of sewage, and remove and recover nutrient salts, is performed. In the future, the results will be applied to prepare guidelines and support will be provided to promote their introduction to actual systems and to expand the water business overseas.

[Water Quality Control Department]

— Guiding and Supporting Initiatives to Reconstruct Housing in Disaster Regions —
The Great East Japan Earthquake destroyed homes which could be inhabited by an extremely large number of people, by partially or completely destroying more than 380,000 homes. Durable homes which will stabilize the lives of these victims and lay the foundations for regional recovery must be provided quickly. To achieve this goal, the NILIM is drawing on its experience and technological knowledge etc. concerning the restoration of housing after a disaster, which it has accumulated up till the present time, to provide technological guidance and support for the promotion of the provision of “regional restoration housing supply systems” based on production systems deeply rooted in each disaster region, and for the planning of “disaster public housing” in cities, towns, and villages in the disaster regions (example in the figure on the right).

[Housing Department]

— Supporting Efficient Maintenance of Airport Pavement —
The NILIM has developed an airport pavement patrol inspection support system applying the Differential Global Positioning System (DGPS) and a Geographic Information System (GIS) to allow efficient maintenance of runways and other airport pavement. In the future, it will continue to support the maintenance work at airports operated by the national government by promoting the wide use of this system with an inspection record keeping function, a function to judge necessity of repair work for each pavement abnormality, and a useful multiple map utilization function.

[Airport Department]

— Providing Technical Advice Regarding Emergency Countermeasures in response to the Damage Caused by Typhoon 12 —
Typhoon 12 (Talas) in September 2011 caused many large-scale sediment-related disasters, mainly in the Kii Peninsula, for example landslide dams caused by torrential rainfall over 2,000mm. NILIM officials were dispatched immediately after the disaster to provide technical advice to the Kinki Regional Development Bureau, Nara, Wakayama and Mie prefecture, and to municipalities in the affected area regarding “Emergency Survey” based on the Sediment-related Disaster Prevention Law, monitoring and observation and building emergency countermeasures such as disaster prevention facilities.

[Research Center for Disaster Management]
Response by the NILIM to the Great East Japan Earthquake

Activities of the NILIM started immediately after the earthquake — Quick adaptability to needs in the field —

Immediately after the earthquake, the NILIM responded to requests from the regional development bureaus and regional governments by dispatching TEC-FORCE (Technical Emergency Control Force) and other experts to the disaster region to provide technological support for damage surveys and the restoration of public works structures, buildings, etc.

Activities at each phase

Immediately after the disaster
Technological guidance with the evaluation of the usability and the emergency restoration of public infrastructure structures, which are indispensable for rescue and restoration activities.

Before the disaster
Constantly in cooperation with related bureaus at MLIT headquarters, flexibly performing necessary studies.
- Setting tsunami external force as premises for planning restoration
- Verifying the suitability of technological standards etc. by clarifying and analyzing the state of damage
- Studying facility restoration countermeasures (tsunami inundation simulations, liquefaction judgment methods)
- Studying early response items to prepare for restoration, etc.

Future
As an organization under the Ministry of Land, Infrastructure, Transport and Tourism, the NILIM will take responsibility not only for tackling challenges faced during final restoration and recovery, but for taking a birds-eye view of challenges which must be faced on the entire national land to take necessary initiatives.
- Study of revision of technological standards
- Research necessary to improve facility management
- Research necessary to propose new disaster prevention countermeasures for natural disasters which exceed past expectations

Personnel dispatch to the field as part of TEC-FORCE etc.

<table>
<thead>
<tr>
<th>Specialization</th>
<th>Total number of people</th>
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<tbody>
<tr>
<td>Sewage</td>
<td>58 (119 person-days)</td>
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<tr>
<td>Rivers</td>
<td>13 (36 person-days)</td>
</tr>
<tr>
<td>Coastlines</td>
<td>12 (29 person-days)</td>
</tr>
<tr>
<td>Roads</td>
<td>85 (156 person-days)</td>
</tr>
<tr>
<td>Dams</td>
<td>3 (8 person-days)</td>
</tr>
<tr>
<td>Buildings</td>
<td>44 (116 person-days)</td>
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<tr>
<td>Airports</td>
<td>6 (34 person-days)</td>
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<tr>
<td>Ports</td>
<td>24 (66 person-days)</td>
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<td>Sabo</td>
<td>17 (25 person-days)</td>
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<tr>
<td>Total</td>
<td>262 (592 person-days)</td>
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(From March 11, 2011 to March 31, 2012)

Total number of people dispatched during one month immediately after the disaster: 84 (252 person-days)

Specific duties of TEC-FORCE
In 2008, established in MLIT headquarters, the NILIM, Geospatial Information Authority of Japan, regional branch bureaus, and the Meteorological Agency technological support for emergency disaster response countermeasures undertaken by regional public bodies, etc.
- (1) Rapid clarification of the state of damage
- (2) Prevention of the occurrence and expansion of damage
- (3) Rapid recovery in the disaster region

Examples of multidisciplinary studies taken to deal with the large-scale tsunami disaster — from setting external force to taking countermeasures —

External force

Estimating tsunami water level and inundation
Preparing the method of setting the water level of a tsunami that occurs relatively often (design tsunami) and standard method for tsunami inundation simulations of the maximum class of tsunami predicted to occur.

Countermeasures

Impact of damage to ports and harbors and tsunami countermeasures
The Tsunami Design Guideline is now being compiled to propose tsunami countermeasures such as breakwaters, storm surge barriers, and so on.

Coastal dikes which display persistent effectiveness
Model experiment etc. based study of the protection of inland-side slope toes etc., which was the point of structural innovations based on analysis of disasters.

Design guidelines for structures concerning tsunami evacuation buildings
The Building Structure Standards Committee has been established to study and prepare proposed technology standards for structures related to tsunami evacuation buildings, and so on.

Earthquake and tsunami countermeasures for sewage treatment system facilities
Establishing future countermeasures based on the present state of earthquake resistant and tsunami resistance countermeasures.

Tsunami countermeasures for airports
Preparation of guidelines for tsunami countermeasures for airports by studying comprehensive tsunami countermeasure including soft and hard approaches.

Countermeasures for erosion caused by tsunami run-up and overflow on river levees
Study to improve technology to study tsunami run-up water level, levee height, and levee structures based on the characteristics and state of individual rivers

Restoration etc.

Reconstructing housing in disaster regions
Technological support for the promotion of the provision of regional restoration housing supply systems and planning of public disaster housing.

(Contains results of the survey of the damage and documents from earthquake disaster report meetings held in April 2011 and in March 2012).
The NILIM establishes research challenges which should be resolved preferentially and rapidly (target is 3 to 5 years) as technology policy challenges in order to support the planning, proposal and implementation of policies of the Ministry of Land, Infrastructure, Transport and Tourism. Technology policy challenges are broken down into six research and development fields, and research is undertaken in each research and development field to resolve the challenges shown below.

I. Achieving a Safe Society Free from Fear
The Great East Japan Earthquake of March 11, 2011 caused a severe disaster including 20,000 people dead and missing, centered on the Pacific Coast of East Japan. And this was followed by flooding and sediment disasters triggered by typhoon 12 which superimposed new damage while Japan was still struggling to overcome the earthquake damage. As a result, preparing for disasters with a scale exceeding any formerly anticipated or multiple disasters is a pressing challenge, which has strengthened our awareness of the importance of taking all hard and soft disaster countermeasures. Our aim is to realize a society whose members are safer and freer from fear, because accidents, fires, and other dangerous phenomena caused by inappropriate design and execution etc. have resulted in conspicuous insecurity regarding the people's daily lives.

II. Serving a Mature Society
The goal is to maintain safe national land in this time of restrictions on investment in the improvement of public capital by establishing management which systematically utilizes, maintains, repairs, and renews the existing housing and public capital stock. And the other goal is to respond to changes in social and economic conditions such as the aging of society and population decline by creating national land harmonizing safety, the environment and energy by clarifying a future image of the national land. And we also aim to realize a society whose members can lead pleasant highly convenient living environments by converting to intensive urban structures.

III. Strengthening Growth Capacity and International Competitiveness
The goal is to strengthen Japan's growth capacity and international competitiveness by constructing efficient transportation and cargo distribution systems to support economic activities linking countries, cities, and outlying regions, thereby ensuring lively exchanges of people and goods, and at the same time, promoting the effective use of industrial and social infrastructure which form their backbones or cores, and promoting the export of superior technologies to foreign countries.

IV. Creating a Society in Harmony with the Environment
The goal is to realize a society which preserves rich ecosystem and incorporates beautiful natural features, and regional history and culture and which conserves the national land along rivers and coastlines etc. by appropriately assessing the impact of human activities on the environment and resolving various challenges in order to realize a society in harmony with nature.

V. Dealing with Global Scale Climate Change
It is feared that we will be severely impacted by unprecedented torrential rainfall and numerous typhoons which cause frequent floods and storm surge disasters, and by global scale climate change. We are promoting initiatives to adapt to the impacts of global warming at the same time as we are promoting measures to mitigate climate change by, for example, lowering emissions of greenhouse effect gasses which are one cause of global warming, and verifying new low cost technologies to recover energy and resources.

VI. Establishing Comprehensive Methods of Supporting Improvement of the National Land
The goal is more efficient administration by ensuring better quality, competitiveness, and clarity of public works procurement, effectively introducing information communication (ICT) which is advancing spectacularly, and advancing project evaluations. We also aim to advance technological standards by providing performance regulation type technological standards or performance verification methods for various structures. And we are also promoting advanced information capabilities by, for example, introducing advanced road traffic systems (ITS), and a common platform for material cycle analysis software (CommonMP).
The NILIM, designates research which is performed with priority in the view of the NILIM as project research by, for example, uniting research which can share goals, centered on research whose research and development goals based on technology policy challenges are clearly presented. Project research enables studies to resolve technological policy challenges to be conducted more effectively, as researchers in fields required for target achievement are gathered under a project leader. The following table shows project research which is now in progress. For details see the NILIM web site.

### I. Achieving a Safe Society Free from Fear
- Development of seismic performance evaluation technology for buildings in response to improvement of earthquake motion information
- Research on immediate damage estimation technology to improve crisis management for mega-earthquakes
- Research on tsunami damage mitigation systems using multifaceted protective mechanisms
- Research on risk and crisis management strategies for excessive and multiple actions of natural disasters
- Research on effective sediment management in catchment basins after huge scale sediment production

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### II. Serving a Mature Society
- Development of inspection and monitoring technology for preventive maintenance of infrastructure
- Study on introduction of LCA for infrastructure
- Development of land suitability assessment method for sustainable land use planning
- Development of existing housing performance evaluation technologies to promote circulation and utilization of housing stock
- Research on fire safety of 3-story wooden school buildings

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### III. Strengthening Growth Capacity and International Competitiveness
- Research on measures for seamless international ferry transport in response to the expanding network in Asia
- Research to advance the collection, analysis, and use of continuous observation road traffic data

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### IV. Creating a Society in Harmony with the Environment
- Developing urban systems technology aimed at creating a low-carbon society and hydrogen energy systems
- Research and development of green ITS
- Research on the introduction of new technologies to buildings focused on renewable energy
- Research on conservation and restoration of port and harbour environments based on integrated management of coastal regions

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### V. Dealing with Global Scale Climate Change
- Development of base technology to support forming a portfolio of management alternatives for large-scale water-related disasters under changing climate
- Research on risk and crisis management strategies for excessive and multiple actions of natural disasters (repeated)

<table>
<thead>
<tr>
<th>Research Period</th>
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<tbody>
<tr>
<td>2010-2013</td>
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<td>2012-2014</td>
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### VI. Establishing of Comprehensive Methods of Supporting Improvement of the National Land
- Research on improvement of design, execution, and maintenance using three-dimensional data
- Research to improve the collection, analysis, and application of data obtained by constant monitoring of road traffic (repeated)

<table>
<thead>
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The goal is more efficient administration by ensuring better quality, competitiveness, and clarity of public works and to realize a society whose members can lead pleasant highly convenient living environments by converting to intensive urban structures.

Export of superior technologies to foreign countries is also promoting advanced information capabilities by, for example, introducing advanced road traffic systems and technological standards or performance verification methods for various structures. And we are advancing project evaluations. We also aim to advance technological standards by providing performance procurement, effectively introducing information communication (ICT) which is advancing spectacularly, and warming, and verifying new low cost technologies to recover energy and resources.

It is feared that we will be severely impacted by unprecedented torrential rainfall and numerous typhoons which are the cause of global warming, and verifying new low cost technologies to recover energy and resources.

The goal is to realize a society which preserves rich ecosystem and incorporates beautiful natural features, and to realize a society whose members are safer and freer from fear, because accidents, fires, and other dangerous phenomena caused by inappropriate design and execution of traffic systems can lead pleasant highly convenient living environments by converting to intensive urban structures.
The site actively provides information including an overview of the NILIM, its research policies, research challenges, research achievements, event information and so on.

We make simple and timely introductions of the activities and research achievements of the NILIM. We send it out more than twice a month. You can register for our mail service at this site.

The web site publishes timely introductions of research contents and achievements, even when it is still at the study stage, and directions of the development of future standards, policies, and technologies.

"Comprehensive Research Report of NILIM" is a report of a research result which has academic value, superior policy recommendation or significant social meaning.

NILIM holds a “NILIM Lecture Meeting” once a year and introduce its activities, announce research results and make recommendations for technical policy issues. Also, NILIM holds various symposiums that are in line with the needs of the age. Information of such lecture meetings and symposium can be seen at our website.

Project Research Report of NILIM

“Project Research Report” reports about a result of project research.

Research Materials of the Comprehensive Research Report of NILIM

“Research Materials of Comprehensive Research Report” is a record of research activities or result of research, investigation, tests and observations that is considered to be of value in published.

NILIM News Letter

The News Letter is published four times a year to inform concerned institutions and researchers both inside and outside Japan of the latest activities at the NILIM.
International Cooperation

In line with the government’s Asian economic strategy, we are promoting international cooperative research activities, have agreed to prepare a research cooperation roadmap with major national research institutes, are surveying and analyzing the needs, plans, and standards of partner countries, and are taking part in joint research and development of technologies adaptable to specific regions. We are also conducting international research on common international challenges such as protecting the global environment, preventing earthquake disasters, fireproofing buildings, managing water, and mitigating traffic congestion, participating in international standardization of technologies, conducting emergency surveys of large-scale natural disasters, and are striving to make an international cooperation by providing technological assistance through the JICA.

Open House and Lectures on Demand

From time to time, the NILIM opens its facilities to the public, or gives lectures on demand at schools and elsewhere. Please see the web site for information about lectures, symposia, and open house.

Evaluation of the Research

NILIM establishes an autonomous management cycle in which it undertakes external evaluation and internal evaluation on its research policy, research activities and research results from the viewpoint of its mission. With this, NILIM intends to promote and enhance its research activities and raise the motivation of its researchers.

<External Evaluation>
NILIM undertakes fair and transparent evaluation on a periodic basis by external experts with respect to the policy of the research, research activities and their results. Moreover with respect to project researches with NILIM promote intensively, prior evaluation, interim evaluation and posteriori evaluation are being undertaken.

<Events Held in 2011>

| Research Evaluation Committee | June 13, 2011 |
| Research Evaluation Committee Sub-committees |  |
| 1st Sub-committee meetings | July 21, Dec. 13, 2011 |
| 2nd Sub-committee meetings | July 21, Dec. 8, 2011 |
| 3rd Sub-committee meetings | July 21, Dec. 9, 2011 |

Links with Research Institutes and Universities in Japan and Overseas

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<tr>
<th>In Japan</th>
<th>Overseas</th>
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<tbody>
<tr>
<td>Agreements on Cooperation with Related Graduate Schools Tsukuba University</td>
<td>Agreements on Research Cooperation with Research Institutes National Institute of Disaster Management, Ministry of Home Affairs, India Research and Development Center for Road and Bridge (RDCRB), Agency for Research and Development, Ministry of Public Works, Indonesia Institute of Transport Science and Technology (ITST), Ministry of Transport, Vietnam</td>
</tr>
<tr>
<td>Implementation of Joint Research Private sector, universities, Incorporated Administrative Agency research institutes</td>
<td>Conferences held for Research Institutes Asia-Pacific International Symposium etc.</td>
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</tbody>
</table>
Introduction of Facilities

Asahi Office  Tachihara Office
Asahi Office and Tachihara Office are in Tsukuba city and numerous experimental facilities are deployed in the enormous compounds.

1 Tachihara Office
Kyoinkensyu center (National Center for Teachers’ Development)

2 Tornado simulator
The tornado simulator (completed in 2009) (diameter: 1.5m) generates tornado-like vortices used to study the impact of wind pressure and flying debris of tornados acting on buildings.

3 Landslide model experimental facility
At this facility, in order to forecast and prevent disaster from gravel as a result of landslide, research that is designed to elucidate the action soil collapse and mechanism of sedimentation and research on the effectiveness of buffers with respect to the shock of soil collapse are being undertaken.

4 Collision experiment facility
This is an experimental facility that develops, improves and confirms the performance of protective fences, buffer facilities and other traffic safety facilities.

5 Noise experiment facility
Research on experiments on forecasting road traffic noise and peculiarity of sound propagation and experiments on measuring the acoustic characteristics of various acoustic material and noise barriers are carried out in this facility.

6 Asahi Office

7 Shared hydraulic experimental laboratory
Water conduits with various accessory facilities are installed and are used in designing river structures, research on the fluctuation of the river bed, experiments on hydraulic models in order to conduct fundamental experiments required to make improvements.

8 Sanitary engineering and hydrology laboratory
Experimental facilities for development and improving the water treatment process, experimental laboratories for testing bacteria and protozoa in waste water, various chemical analysis equipment for analyzing hazardous materials and hazardous elements in waste water are installed in this laboratory.

9 Marine coastal experiment facility
In order to protect the livelihood of people from the dangers of high tide, high waves, tsunami and coast erosion, marine model experiments on the preservation of the marine coast are being conducted.
Yokosuka Office

10. Three-story wooden school building fire test facility
   It is used for full-size fire testing in order to clarify the safety performance during a fire required of a three-story wooden school building to prepare technology standards based on scientific grounds.

11. Full-scale tunnel experiment facility
   Full-scale tunnel experiment 700 meters in length and with a sectional area of 45.5 m², which is an unprecedented scale in the world, is used to perform a variety of experiments.

12. Test track
   This 6,152 m track is used to conduct field experiments on the relationship between road structures and vehicle operating characteristics. Experiments on ITS and road facilities shown in 15, 16, and 18 are also carried out on and along this track.

13. River hydraulic model test facility
   This 50 m wide and 200 m long indoor facility is used for river hydraulic model tests requiring precise measurements using a variety of instruments, by taking advantage of its characteristics as an indoor structure to prevent any change of the flow patterns of water in the channel or of the shape of its bottom surface under the impact of wind or rain.

14. River model experiment facility
   This is an enormous facility with area of 15 ha that is outdoors. In the site, it is possible to install a maximum of 15 models of rivers.

15. Lighting test facility
   A facility used to test the layout of and the visibility provided by road lighting, it can create a variety of road lighting conditions by varying the type of lighting fixture including LED and the height, angle, and location etc. of the lighting.

16. Full-size overflow channel
   It is used for tsunami overflow testing of coastal dikes with a 1/2 scale which is almost full size, in order to study how to build resilient structures, even if a tsunami exceeds the design level and flows over a coastal dike.

17. Rain and fog environment experiment facility
   With respect to a variety of sensors that detect vehicles and impediments, experiments in evaluating the detection performance in such environments as rain and fog are being conducted.

18. High flow velocity test channel
   A closed square channel capable of carrying water at a flow velocity equal to that during a flood discharge on an actual river, it is used for experiments to clarify erosion resistance during flood discharge by placing large specimens obtained from the actual slope of a levee or from the actual flat plains of high water channels in the closed channel.

19. Actual-size aeration test system
   This system is actual size, and used to investigate the properties of aerators such as the oxygen solubility and water flow in an aeration tank. This system consists of two aeration tanks, one standard type (length 6 m × width 6 m × depth 5.5 m) and one deep tank type (length 10 m × width 3 m × depth 10 m).

20. Pipe model for performance evaluation of investigation TV camera
   This pipe model is able to reproduce the deterioration of sewerage system pipes, and used for the performance evaluation of self-propelled investigation TV cameras, which are used for maintaining pipes, and other survey equipment.

21. Intersection experiment facility
   A variety of sensors for detecting vehicles, impediments, and pedestrians and communication beacons that conveys the road traffic information and the road surface situation to vehicles are installed and various experiments on APBI are being conducted.

22. South curve section
   This section of the track features its sharp curve design with a high superelevation rate, which enables a vehicle to travel at the design speed of 120 km/h (100 km/h at the north curve section) with no steering action, where the centripetal force is balanced by the weight component of the vehicle. The curve radiiues are 222.5 m and 147.5 m at the south curve section and the north curve section, respectively.