



Ministry of Land, Infrastructure, Transport and Tourism
National Institute for Land and Infrastructure Management

NILIM



Damage to levees due to flooding



Survey of damage to bridges



Steel sheet pile thickness measurement



Survey of damage to houses caused by strong winds

Research Institute that creates
the society of the future

2020



<http://www.nilim.go.jp/>

Mission of the National Institute for Land and Infrastructure Management (NILIM)

As the only national research organization in the public capital/housing field, our goal is to use technology as the driving force to create an attractive country and society that are safer, more secure, and more vigorous, both now and in the future.

NILIM research policy (excerpt)

Basic stance

- Participate in policy development of the Ministry of Land, Infrastructure, Transport and Tourism as a technical specialist taking into account the administrative perspective among other aspects
- Return advanced, comprehensive technical capabilities cultivated by research activities to practical work fields
- Connect to the creation of new policy by insight into the future image of national land/society and promotion of technology development

Activities forming the basis

- Research and development that supports planning, drafting, and spreading the policy for land, infrastructure, transport, and tourism (pp. 3–14)
- Advanced technical support for response to disasters/accidents and improvement of countermeasure techniques (pp. 15–16)
- Support for improvement of the field technology of regional development bureaus (p. 17)
- Collection, analysis and management of data forming technical basis of policy formation, and return to society (p. 18)

Click here for the full research policy. →

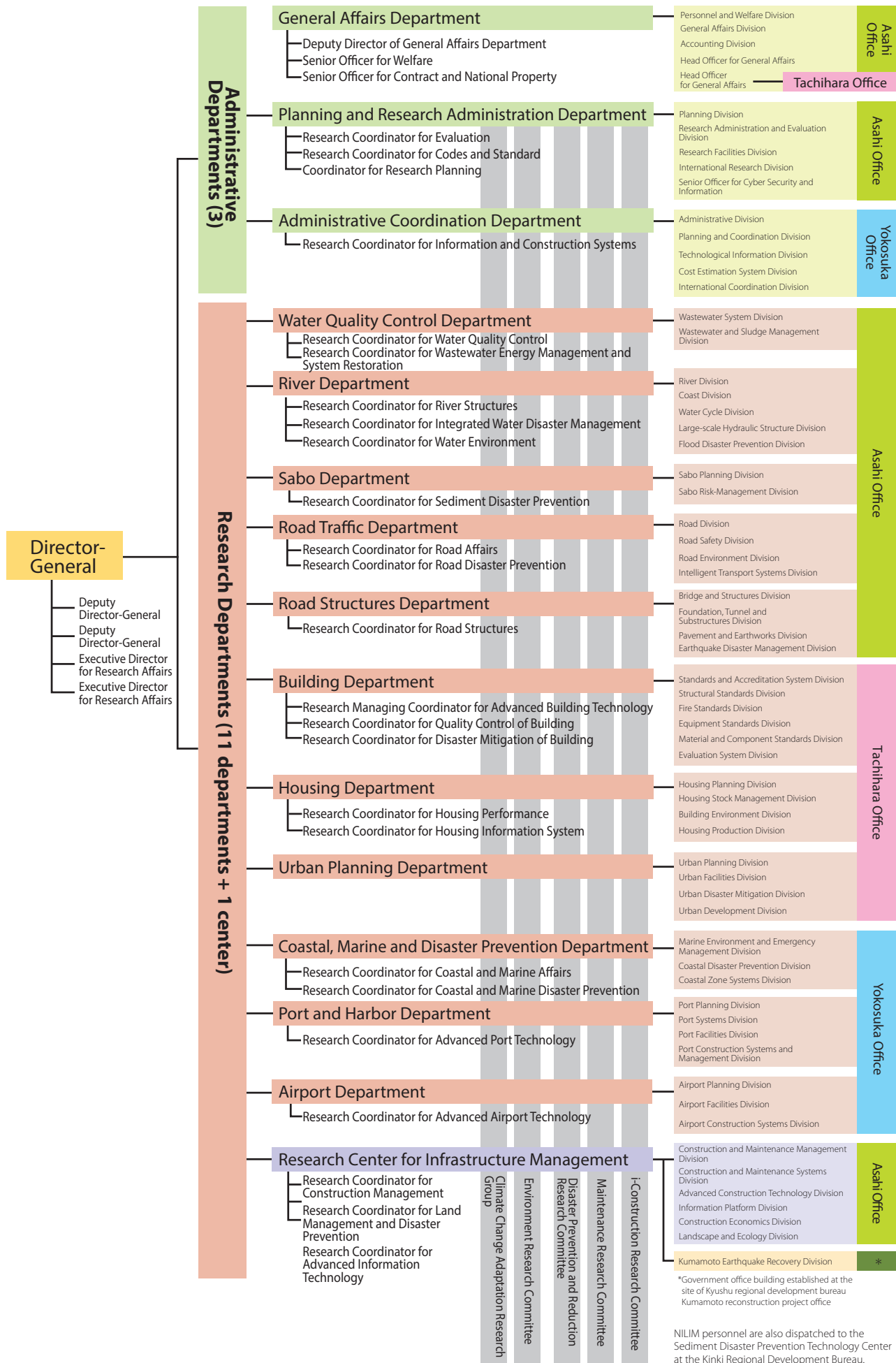


Yokosuka Office



Asahi and Tachihara Offices

Organization



Research and development that supports the planning, drafting, and

The main research themes of NILIM in FY 2020

- 1. Research to improve national resilience and protect the lives and livelihoods of the people ... 05 ~ 10
- 2. Research to increase the productivity and growth potential of society ... 11 ~ 12
- 3. Research to create affluent and comfortable communities and environments ... 13 ~ 14

P. 11 Improvement of productivity at construction sites using 3D models

P. 10 Development of diagnostic and monitoring technologies to extend the service life of dams

P. 7 Protecting life and livelihood from strong winds

P. 5 Protecting life and livelihood from flooding

P. 8 Monitoring the behavior of infrastructure during an earthquake for quick restoration

P. 12 Automation and labor saving using AI (e.g. sewage treatment plant operation)

P. 6 Quickly responding to damage to sewage treatment facilities and protecting people's livelihoods

P. 9 Responding to aging transportation infrastructures

P. 14 Regional revitalization through the development of a new port town

P. 8 Ensuring the safety and security of airports and port users



P. 6 Protecting life and livelihood from sediment and flood damages

P. 10 Comprehensive management of sewerage pipelines that extend 12 times around the globe

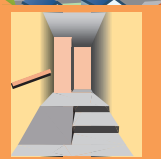


P. 13 Regional revitalization through support for smart city promotion

P. 13 Support for rural cities through wide-area cooperation in urban functions

P. 12 Realization of automated driving with support from infrastructure

P. 14 Visualizing the effects of barrier-free accessibility to match residents with barrier-free access



1. Research to improve national resilience and protect the life and livelihood of the people

(i) Research on weather disasters that are increasingly becoming more intense

1 Protecting life and livelihood from flooding

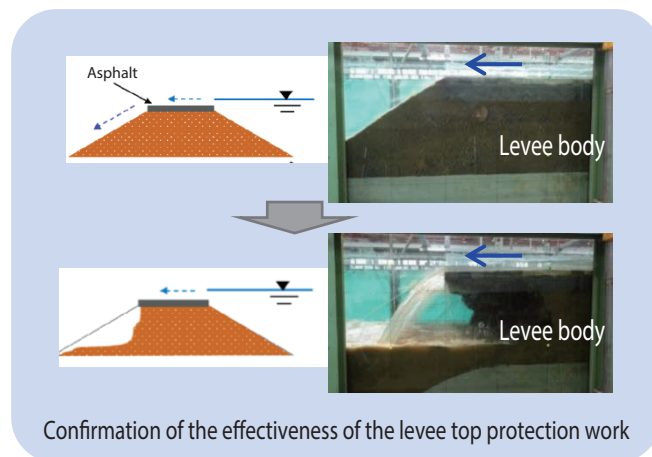
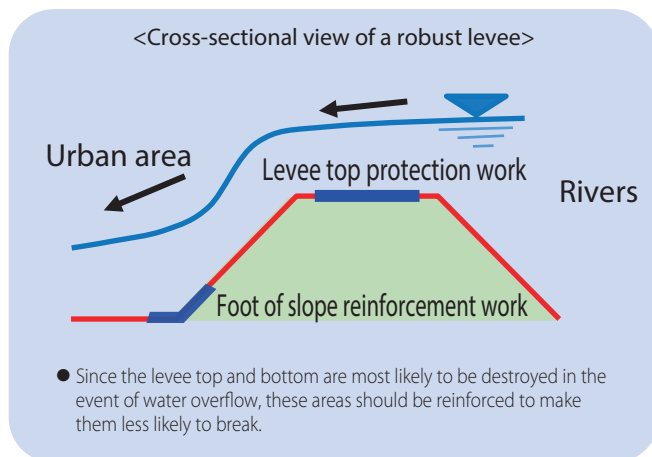


The research will contribute to the realization of a safer and more secure society against floods by developing levees that are resilient and that protect people's livelihoods and by developing systems to communicate the risks of flooding.

- The effects of climate change, such as frequent heavy rainfall disasters, have become apparent in recent years.
- A notable example was Typhoon No. 19 (Hagibis) in 2019, which caused widespread and multiple floods at the same time.
- In addition to conventional countermeasures, it is necessary to prepare for major floods through both infrastructure and systems by implementing crisis management measures in recognition of the fact that major floods that cannot be prevented by facilities will inevitably occur.

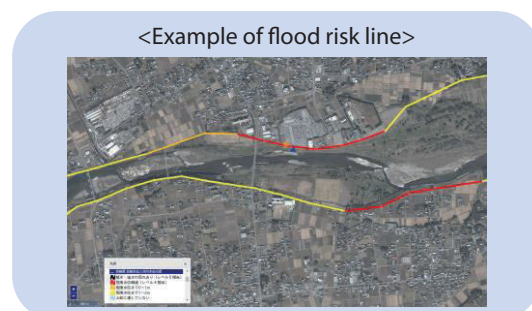
Research on strengthening levees as crisis management

- Development of more effective and efficient countermeasures based on the status of the construction of countermeasures to make a structure robust (crisis management type countermeasures through infrastructure) and examples of damage.



Visualization of flood risk using flood risk lines

- Development of technology and systems to communicate flood risk (e.g. the risk of river flooding and the degree of imminence) in real time and in an easy-to-understand manner to encourage accurate decisions and actions to evacuate in the event of a flood
- Displaying color-coded lines on the map at hundreds of meter intervals along the river according to flood risk



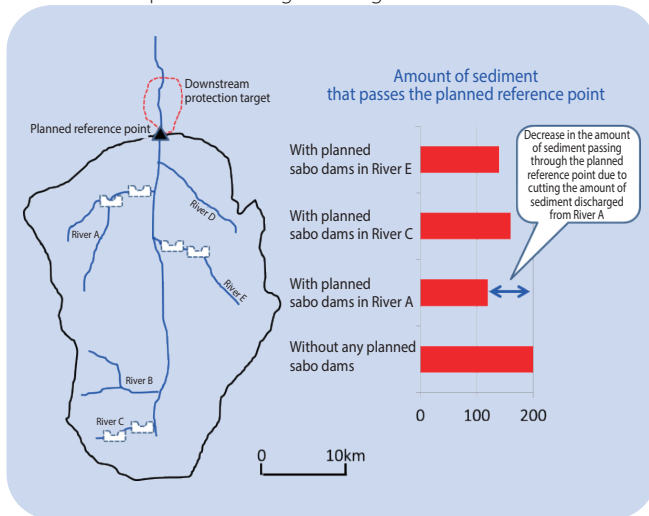
(River Department)

This research contributes to the prevention and reduction of damage by suggesting effective placement methods of Sabo(sediment control) facilities and the rapid identification of damaged areas by developing methods for identifying the location of sediment disasters using satellite images.

- In 2019, Typhoon No. 19 (Hagibis) caused the largest-ever number of sediment disasters associated with the typhoon. As seen in this case, sediment disasters have been occurring simultaneously over a wide area in recent years.
- Expansive damage was caused by sediment and muddy water washed into residential areas downstream.

A study on the layout plan of sediment and flood damages control facilities

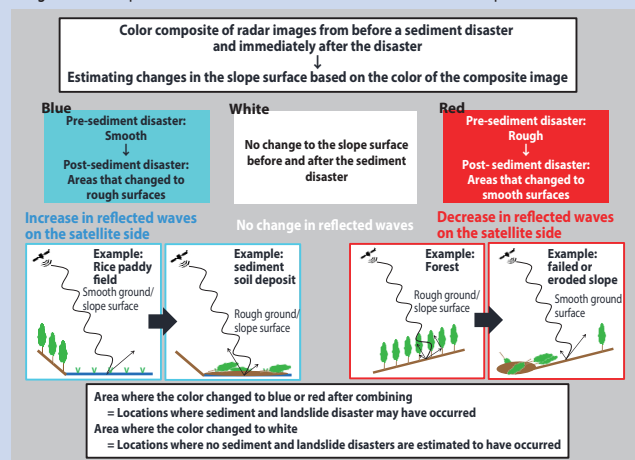
- Technical guidelines were prepared, which includes the concepts and methods to analyse the effective placement of erosion control dams (i.e. sabo dams) by identifying tributary areas that make a significant contribution to riverbed fluctuations near the downstream protection target through numerical simulations.



Early detection of sediment and landslide disasters using SAR images

- By processing SAR images (radar images) obtained from satellites, a demonstration experiment is carried out to improve speed and accuracy and to propose a better method for early detection of sediment and landslide disaster sites.

<Changes in the slope surface before and after sediment disasters are represented with colors.>



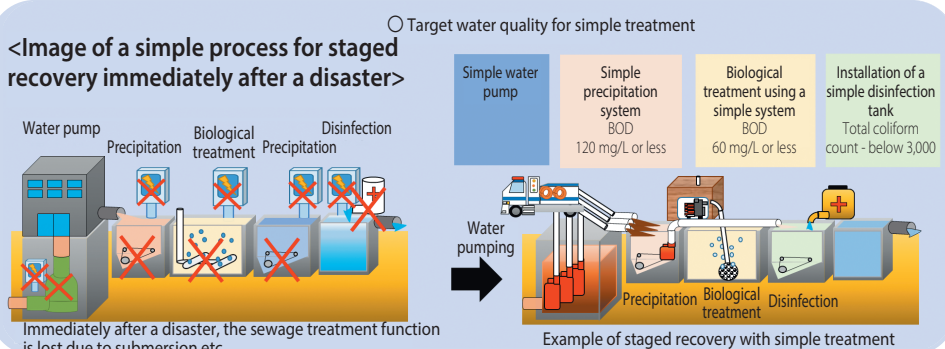
(Sabo Department)

This research contributes to maintaining a sanitary living environment by providing simple sewage treatment even when sewage treatment facilities lose their functions immediately after a disaster and untreated sewage overflows.

Research on measures for securing sewage treatment functions at the time of emergency restoration

- Because of flooding caused by Typhoon No. 19 (Hagibis) in 2019, a sewage treatment plant was submerged and its treatment function was lost.
- It is necessary to establish simple treatment operation and management methods for staged restoration of sewage treatment plants as soon as possible, while ensuring the minimum functions of the plants to prepare for an event of similar damage in the future.
- The appropriate disinfection method for overflowing water, the operation and management of simple treatment after a disaster etc. were clarified and organized through experiments using actual sewage.

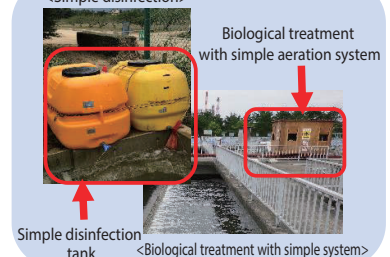
<Image of a simple process for staged recovery immediately after a disaster>



<Sewage overflow from a sewage treatment plant inflow conduit>



<Simple disinfection>



(Water Quality Control Department)

4 Protecting life and livelihood from strong winds

This research contributes to the realization of a safe and secure lifestyle that is resistant to wind damage by studying the strengthening of the joints in building exteriors, sufficient measures for lashing containers, and the creation of street spaces without utility poles.

Research to contribute to the improvement of wind resistance of building exterior materials and roofs

- The strong winds of Typhoon No. 15 (Faxai) in 2019 damaged the exterior of buildings (roof tiles, fittings, and glass at openings, etc.) and wooden roofs.
- Improving the wind resistance of exterior materials and wooden roofs is an urgent issue.
- Interviews and other surveys of damaged buildings are conducted to determine the actual damage.
- The following (i) to (iii) were studied to clarify the performance of exterior materials and wooden roofs against strong winds and to ensure and improve wind resistance. The results were used to create technical documents (e.g., guidelines) to supplement the Building Standards Act.
 - (i) Development of a strength test and evaluation method for joints of outdoor fittings (sashes)
 - (ii) Review of current guidelines for roof tiles
 - (iii) Development of specifications for the roof sheds of wind-resistant wooden roofs

<Building damage caused by a typhoon>



Inside a store with damage to the roof and exterior materials



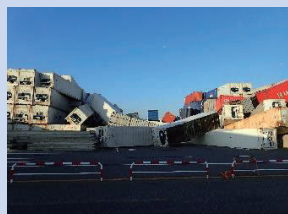
A house with a damaged roof shed

Wind resistance measures for containers

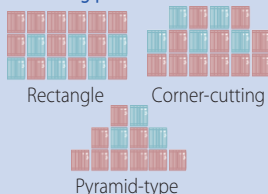
- Containers collapsed in port areas during Typhoon No. 21 (Maymay) in 2018 and No. 15 (Faxai) in 2019.
- Measures to prevent the collapse of containers during typhoons and other strong winds are important.

- A quantitative method of calculation is proposed to evaluate the wind resistance performance of containers based on how container models are stacked and lashed by setting three cases of tiers (three to five tiers), three cases of stacking patterns, and four cases of lashing patterns.

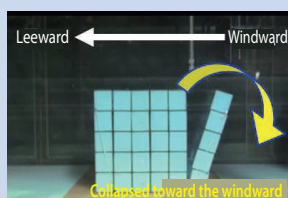
< Collapse of containers caused by typhoons >



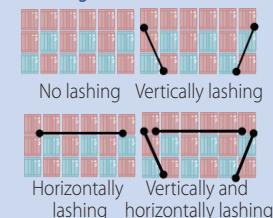
<Stacking pattern> Three cases



< Collapse experiment using container models >



< Lashing method > Four cases



Research to speed up zero utility pole projects

- Typhoon No. 21 (Maymay) in 2018 and other strong wind conditions have caused utility poles to collapse, which further increased the momentum to eliminate utility poles.
- Speeding up and reducing costs are essential to accelerate the shift to no-utility pole systems.

- Research on methods for smooth consensus building in planning and implementation
- Research on improving the efficiency of construction
- Reflected in technical reference books for consensus building and construction efficiency improvement

< Damage caused by typhoons >

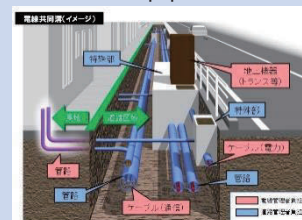


[Shinge, Sennan City, Osaka]



[Okubo-cho, Moriguchi City, Osaka]

< Image of wires and other equipment buried in the ground >



(ii) Disaster prevention and mitigation against earthquakes etc.

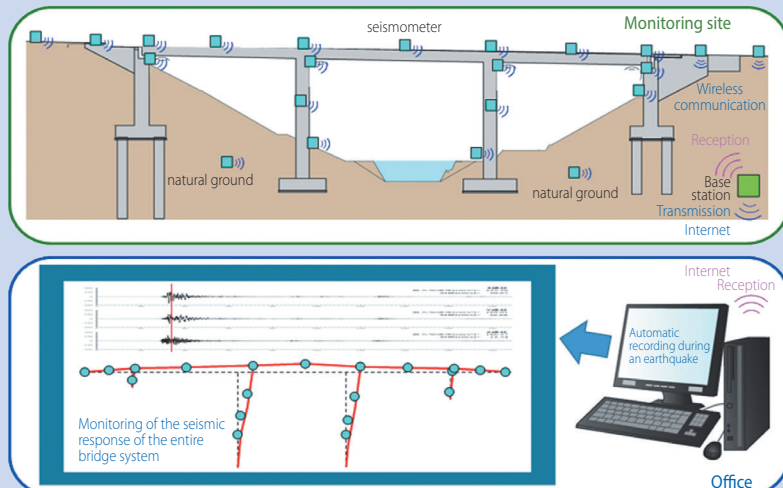
1

Monitoring the behavior of infrastructure during an earthquake for quick restoration

By developing a monitoring system for the behavior of critical infrastructures (such as bridges) during earthquakes, this research contributes to rapid restoration through the immediate detection of damaged areas.

Development of a system for the immediate detection of damage to critical infrastructures and a strong-motion monitoring system

< Outline of the Strong Motion Monitoring System >



- The efficiency of inspections immediately after an earthquake must be improved.
- It is necessary to clarify the behavior of the entire infrastructure system and develop design methods and countermeasures based on the results.
- Strong motion monitoring system (left) for the entire infrastructure system using wireless communication
- Development of an instant damage detection function to detect and report the damage caused by an earthquake etc.

< Put the seismometer >



(Road Structures Department)

2

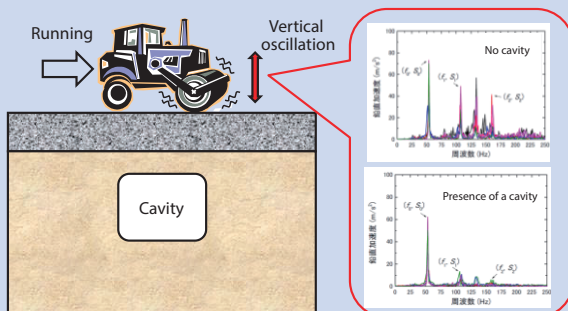
Ensuring the safety and security of airport and port users

This research contributes to ensuring the safety and security of airport and port users by developing a method to quickly inspect airport pavements immediately after a disaster, and by building a system to track the current position of work vessels.

Research on the bearing capacity evaluation of airport pavements under earthquake disaster

- When liquefaction occurs in an airport, it is desirable to be able to easily and quickly confirm the existence of cavities underneath the airport pavement without the use of special equipment.
- A simple and rapid method was developed to detect the loss of the bearing capacity of airport pavements due to cavities created by liquefaction by measuring the vertical acceleration of oscillating rollers running on airport asphalt pavements.

< Image of an inspection using an oscillating roller >

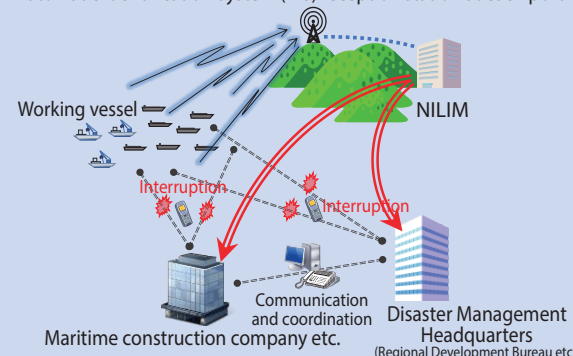


Advancement of real-time management systems for work vessels

- In order to ensure the continuation of port functions after a large-scale disaster, it is essential to make rapid decisions on the availability of work vessels for reopening of navigation channel and emergency recovery of port facility.
- Development of a system to track the current position of working vessels and automatically detect anchor dragging and drifting
- Exploring ways to improve the accuracy of detecting anchor dragging and drifting and utilize the system for immediate assessment of situations upon the onset of a disaster

< System overview >

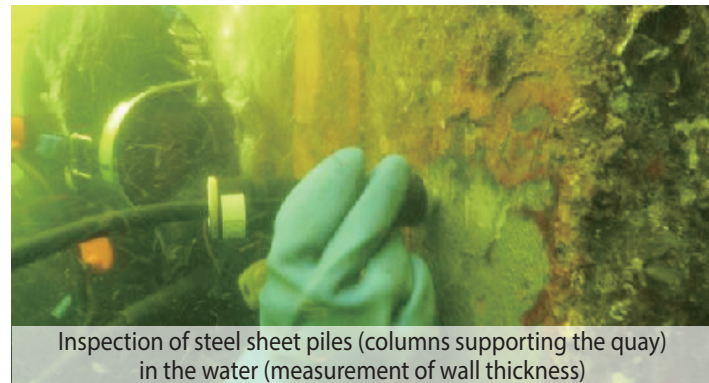
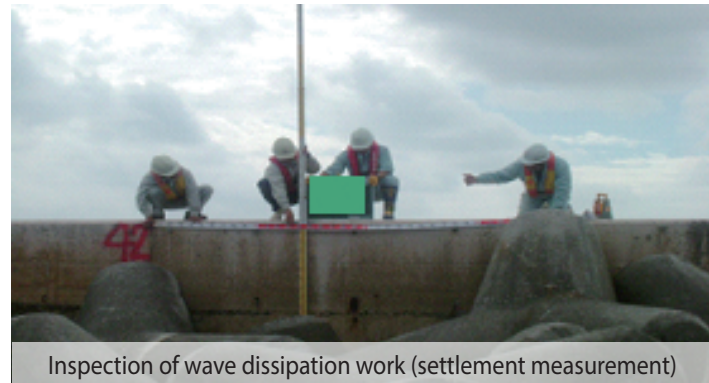
Automatic Identification System (AIS) reception station at each port



(Airport Department, Harbor Department)

(iii) Infrastructure maintenance and management

1 Responding to aging transportation infrastructures

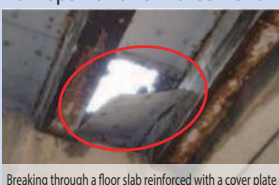


Based on the results of legally required inspections of road bridges and port facilities, this research will standardize more reasonable repair/reinforcement design methods to contribute to more efficient and effective inspections and repairs.

Development of next-generation technical standards that enable the use of various inspection and monitoring technologies and repair/reinforcement technologies

- Legally required road bridge inspection every five years started in FY 2014.
- The first stage ended in fiscal year 2018.
- Improving the quality of periodic inspections, streamlining the inspection process, and extending the service life of road bridges are essential to preparing for further aging and intensifying natural disasters.
- The legally required inspections moved to the second stage in fiscal year 2019.
- Preparation of reference materials to promote the introduction of various new technologies for periodic inspections and monitoring.
- Research was conducted to establish technical standards for repair and reinforcement so that reasonable repair and reinforcement could be carried out.

<Deterioration of members for repair and reinforcement>



< Examples requiring improvement of the quality of periodic inspections >



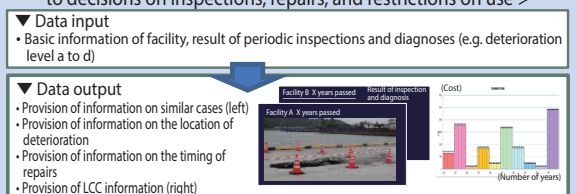
Schematic and effective maintenance and management of harbor facilities

- Quays are exposed to severe environments, such as salt damage, and it is difficult to ascertain the deterioration and damage of underwater areas.
- The establishment of maintenance plans is mandatory.
- Utilization of a database of maintenance and management history for efficiency improvement and reducing labor
- Accumulation of data enables the prediction of changes and deterioration of facilities.
- An information provision system that utilizes accumulated data and deterioration prediction information was developed to help make decisions on inspections, repairs, and usage restrictions.

< Deterioration of harbor facilities >



< Outline of the information provision system that contributes to decisions on inspections, repairs, and restrictions on use >



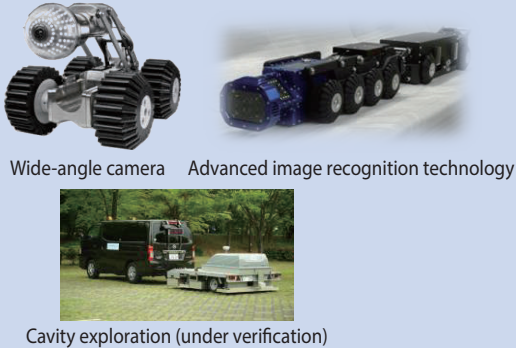
(Road Structures Department, Port and Harbor Department)

This research contributes to the realization of efficient and effective inspections and repairs by developing methods for selecting inspection and investigation technologies that match the actual conditions of cities and proposing methods for optimizing maintenance and management through the use of information.

Total management of sewer pipelines

- The stock of sewerage pipelines is huge, amounting to approx. 480,000 km at the end of fiscal year 2018. The number of old pipes that have been laid down for 50 years is expected to increase at an accelerated rate, and the number of pipeline facilities to be reconstructed for the first time is expected to increase rapidly.
- Approximately 3,300 road collapses occur each year due to aging sewerage pipes etc., but only about 30% of cities carry out inspections and surveys. And with the number of sewerage workers decreasing, there are issues with the enforcement system and other situations.
- A selection method for inspection and investigation techniques based on the actual conditions of a city, such as installation conditions and types of pipe materials was developed (e.g. identifying and prioritizing accident-prone areas for inspection).
- Based on the results of surveys and the characteristics of repair and reconstruction methods (performance and construction), the most appropriate repair and reconstruction method is proposed using maintenance and management information.

< Inspection and investigation machine that has gone through multiple stages of development >



<Accidents due to the aging of pipelines>



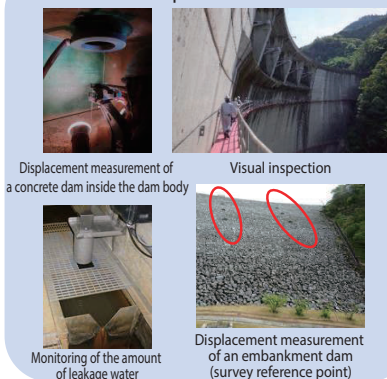
(Water Quality Control Department)

By developing nondestructive methods to visualize the internal conditions and by proposing methods of utilizing satellite data, this research contributes to the efficiency of the safety management and life extension of large-scale dam structures.

Development of technologies to diagnose and monitor the soundness of dam structures for their life extension

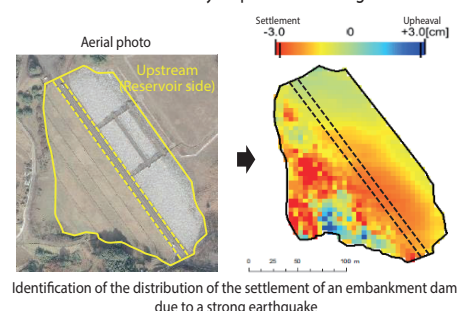
- Visual inspection from the surface and various types of measurements are the basics. Still, there are some difficulties unique to dams, such as the large inspection area and the difficulty of working at high elevations, and the large number of objects to be managed including the dam body, discharge facilities and reservoir slopes.
- By using only conventional methods to investigate the condition of the dam body, such as surface surveys and core sampling, there is a limit to the ability to understand the condition of the dam body itself, including the inside of it.
- The use of satellite data allows the identification of changes (displacement) in the surface of a whole dam body and the wider area around the dam including reservoir slopes.
- Technology for nondestructive tests to investigate the condition of invisible area such as inside the dam body is being developed using elastic waves and other techniques.

< Basic inspection method >

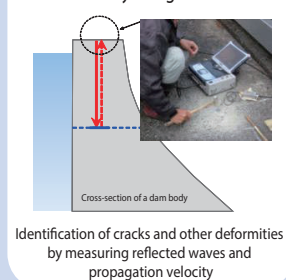


< Diagnosis and monitoring using new technologies >

Measurement of dam body displacement using satellite SAR



Investigation of the inside of the dam body using elastic waves

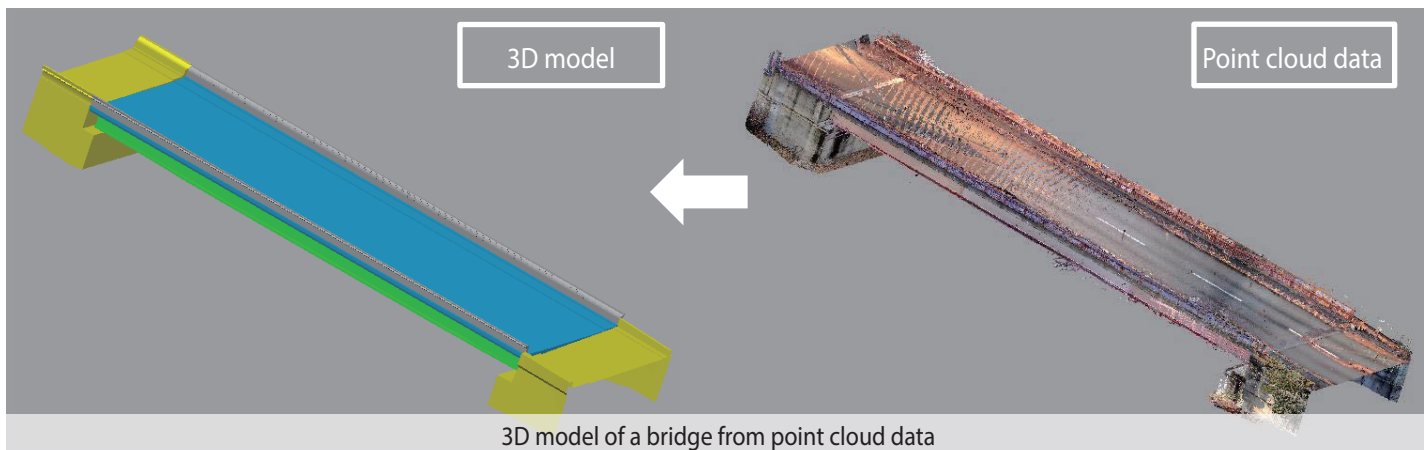


(River Department)

2. Research to increase the productivity and growth potential of society

1

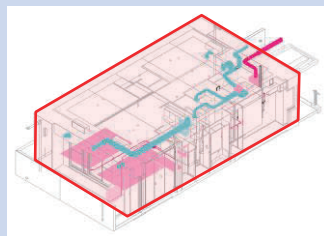
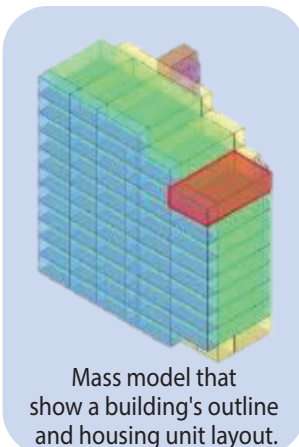
Improvement of productivity at construction sites using 3D models



The development of 3D models improves the efficiency of construction and maintenance management in a wide range of fields, including bridges, riverbanks, harbors, and buildings, and contributes to improvements in the productivity of construction sites.

Research and development of BIM (Building Information Modeling) for public housing construction projects

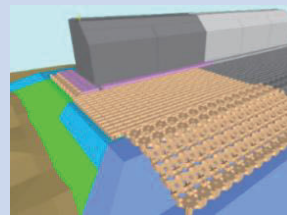
- BIM (*1) is created on a computer with 3D shape information and property information of the building.
- Researching the effects of introducing BIM to housing projects and creating draft guidelines for the use of BIM.



Development of CIM introductory guidelines (port)

- We developed a draft of the CIM (*2) introductory guidelines (port) and created drawings of the CIM models for the breakwater and quay (sheet-pile type) as port facilities following the pier.

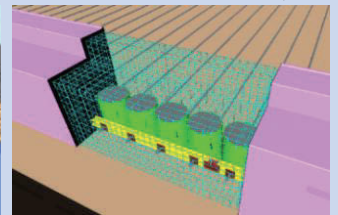
<CIM model (breakwater)>



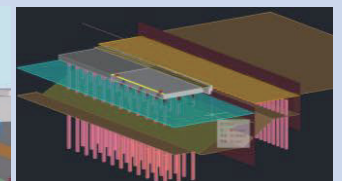
< Image of a pier construction simulation model >



<CIM model (sheet-pile quay)>



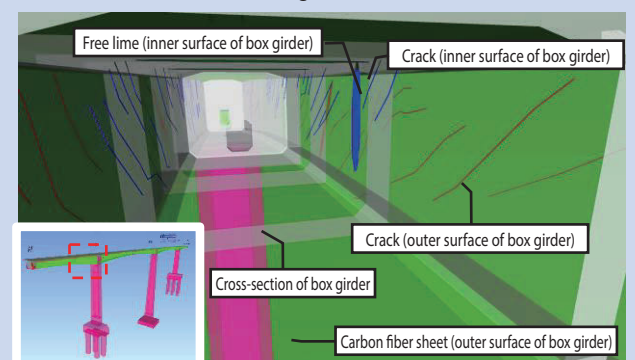
<CIM model (pier)>



Recording and storage of information necessary for maintenance and management after repairs

- Research on how to record and store the information of the damage and repairs
- A proposal for a method of recording and storing information using a 3-D model is created assuming that the information will be used in maintenance and management.
- For example, it is expected to make it easier to recognize the location of cracks (right).

< Information management with 3D model >



*1 Abbreviation of Building Information Modeling

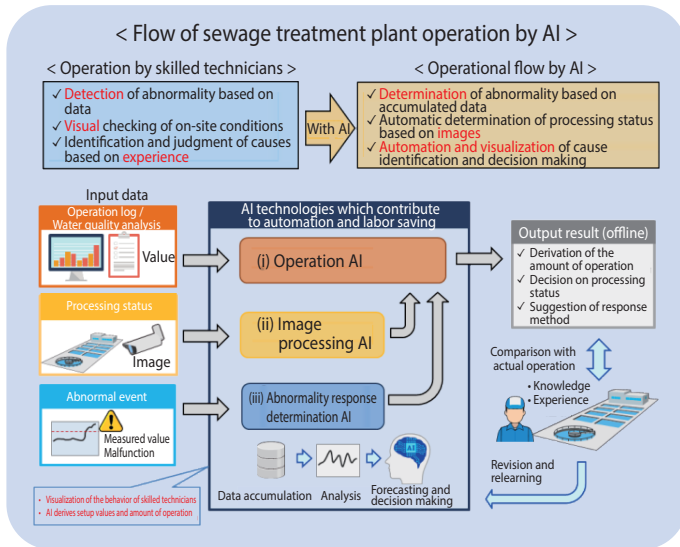
*2 Abbreviation of Construction Information Modeling

2 Automation and labor saving using AI

This research contributes to the realization of a society where work is automated and saves labor through the development of methods for operating sewage treatment plants and monitoring traffic volume using AI.

Automation and labor saving of sewage treatment plant operation using AI

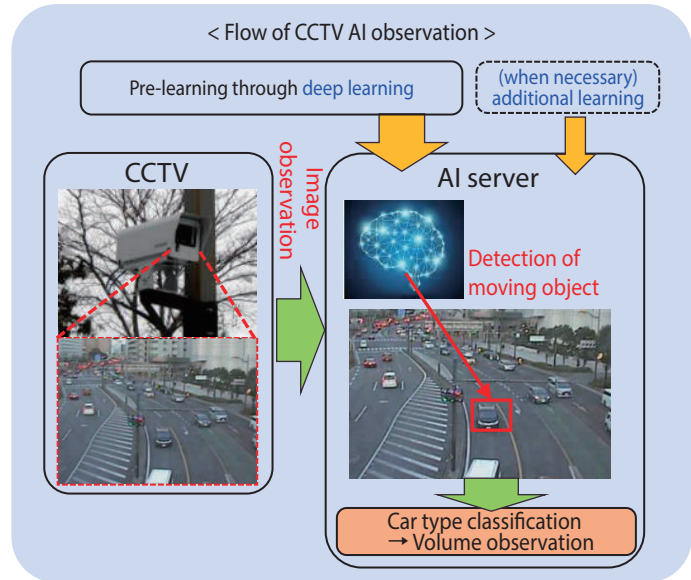
- Comparing conventional operations performed by skilled technicians with those performed by AI, the possibility of AI ensuring reliability for practical use, and methods for introducing AI were verified.



* Abbreviation of closed circuit television

New traffic volume survey using CCTV and AI

- AI analysis is introduced to existing CCTV (*) to achieve a low-cost system for constant traffic volume observation



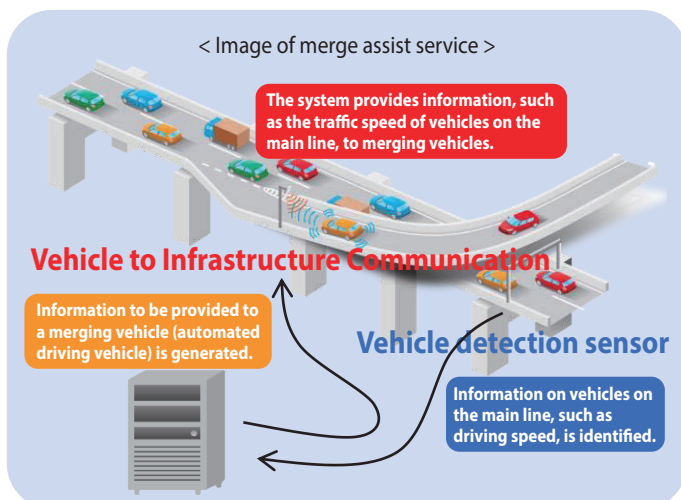
(Water Quality Control Department, Road Traffic Department)

3 Realization of automated driving with support from infrastructure

By conducting demonstration experiments through public-private partnerships in hilly and mountainous areas and airports, developing a mechanism to provide information to vehicles, and developing traffic simulation models, this research contributes to the realization of automated driving.

Technology development toward the practical use of next generation cooperative ITS

- Information ahead that cannot be detected by a car sensor needs to be provided from the roadside.
- Development of a system to detect and provide information on traffic conditions of the main line at merge points

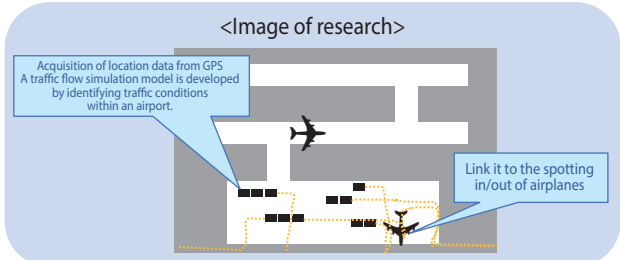


Research toward the promotion of automatization of vehicles that support airport operations

- An increase in demand for air transportation due to increased inbound tourists
- Shortage of labor associated with a declining productive-age population

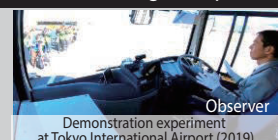
Development of traffic simulation models for airports

- Safety and efficiency assessment
- Examination of facilities required
- Examination of the rules to operate autonomous vehicles etc.



Demonstration experiment on automated driving at airports

In FY 2019, demonstration experiments on automated driving were conducted at four airports, including Tokyo International Airport.



(Road Traffic Department, Airport Department)

3. Research to create affluent and comfortable communities and environments

1 Regional revitalization through support for smart city promotion

By surveying advanced cases and developing evaluation methods, this research supports the promotion of smart cities (*) by local governments, contributing to increased productivity and convenience in the lives of citizens.

Development of evaluation method for smart city plan in solving major urban problems to support its promotion

- The theme of smart cities has become multifaceted in the areas of transportation, livelihood support, disaster prevention, crime prevention, and tourism, and new technologies have become more diverse.
- However, because new technologies that can solve various urban problems have not been systematically organized, and evaluation methods for smart city plan in terms of the effectiveness of installing new technologies in solving urban problems have not been established, support is needed for local governments to examine the direction of smart cities.
- Survey on advanced cases of smart cities inside and outside of Japan
- Systematic organization of new technologies that can be used to solve various urban problems
- Based on the above, an evaluation method for smart city plan in terms of the effectiveness of installing new technologies in solving major urban problems was developed.

*What is a smart city?

A sustainable city in which management (planning, development, management and operation, etc.) is carried out to address various issues that the city is facing by utilizing new technologies, such as ICT, to achieve optimization in the overall aspects.

< Example of using new technologies in smart city initiatives in and outside of Japan >



Transport and livelihood support (automated driving bus)



Maintenance and management, disaster restoration, and livelihood support (drones)



Transport, crime prevention, disaster management, and environment (CCTV [Incheon City in South Korea])



Environment and tourism (heat map based on SNS data)

(Urban Planning Department)

2 Support for rural cities through wide-area cooperation in urban functions

By creating a guideline to support the formulation of plans for wide-area coordination (*), this research supports the promotion of wide-area coordination of urban functions and contributes to reducing the burden on local finances to maintain urban functions.

Research on wide-area coordination of urban functions in rural cities

*What is wide-area coordination?

The development and provision of administrative services and other services through collaboration and sharing of resources among multiple local governments

- In rural cities, where populations are rapidly shrinking, individual local governments are facing difficulty in maintaining high quality urban functions.
- Therefore, multiple local governments work together and share costs to provide high quality urban functions to their residents.
- A problem, on the other hand, is lowered accessibility and convenience due to the consolidation of facilities.
- Compilation of cases on wide-area coordination in urban functions
- Compilation of methods for examining measures to improve the convenience of intercity mobility
- These are reflected in the guideline for preparing site optimization plans based on the Act on Special Measures concerning Urban Reconstruction.

< Example of "a hospital redeveloped as the integration of a bus terminal" >



A hospital with advanced medical functions was redeveloped in the center of a city using the wide-area coordination system.

Travel to the hospital became inconvenient for patients living in distant areas.
↓
The accessibility was improved by integrating the hospital with a bus terminal.

(Urban Planning Department)

This research contributes to the revitalization of waterfront areas and regional areas through developing spatial composing and planning methods that are keys to the waterfront redevelopment.

Promotion of the waterfront redevelopment with new approaches

- The revitalization of waterfront areas is the core of regional revitalization in a society with a declining population.
- On the other hand, regional resources in waterfront areas, such as seaside spaces, are valuable assets to them, but they are not fully utilized at the present.
- Regional invigoration measures that utilize the regional resources of coastal areas are necessary to increase tourists and visitors
- A guideline for research, planning, and spatial composing methods for the waterfront redevelopment with new approaches will be developed.
- The waterfront redevelopment is promoted while supporting local projects and discussing and studying with experts.

< Example of waterfront utilization >

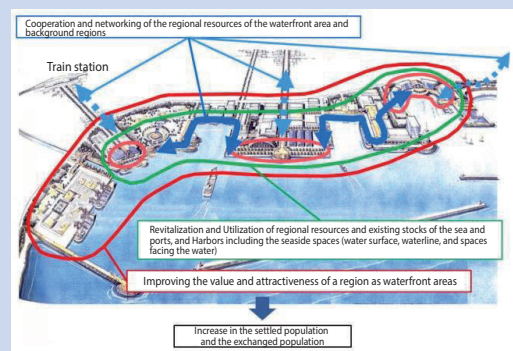


Occupation use and utilization of water surface



Utilization of space on seawalls

< Image of a new waterfront areas >



(Coastal, Marine, and Disaster Prevention Department)

By establishing a method for visualizing the barrier-free effect of housing, this research evaluates its performance and contributes to the provision of an appropriate barrier-free environment that suits the conditions of the occupants.

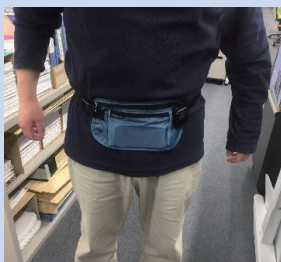
Establishment of a method for visualizing the effect of providing barrier-free facilities that suit different life stages

- In recent years, there has been significant progress in making new barrier-free housing. On the other hand, it is also necessary to promote the barrier-free renovation of existing houses. Yet, the effect of barrier-free housing, which is a comprehensive evaluation of the degree of reduction in the burden of daily life activities taking into account the cost of the renovation, has not been clarified.
- The barrier-free performance of housing is evaluated by visualizing the ease of activities in the living environment using the amount of physical activity (how much a person usually moves) as an indicator.
- Monitoring surveys and physical activity measurements are conducted, and proposals are made to policies for effective housing renovation methods tailored to the characteristics of users.

< Monitoring survey >



Activity measurement
(use of a vacuum cleaner)

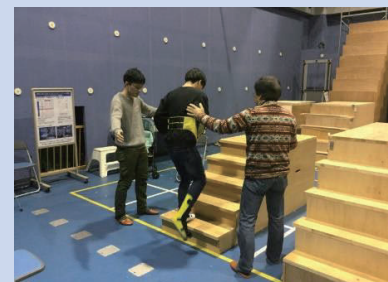


Wearing a simple physical
activity meter and smartphone

< Measurement of the physical activity >



Self-propelled wheelchair



Going up and down stairs

(Housing Department)

Advanced technical support for response to disasters/accidents

Results from dispatch of TEC-FORCE by NILIM during the past three years

When a disaster occurs, in response to requests from the disaster region, NILIM sends its own research personnel with advanced technological expertise in various fields to the disaster region. When a particularly severe disaster has occurred, it sends TEC-FORCE*, etc. to give stronger support for measures to prevent secondary disasters and to reconstruct the region.

In recent years, we dispatched experts to areas hit by torrential rains in northern Kyushu in FY 2017, torrential rains in July 2018, the Eastern Iburi earthquake in Hokkaido in 2018, and Typhoon Nos. 15 (Faxai) and 19 (Hagibis) in 2019, among others.

* Technical Emergency Control Force: Team dispatch system established in FY 2008 by the Ministry of Land, Infrastructure, Transport and Tourism in order to respond to a large-scale natural disaster by surveying disaster damage and providing local governments etc. in the disaster regions with technical assistance.

Dispatch history

FY 2019: 8 disasters
156 person-day
FY 2018: 15 disasters
215 person-day
FY 2017: 11 disasters
91 person-day

2018 Hokkaido Eastern Iburi earthquake (September 2018)

Atsuma and other areas in Hokkaido



Damage survey from a helicopter

Legend

Solid line: Disasters to which NILIM dispatched TEC-FORCE
Dashed line: Disasters other than those mentioned above

Heavy rain in Northern Kyushu (Jul. 2017)

Asakura City, Fukuoka Prefecture, etc.



Survey of Kagetsu River

[Typhoon-caused disasters in 2019] (Typhoon No. 15 (Faxai) and No. 19 (Hagibis))

Minamiboso City, Kyonan City, and Tateyama City, Chiba
Tomioka City, Tsumagoi Village, Agatsuma County, Gunma
Marumori Town, Miyagi and Mito City, Ibaraki
Fukushima City, Motomiya City, Kooriyama City, Iwaki City, and Kunimi Town, Fukushima
Nagano City, Ueda City, and Saku City, Nagano, and other locations



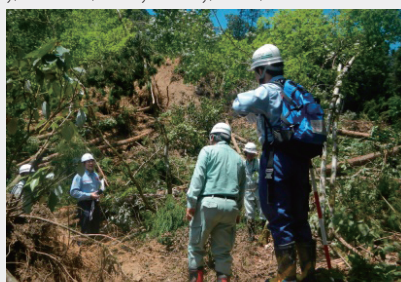
Status of sewage purification center surveys

Heavy rains in July 2018

Fukuchiyama City, Kyoto; Kurashiki City, Okayama; Hiroshima City, Hiroshima; Matsuyama City, Ehime, and other locations



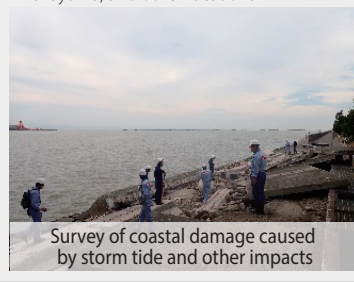
Damage investigation of an inundated water treatment facility



On-site investigation of a landslide dam

Typhoon Jebi (Sept. 2018) (Typhoon No. 21 (Maymay))

Osaka City, Osaka, and Kobe City, Hyogo
Nishinomiya City, Hyogo, and Wakayama City, Wakayama, and other locations



Survey of coastal damage caused by storm tide and other impacts

and improvement of countermeasure techniques

Technical support for the damage caused by Typhoons No. 15 (Faxai) and No. 19 (Hagibis) in 2019

Typhoon No. 15 (Faxai) (Boso Peninsula Typhoon of 2019) occurred in September 2019 and Typhoon No. 19 (Hagibis) (East Japan Typhoon of 2019) in October 2019. Responding to requests from the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Regional Development Bureaus, Miyagi Prefecture, Nagano Prefecture, Ibaraki Prefecture, and Chiba Prefecture, officials were dispatched to the affected areas immediately after the disaster to provide technical support.

- Investigation of damage to bridges, sewerage facilities, wooden buildings, etc. caused by flood inundation and sediment and landslide disasters
- Identification of the status of emergency responses and technical advice on emergency recovery efforts and other aspects



Investigation of Hounji Bridge on National Road 20



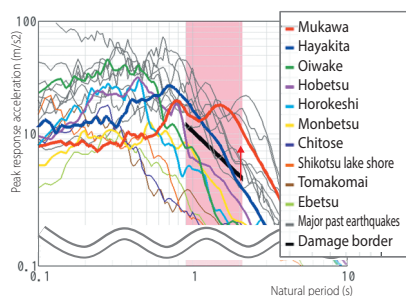
On-site investigation of landslide disaster in Tomioka City

Minimization of Information blank time After an earthquake

In the event of a large-scale earthquake, we make effective use of existing facilities, such as CCTV cameras and satellites, and thereby contribute to the prompt acquisition of extensive information. We contributed to the identification of conditions after the earthquake in Eastern Iburi, Hokkaido, in September 2018 and the earthquake off the coast of Yamagata in June 2019.

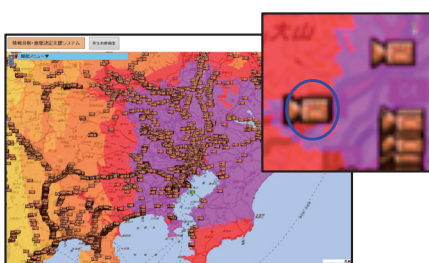
■ Spectrum analysis information

By comparing the damage line, the scale of damage is quickly estimated.



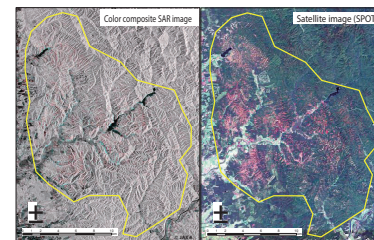
■ List of CCTV cameras

Prompt view of situations through the extraction of cameras in areas of high seismic intensity



■ SAR image interpretation support system

Helicopter survey in areas selected based on interpreted outcomes

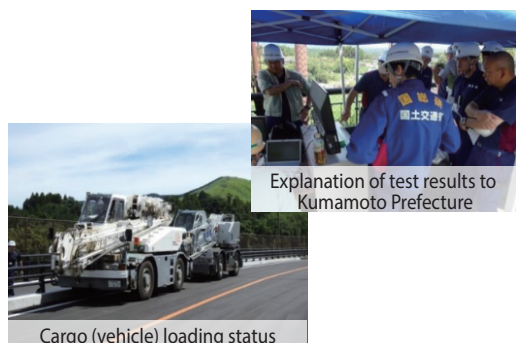


Example of the detection of slope deformation based on SAR images (the earthquake in Eastern Iburi, Hokkaido, in 2018)

Restoration support for the Kumamoto earthquake in 2016 - Opening of the Tawarayama Tunnel Route

In April 2017, the Kumamoto Earthquake Recovery Division was established for the first time at a disaster recovery site by NILIM in order to accelerate restoration efforts after the Kumamoto earthquake. In 2019, the restoration work at Tawarayama Bridge and Okirihata Bridge on the Tawarayama Tunnel Route (prefectural road) was completed, and the use of the same route as before the earthquake was resumed in September 2019.

■ Verification of the effect of repair



Cargo (vehicle) loading status

■ Restoration of Tawarayama Bridge



Tawarayama Bridge during restoration work



Tawarayama Bridge when the restoration work was completed

Hosting of personnel

● Acceptance of local governments and private businesses

NILIM is accepting people from local governments and private businesses as exchange researchers and supporting them in improving their technical skills through technical guidance and workshops. (Forty-nine exchange researchers have been accepted as of April 2020.)

● Hosting personnel from regional development bureaus

We accept staff members from regional development bureaus who have realized field issues through their work as researchers or staff holding two posts for a certain period to help improve their skills. Personnel who have acquired technical skills are active as core technicians in each region after returning to their regional development bureaus.

Completing and strengthening training

NILIM holds training sessions and lecture courses, and sends out lecturers in order to spread and establish its technical policy and improve the technological level of society as a whole. (A total of 452 lecturers dispatched in FY 2019 as of the end of March 2019)) (Forty training courses with 818 participants held in FY 2019 (Yokosuka Office No. 2))



Port facilities maintenance and management course

Support for local issues

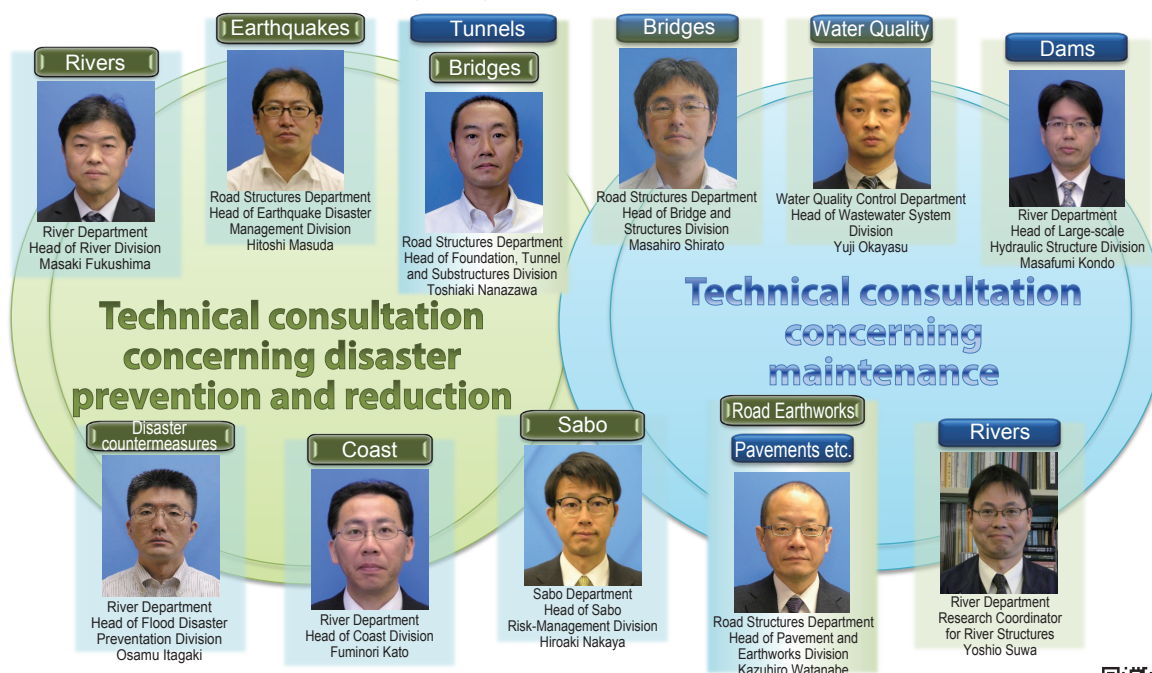
NILIM is working to overcome issues that arise on site in cooperation with local offices and other outposts. In addition, we have established the Kumamoto Earthquake Recovery Division at the site of the Kumamoto earthquake to accelerate restoration and recovery efforts. We have also dispatched staff to Sediment Disaster Prevention Technology Center of Kinki Regional Development Bureau to perform research and technical development concerning large-scale landslide disasters.

Technology consultation

NILIM constantly provides national government agencies and local governments etc. with technical support of various kinds for policy implementation and project execution. For example, the Coast Division looks after a technical support counter for storm surge flooding simulations necessary for preparation of maps, which show areas likely to be affected by storm surge flooding as created by prefectural governors based on the Flood Control Act.

● Technical Consultation Office

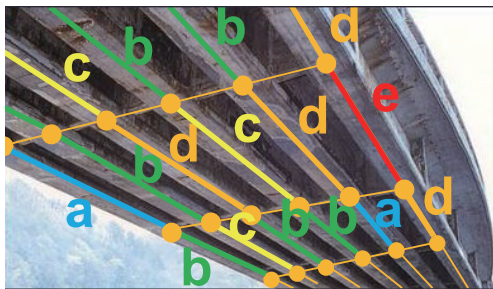
In December 2014, NILIM Technical Consultation Office was established. Covering all fields over which NILIM is in charge, this one-stop service accepts consultations regarding all fields and facilities.



Collection, analysis, and management of data forming technical basis of policy formation, and return to society

Support for the Development of a Road Bridge Maintenance Cycle

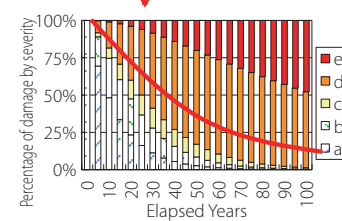
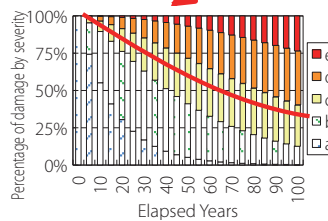
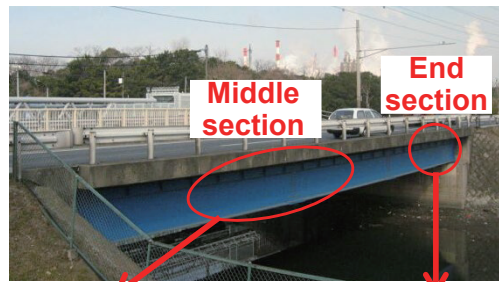
- Official announcement of deterioration analysis data obtained from periodic bridge inspections
 - Based on a vast amount of detailed data on the results of inspections of nationally managed road bridges accumulated by the national government, the deterioration characteristics are organized under 272 conditions that vary in terms of the type of damage, type of components, environmental conditions, etc. and are posted on the website below.



a ←→ **e**
Damage (small) Damage (large)

x 24,000 bridges

Image of inspection data of 24,000 bridges managed by the government



End sections deteriorate quickly

Example of the characteristics of predicted deterioration (corrosion of main steel girder)

<Announcement URL> <http://www.nilim.go.jp/lab/bcg/siryou/tnn/tnn0985.htm>



Support for the promotion of the stock management of sewers

- Release of sewer pipe deterioration database
 - Database that collects survey results of local governments' information on deterioration judgment results, such as type of pipe, elapsed years, corrosion, and slacking.
 - Data of about 250,000 spans of 56 local governments has been released on the website below (as of June 2017).

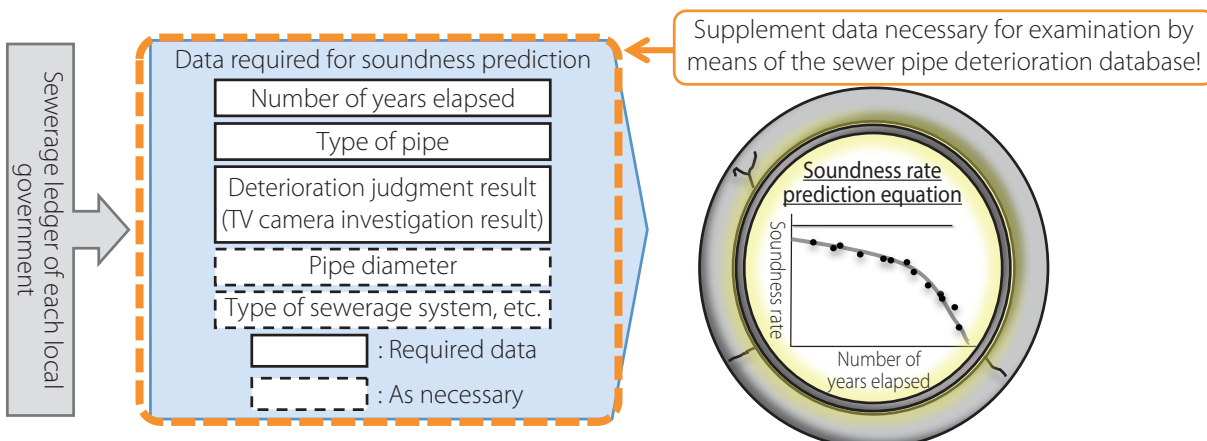


Fig. Utilization of sewer pipe deterioration database

<Announcement URL> <http://www.nilim.go.jp/lab/ebg/rekka-db.html>



International research activities

NILIM is promoting international research activities based on the perspectives of "Technical contribution to domestic policy", "Technical cooperation with developing countries", and "Overseas deployment of infrastructure systems".

Conference on flood management (Netherlands)

- Discussions were held with the Ministry of Infrastructure and Water Management of the Netherlands, and visits were made to sites where flood control measures are being implemented.
- Up-to-date information on flood risk reduction measures and climate change-adapted flood control measures were directly exchanged.



Meeting with Ministry of Infrastructure and Water Management



Site visit to a widened river section to reduce flood risk

Cooperation in development of national technical standards (of Viet Nam)

- Based on the memorandum concerning cooperation in developing national technical standards for port facilities between the Ministry of Transport of the Social Republic of Viet Nam and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) of Japan, we cooperated in examining the standards.
- In FY 2019, we jointly edited the standards for mooring facilities and maintenance and management through five workshops.



Workshop

Dispatching Experts to the Disaster Risk Reduction Training Program for Latin America and the Caribbean

- NILIM cooperates in human resource development training for Latin America and the Caribbean based on the request from JICA.
- In FY 2019, bridge and building experts were dispatched to Chile to introduce Japan's knowledge at seminars and training sessions on tsunami and earthquake resistance.



Lecture on tsunami damage to bridges



Seminar on the earthquake resistance of buildings

Signing a memorandum of cooperation with Federal Institute for Research on Building, Urban Affairs and Spatial Development, Germany (BBSR)

- In FY 2019, a new five-year memorandum of cooperation was signed between NILIM, Building Research Institute, and Federal Institute for Research on Building, Urban Affairs and Spatial Development.
- In May 2019, the three institutions held a meeting at NILIM to exchange views and a hold ceremony to commemorate the signing of a memorandum of cooperation.



Ceremony

Management initiatives supporting high-quality research

Cooperation with external organizations

By implementing joint research, contract research, calls for technologies, and social experiments; concluding agreements; and leveraging technologies provided by industry and academia, as well as knowledge of different fields, such as social science and the humanities, NILIM strives to improve the efficiency and quality of its research.

☐ Contract research

Research aiming to achieve better research results efficiently by entrusting to other organizations

☐ Joint research

Research aiming to achieve better research results by conducting joint research with other organizations

☐ Call for technologies

It aims to promote the use of superior technologies by inviting technologies from the public, which will be tested on-site by the MLIT.

☐ Social experiment

This is an experiment on the implementation of research results with a local government etc.

■ Domestic cooperation

It aims to develop education and research on the university side and to contribute to the activities of NILIM through coordination and cooperation between universities and NILIM.

University of Tsukuba, Kansai University, Tokyo University of Science, etc.

■ International cooperation

It aims to improve the quality of research results of NILIM and to give technical support to other countries (international contribution) through joint research, as well as regular information exchange between overseas research institutes and NILIM.

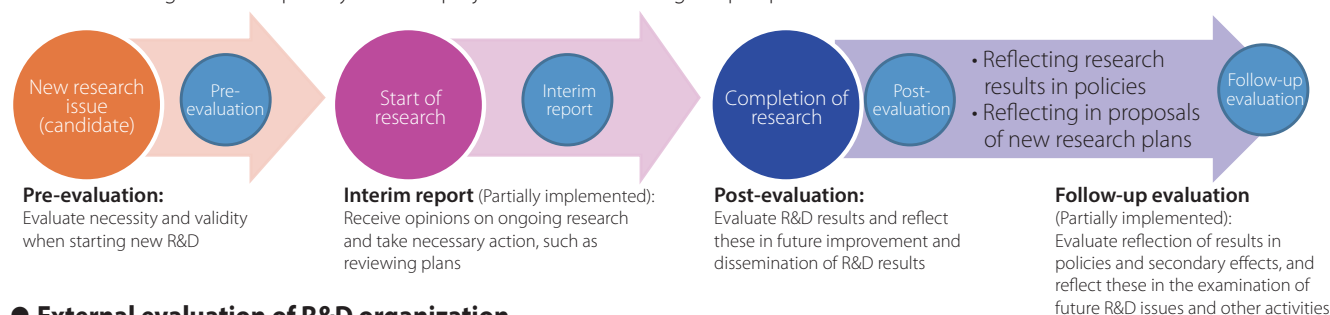
Indonesia Department of Public Works and Department of Citizen Housing Road Research Institute, Korean Research Institute for Human Settlement, Sri Lanka Ministry of Disaster Management National Building Research Organization, German Federal Institute for Research on Building, Urban Affairs and Spatial Development, etc.

Research evaluation

Internal evaluations and external evaluations of individual research challenges, achievements, and the operation of institutions are performed on the basis of the General Guidelines on the Evaluation of National R&D to build an independent and individual management cycle, promote, and improve the quality of research activities.

● External evaluation of individual research challenges

NILIM strives to improve the quality of research results by introducing systems allowing external experts to evaluate individual research challenges that are priority research projects from a wide range of perspectives.



● External evaluation of R&D organization

Outside experts evaluate research activities as a whole at NILIM, as well as environment improvement initiatives that support the research activities, and NILIM strives to improve its operation based on these results.

Internal training

Research Departments and Administrative Departments cooperate and work on developing young personnel systematically by combining Off-JT and OJT effectively. NILIM holds internal presentation meetings for young researchers who have little presentation experience and a study group by young personnel aimed at enhancing development through mutual learning.

Experience and Know-how Transmission Lectures are held in order to make use of the accumulation of research, experience, and know-how of predecessors for improving the skills of each staff member.



Internal presentation meeting for young researchers

Compliance

We conduct compliance activities according to the promotion plan for the current fiscal year while giving due consideration to the monitoring results and advisory opinions of the Compliance Advisory Committee (External Expert Committee).

Response to misconduct in research

In addition to establishing NILIM Guidelines for Responding to Misconduct in Research, NILIM makes efforts to improve awareness toward research ethics to prevent misconduct (fabrication, falsification, and plagiarizing).

To create a deeper understanding of civil engineering and building construction

Website

The site actively provides information, including an outline of NILIM, direction of research activities, research subjects, results, and event information. (URL: <http://www.nilim.go.jp/>)

Visit this site to view information about lecture meetings, open houses, open experiments, and other PR information.



E-mail service

We make simple and timely introductions of the activities and research achievements of NILIM. We normally send information out twice a month. You can register to receive the e-mail service from the QR code on the right.



NILIM Report

NILIM Report is published annually to introduce and explain research trends and the reflection of research results in policy and presents recommendations concerning technology policy challenges. (The full report is published on NILIM website at the beginning of each fiscal year.)



Comprehensive Research Report of NILIM

A Comprehensive Research Report of NILIM is a report of the research results that have academic value, contribute to the planning and enactment of policy, or present the results of surveys, testing, observations, etc. that are deemed valuable enough to be released to the public. (The full report is published on NILIM website.)



Presenting papers

NILIM announces approximately 700 papers per year, and receives awards for papers in many fields, both from inside and outside of Japan.

- FY 2019 Committee on the History of Civil Engineering, Japan Society of Civil Engineering - Excellent Lecture Award (June 2019)
- Japan Association for Earthquake Engineering Convention 2019 - Excellence Award (September 2019)
- The 33rd Japan Road Association - Excellence Award (November 2019) etc.

Lectures

NILIM Lectures

NILIM holds the NILIM Lecture Meeting every year and introduces its activities, announces research results, and makes recommendations for the resolution of technical policy issues. Approximately 700 people attend every year.

It also holds specialist lecture meetings and symposiums in each field whenever necessary.



NILIM Lecture Meeting (Dec. 2019)



Lectures on demand

Lectures on demand are held with the aim of having NILIM researchers go directly to schools etc. to explain research contents and answer questions while holding open communications with people.

(Data in FY 2019: 75 lectures)



View of a lecture on demand at an elementary school in Tsukuba City



Open house

Open house is provided to introduce research facilities while explaining NILIM's research contents.

(Data in FY 2019: 3,138 visitors)



Contest for making bridges out of cardboard (productions on display at open house)

Private facility tours for groups are also possible whenever asked for.



Tour of a testing facility



Facility Tour

We conduct facility tours where we introduce our research facilities while introducing research cases.



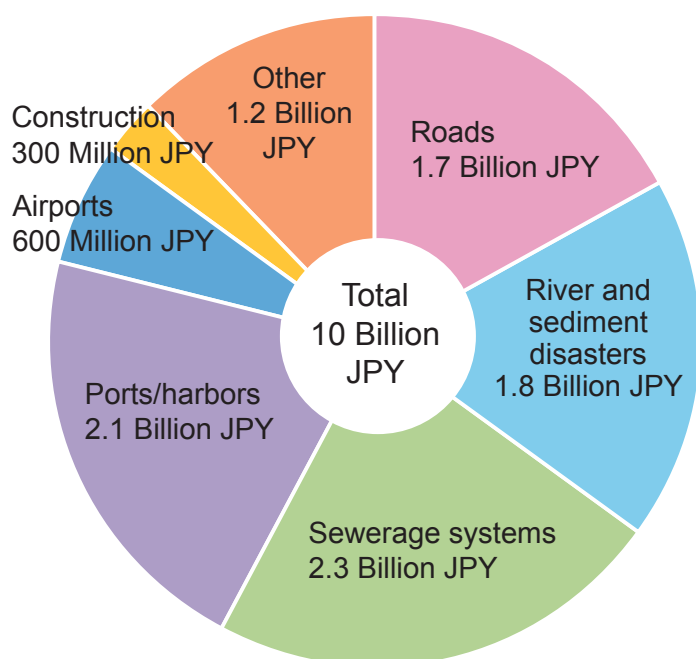
Facility Tour





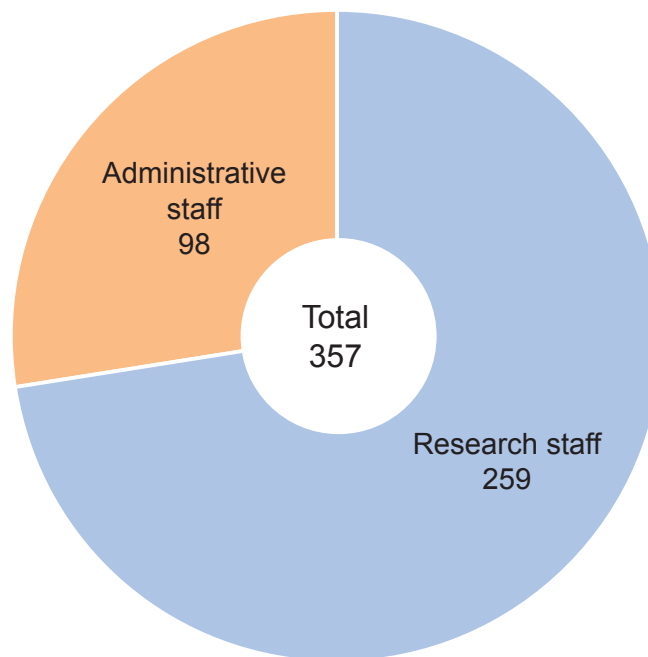
Research budget and employees

Research budget



Structure of research budget (initial budget for FY 2020)

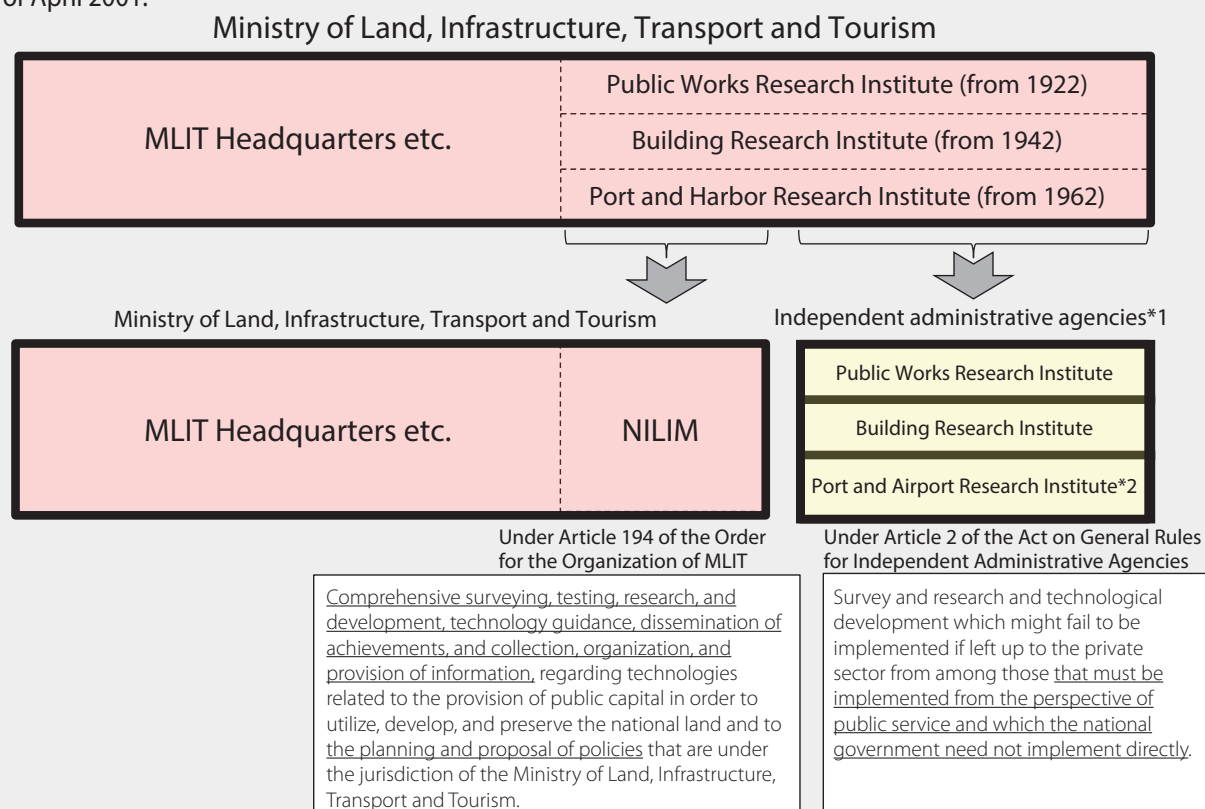
Employees



Structure of employees (April 2020)

Establishment of NILIM

- As part of the establishment of the independent administrative corporation system following on from the reorganization of ministries and agencies in January 2001, departments conducting work in close and inseparable cooperation with the Ministry of Land, Infrastructure, Transport and Tourism were integrated into one organization as of April 2001.



*1 With the April 2015 revision to the Act on General Rules for Incorporated Administrative Agencies, the Public Works Research Institute, Building Research Institute, and the Port and Airport Research Institute became the National Research and Development Agencies.

*2 In April 2016, the National Maritime Research Institute and the Electronic Navigation Research Institute were merged to form the Port and Airport Research Institute.

Introducing research departments etc.

Director-General

- Deputy Director-General ● Deputy Director-General
- Executive Director for Research Affairs ● Executive Director for Research Affairs

General Affairs Department

- Deputy Director of General Affairs Department ● Senior Officer for Welfare
- Senior Officer for Contract and National Property

Personnel and Welfare Division General Affairs Division Accounting Division
Head Officer for General Affairs (Asahi, Tachihara Office)

Planning Division

- Research Coordinator for Evaluation ● Research Coordinator for Codes and Standards
- Coordinator for Research Planning

Planning Division Research Administration and Evaluation Division
Research Facilities Division International Research Division
Senior Officer for Cybersecurity and Information

Administrative Coordination Department

- Research Coordinator for Information and Construction Systems

Administrative Division Planning and Coordination Division Technological Information Division
Cost Estimation System Division International Coordination Division

Water Quality Control Department

- Research Coordinator for Water Quality Control
- Research Coordinator for Wastewater Energy Management and System Restoration

The Water Quality Control Department researches technical standards and management methods for sewerage facilities in order to protect hygienic living environments and beautiful water environments, reduce flood damage in cities, and at the same time, conserve the global environment and form a recycling society.

Wastewater System Division

The Wastewater System Division conducts research to support stock management, earthquake countermeasures for wastewater facilities, mitigation of urban storm water damage, and wastewater system planning using low cost methods in order to appropriately manage sewer networks.

Wastewater and Sludge Management Division

The Wastewater and Sludge Management Division conducts research on the effective use of resources, energy, and stocks of wastewater systems, the building of a sound water cycle and conservation of the water environment through wastewater treatment, and improvement of hygienic safety through river system water quality risk measures and global warming countermeasures for wastewater systems.

River Department

- Research Coordinator for River Structures
- Research Coordinator for Irrigated Water Disaster Management
- Research Coordinator for Water Environment

The River Department conducts research on technologies to plan, design, manage, and perform crisis management concerning facilities on rivers, coastlines, and at dams to ensure the safety and peace of mind of the people of Japan against floods, tsunamis, and other natural disasters and the increasingly severe conditions caused by climate change. The department also works to maintain beautiful national land by preserving rivers, coastlines, water cycles, and sediment systems in good condition.

River Division

The River Division develops methods and accumulates knowledge about river management for socially safer and environmentally better rivers and then systematizes and standardizes technologies that promote policies based on these researches.

Coast Division

The Coast Division is involved in research initiatives that preserve the coast in order to protect the coastal areas from storm surges, tsunami, and erosion with consideration given to the environment and use, as well as research related to the technical standards for shore protection facilities.

Water Cycle Division

The Water Cycle Division researches methods of advanced control of the water cycle using technologies, facilities, etc. to clarify and to predict the state of the flow of water during floods and during normal times, and ways to link these to disaster prevention, environmental conservation, and to ensure water resources.

Large-scale Hydraulic Structure Division

The Large-Scale Hydraulic Structure Division researches the development, systematization, and standardization of technologies related to the design, maintenance, management, and functional improvement of large-scale structures, such as dams and related facilities that play a key role in flood control and water utilization on a basin scale.

Flood Disaster Prevention Division

The Flood Disaster Prevention Division conducts research on flood risk evaluation methods and schemes of reflecting them in flood damage prevention planning, the use of flood hazard maps or flood risk information, and flood mitigation countermeasures integrating structural and non-structural measures together with promoting both self-help and mutual assistance.

Sabo Department

- Research Coordinator for Sediment Disaster Prevention

With the influence of climate change and the imminence of massive earthquakes, the department is researching ways to prevent and mitigate serious damage from frequent sediment disaster hazards, such as sediment and flood damages, by improving the efficiency and emphasis of countermeasures, early detection and damage prediction of large-scale sediment movements, and upgrading warning and evacuation support information based on data science, by taking into account recent sediment disaster hazards and new challenges.

Sabo Planning Division

The Sabo Planning Division researches on the establishment of high-precision prediction methods for the occurrence of sediment hazards; damage estimation for sediment and, flood damages, and deep-seated landslides; and the establishment of response methods, as well as the establishing technical standards for master plan for Sabo (erosion control), including countermeasures against debris flow and driftwood.

Sabo Risk-Management Division

The Sabo Risk-Management Division develops a large-scale sediment disaster monitoring method using remote sensing and UAVs, and a method for upgrading sediment disaster warning information based on a database.

(Eleven research departments, one research center, and three administrative departments)

Asahi Office Tachihara Office Yokosuka Office

Road Traffic Department

- Research Coordinator for Road Affairs
- Research Coordinator for Road Disaster Prevention

Roads have transportation functions that support the movement of people and the transport of goods, plus space functions: forming the backbone of cities, accommodating lifelines, and providing disaster prevention spaces.

The Road Traffic Department researches technologies that clarify, evaluate, and improve these functions and the use of ICT (information communication technologies).

Road Division

The Road Division conducts research into road traffic survey/road traffic management techniques to implement initiatives making smart use of roads, analyses of the effects of road network maintenance, and road geometry construction for smooth road traffic etc.

Road Safety Division

The Road Safety Division conducts research into the acceleration of road traffic safety measure management by applying big data, safety improvement policies for community roads, ensuring safe and pleasant bicycle routes, risk assessment/countermeasures for snow damage to roads, etc.

Road Environment Division

The Road Environment Division conducts researches to achieve a better road space and road environment by speeding up the elimination of utility poles, accelerating the effort through cost reductions, creating and utilizing road space to meet diverse needs, and preserving the roadside, natural, and global environment.

Intelligent Transport Systems Division

The Intelligent Transport Systems Division conducts research to achieve Smartways that comprehensively incorporate ITS (Intelligent Transport System) technologies that are used to build systems to integrate people, vehicles, and roads using information communication technologies.

Road Structures Department

- Research Coordinator for Road Structures

The Road Structures Department conducts research on better design, execution, and maintenance and management methods for road structures, and technological standards that achieve these, so that road networks can appropriately perform their functions, such as ensuring safe and smooth traffic and supporting social and economic activities of all kinds plus emergency response to disasters.

Bridge and Structures Division

The Bridge and Structures Division conducts research on design standards to ensure the quality of execution in order to create good quality, highly durable road bridges and rational road bridge maintenance methods to economically prolong the service lives of bridges.

Foundation, Tunnel and Substructures Division

The Foundation, Tunnel and Substructures Division conducts research on the required performance, rational design, construction, and maintenance methods of road structures, such as road bridge substructures and foundations and tunnels, large culverts, retaining walls, and other structures that are greatly impacted by the earth pressure of soil.

Pavement and Earthworks Division

The Pavement and Earthworks Division conducts research on the required performance, rational design, execution, and management methods of road structures, such as embankments in particular, slope countermeasures, paving, and other soft ground countermeasures that ensure safe road functions.

Earthquake Disaster Management Division

The Earthquake Disaster Management Division conducts researches on earthquake disaster information systems, disaster management and the characteristics of earthquake ground motions.

Building Department

- Research Managing coordinator for advanced Building Technology
- Research coordinator for Quality control of Building
- Research Coordinator for Disaster Mitigation of Building

In an effort to ensure the safe and pleasant use of buildings where living and economic activities are carried out, we conduct research on standards for structures, fire safety, equipment, materials, and members of buildings in compliance with the Building Standard Law, systems for standards and certification, and performance assessment.

Standards and Accreditation System Division

The Standards and Accreditation System Division conducts investigations, research on building standards and certification systems, and helps facilitate general coordination with the MLIT.

Structural Standards Division

The Structural Standards Division engages in research on building structures, the grounds, and technology and performance assessment methods concerning seismic force to secure and improve the safety of buildings etc.

Fire Standards Division

The Fire Standards Division conducts research on the assessment of evacuations and safety performance of buildings etc. in the event of a fire, a fire suppression system to prevent fire from spreading, and the securing of the fire-resistance performance of structures.

Equipment Standards Division

The Equipment Standards Division conducts surveys, testing, and research concerning the building equipment of buildings etc. and the maintenance, management, and protection of building equipment.

Material and Component Standards Division

The Material and Component Standards Division conducts surveys, testing, and research on materials and members of buildings etc.

Evaluation System Division

The Evaluation System Division surveys and researches technologies for evaluating the performance of buildings etc.

Housing Department

- Research Coordinator for Housing Performance
- Research Coordinator for Housing Information System

Aiming to realize quality residential living for people, it is necessary to implement measures, such as the formation of good housing and housing environments, adjustment of the condition of the housing market, and the provision of residential stability for people.

The Housing Department is involved in research concerning technology and methods for 1) extending the useful lives of houses, 2) renewal/utilization of existing housing stock, 3) housing for the aged and a residential safety net, and 4) measures for environmental performance and energy conservation of housing.

Housing Planning Division

The Housing Planning Division is involved in the analyses of trends in residential living and housing construction, as well as research concerning proposals for national housing plans etc. based on such analyses, and measures to secure safety and security of housing and a residential safety net.

Housing Stock Management Division

The Housing Stock Management Division is involved in research initiatives for research projects on the methods for identifying the actual condition of housing stock and improving maintenance management, as well as research on renovation technology and dissemination strategies for improving and enhancing the performance of houses and other structures.

Building Environment Division

The Building Environment Division conducts research on evaluation methods for residential and urban residential environments and methods for regional development, improvement, and maintenance, as well as research on improving the thermal, light, and visual environments surrounding houses and reducing environmental impacts.

Housing Production Division

The Housing Production Division researches on housing and other building production (research on production technology for production rationalization, research on technical and institutional measures for end-user protection, etc.)

Urban Planning Department

The Urban Planning Department researches evaluation methods and technologies for the reconstruction of urban structures, improvement of the safety of cities, and the formation of urban environments needed to create low carbon cities in order to create sustainable cities in the face of changing social conditions, such as a falling birthrate, aging of society, and the spread of global environmental problems.

Urban Planning Division

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

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 for spreading fire, planning of disaster prevention programs in urban areas, and evaluation measures for greenery and open space planning in terms of disaster prevention performance.

Urban Development Division

The Urban Development Division conducts research concerning urban development and improvement methods toward the formation of safe and pleasant urban environments and the appropriate locations of urban functions, such as restructuring and renewal of built-up areas and efforts that contribute to the development of compact cities.

Coastal, Marine and Disaster Prevention Department

- Research Coordinator for Coastal and Marine Affairs
- Research Coordinator for Coastal and Marine Disaster Prevention

The Coastal, Marine, and Disaster Prevention Department researches the development of ocean environment regeneration techniques, tsunami/flood tide damage assessment/disaster reduction policies, and methods of utilizing coastal regions in a balanced manner with regions and societies in order to make smart use of the land and sea areas of coasts and enhance disaster prevention properties.

Marine Environment and Emergency Management Division

The Marine Environment and Emergency Management Division develops techniques for conservation, restoration and creation of marine environment ecosystems, research into the implementation and evaluation of environmental monitoring, and research regarding how to perform crisis management and continuous functioning in harbors.

Coastal Disaster Prevention Division

The research of the Coastal Disaster Prevention Division includes damage assessments due to tsunami and high tides, disaster prevention and mitigation measures via hardware and software, measures against climate change, and the maintenance and management of shore protection facilities.

Coastal Zone Systems Division

The Coastal Zone Systems Division conducts support and research on regional revitalization using local resources in coastal regions, facility maintenance techniques harmonizing with disaster prevention, convenience and scenery etc., and the maintenance of marine environments.

Port and Harbor Department

- Research Coordinator for Advanced Port Technology

The Port and Harbor Department meets the need for ports and harbors to strengthen international competitiveness and support the more enriched and safer lives of people by conducting research on improved port and harbor planning methods and designs while ensuring quality and maintaining public works projects.

Port Planning Division

The Port Planning Division conducts research on analyzing worldwide maritime trends and port planning methods based upon such analyses, and analyzes ship movements using AIS.

Port Systems Division

The Port Systems Division conducts research on seaborne cargo demand trends, the development of an international marine container cargo flow model, and cruise ship demand trends.

Port Facilities Division

The Port Facilities Division conducts research on advancing technology standards for necessary port and harbor structures, such as breakwaters and quay walls, and the internationalization and international expansion of related technology standards.

Port Construction Systems and Management Division

The Port Construction Systems and Management Division conducts research related to improvements in productivity by applying ICT etc. in the port field, effective maintenance and management of port facilities, quality control of public works in the port field, and the use of environmental goods etc.

Airport Department

- Research Coordinator for Advanced Airport Technology

The Airport Department conducts research to facilitate policymaking to strengthen Japan's international competitiveness and revitalize local economies; drafts standards to ensure risk management, safety, and security; and develops efficient maintenance methods etc. in the midst of the process of the deregulation of aviation.

Airport Planning Division

The Airport Planning Division conducts research on policy simulations, such as demand prediction methods, analysis of aviation networks and demand trends, airport risk management, effect of airports on local communities, and the introduction of advanced technology into airport operations.

Airport Facilities Division

The Airport Facilities Division conducts research related to the development of outlines for the design and repair of runways and taxiways etc. to contribute to high-quality airport operations that ensure safe, on-time air transport.

Airport Construction Systems Division

The Airport Construction Systems Division conducts research on estimation and execution standards and operation support systems in an effort to streamline and sophisticate construction projects for the improvement, maintenance, and management of airports.

Research Center for Infrastructure Management

- Research Coordinator for Construction Management
- Research Coordinator for Land Management and Disaster Prevention
- Research Coordinator for Advanced Information Technology

The Research Center for Infrastructure Management researches all construction production processes, from the roles/effects of infrastructure development through to design/construction/inspection/maintenance and management/renovation, and the role of information platform in supporting construction processes based on changes to the conditions of society around social capital maintenance.

Construction and Maintenance Management Division

The Construction and Maintenance Management Division conducts research into policymaking and guideline maintenance etc. related to suitable and efficient service of public utilities, including consideration of optimum bidding contract formats and business execution format in survey/design work and the supply of public works.

Construction and Maintenance Systems Division

The Construction and Maintenance Systems Division conducts research into optimization/acceleration of standards and systems related to public supply processes in design/estimates/supervision/inspection required in proceeding with social capital maintenance and the management thereof, as well as evaluation/reduction of construction costs etc.

Advanced Construction Technology Division

The Advanced Construction Technology Division conducts research into the acceleration of the building of construction machinery and other construction in order to save labor, optimize and improve precision construction production systems, and focus on the construction stage in the construction production processes necessary for social capital maintenance.

Information Platform Division

The Information Platform Division conducts research into basic technology related to information compilation, processing, and application through surveys, designs, construction, and inspections for the efficiency and sophistication of infrastructure development and management.

Construction Economics Division

The Construction Economics Division conducts research in order to clarify the roles and social economic effects of housing/social capital supporting society/economy/living based on grasping the circumstances and trends surrounding housing and social capital.

Landscape and Ecology Division

The Landscape and Ecology Division conducts research in the fields of greening, conservation of living organisms and ecosystems, development and management of greenery and open spaces, and landscape and historical town planning with the aim of creating a society in harmony with the environment, including the creation of a sustainable national land where nature and people can coexist in harmony, and the creation of a living environment in which people can feel the richness of their lives

Kumamoto Earthquake Recovery Division*

The Kumamoto Earthquake Recovery Division conducts research into organization/standardization of expertise obtained at each stage (advanced technical support, surveys, design, and construction) in recovery projects in the wake of the 2016 Kumamoto earthquake.

*Government office building established at the site of Kyushu regional development bureau Kumamoto reconstruction project office

Interdepartmental Organizations

At the same time as each department conducts its specialized research, interdepartmental organizations have been established to contribute to organizational flexibility and undertake comprehensive interdepartmental activities.

Climate Change Adaptation Research Group

The Climate Change Adaptation Research Group conducts crossover research from the perspectives of flood control, irrigation, and environment in relation to plans for adaptation in order to deal with changes, such as floods and water shortages, resulting from future climate change.

Environmental Research Committee

The Environmental Research Committee promotes the sharing of information concerning environmental research and interdisciplinary research in this field.

Disaster Prevention and Reduction Research Committee

The Disaster Prevention and Reduction Research Committee promotes the sharing of information concerning research on disaster prevention and reduction, as well as interdisciplinary research in this field.

Maintenance Research Committee

The Maintenance Research Committee promotes the sharing of information concerning research on maintenance and management, as well as interdisciplinary research in this field.

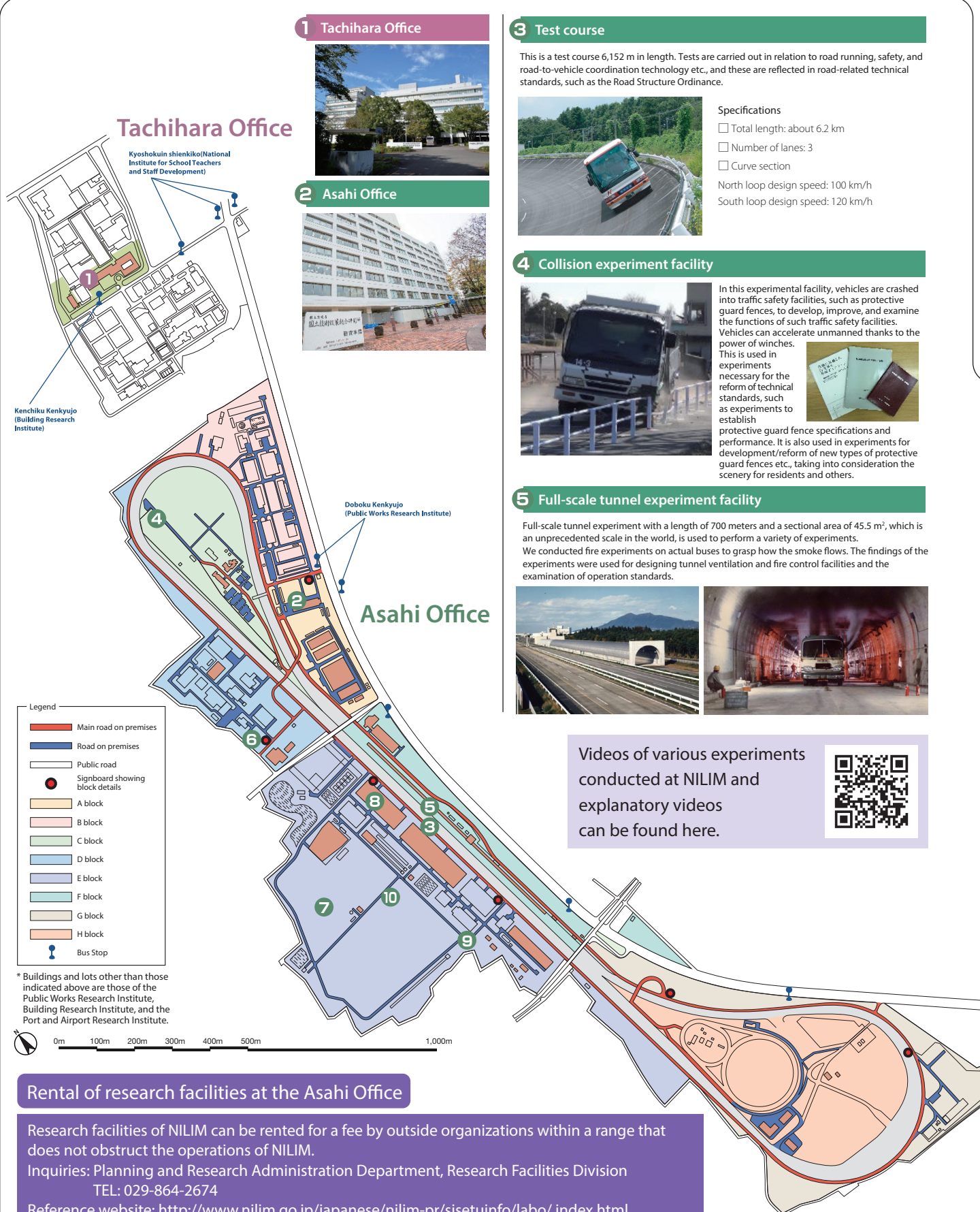
i-Construction Research Committee

The i-Construction Research Committee aims to promote research/development etc. regarding i-Construction and spread i-Construction in the construction field.

Introduction to facilities

Asahi Office Tachihara Office

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



Yokosuka Office

1 Yokosuka Office

The main building was completed in April 2004 and has a patio with a vaulted ceiling to allow natural ventilation and natural lighting to enter the research laboratory and other features that give consideration to protection of the Earth's environment, such as solar energy generation and greening of the rooftop.



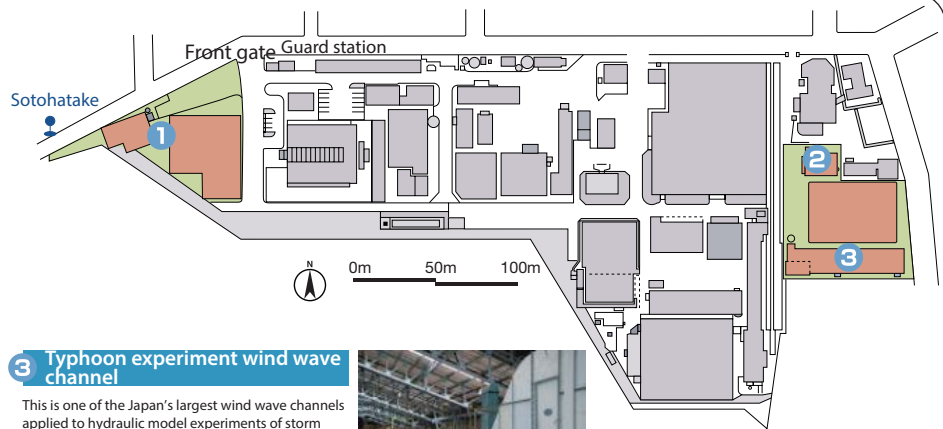
2 Aircraft load simulator

The aircraft load simulator with one set of four-wheeled landing gear the same size as that of B747-400 aircraft is an apparatus for the evaluation of bearing capacity and the durability of airport pavements, such as runways, taxiways, and aprons.



3 Typhoon experiment wind wave channel

This is one of the Japan's largest wind wave channels applied to hydraulic model experiments of storm surges etc. Equipped with a blower to produce the wind of a typhoon and a pipeline system to create the circuit flow, it is used for research on ways to protect large cities from storm surges, high waves, and tsunamis.



6 Dismantled bridge members

Parts of bridges, which were actually used, are used for research to study road bridge maintenance standards and design and execution technology standards.



For example, the effect of repair and reinforcement work can be obtained by examining the strength of a bridge reinforced with cover plates.



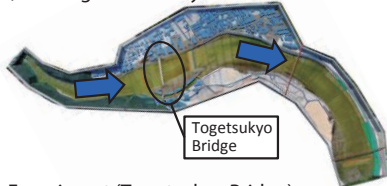
Specimens cut out of dismantled bridge members

7 River model experiment facility



This is an enormous facility with an area of 15 ha that is outdoors. On the site, it is possible to install a maximum of 15 models of rivers. For example, the river model experiment facility in the Katsuragawa-Arashiyama District grasps the hydraulic phenomena in the Arashiyama District, where it is difficult to obtain data on hydraulic phenomena because of the complicated land features, and whose observation data are very limited, via hydraulic model experiments for use in implementing flood measures.

● Overall view of the facility (Katsuragawa-Arashiyama District River Model Experiment Facility)



16.0 k up to 19.0 k can be reproduced.
Model scale: 1/40

● Experiment (Togetsukyo Bridge)



In normal times



In the event of heavy rains

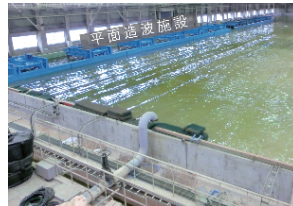


Model

*We also have a river hydraulic model experiment facility, a high flow velocity test channel, and a full-scale aeration test system.

8 Oceanic and coastal experiment facility

This is used for hydraulic experiments concerning shore protection in order to protect the lives of people from the danger of storm surges, high waves, tsunami, and coastal erosion.



9 Sewer pipe model testing facility

This is a pipe model that can reproduce deterioration of sewage pipelines. It is used to test the performance of mobile TV cameras and other inspection devices used for pipeline maintenance.

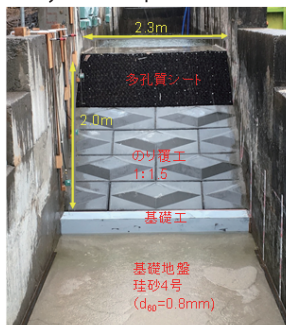


10 Full-size overflow channel



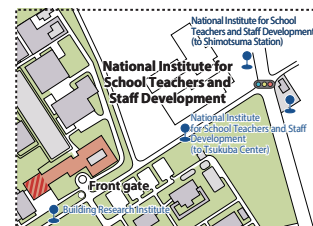
The high head test channel uses models close to actual size to study the external forces acting on river structures, such as levees and their failure mechanisms to study rational design methods for river structures. Crisis-management hard countermeasures (riverbank construction that slightly extends the time until bank collapses), which reduce damage even in the case of an overflow, are carried out based on expertise etc. obtained from experimental results using this overflow channel.

● Hydraulic experiment on the reinforcement of slopes



This map of Tsukuba City highlights the location of the Public Works Research Institute (PWRI) and other key institutions. The PWRI is situated near the center of the city, adjacent to the Tsukuba Station and the Tsukuba Center for Institutes. Other notable locations include the National Institute for Materials Science, the National Institute of Advanced Industrial Science and Technology, and the National Institute for Environmental Studies. The map also shows major roads such as the Joban Expressway (Route 6) and the Arakawa Expressway (Route 125), as well as various ICs (Interchange) and stations (e.g., Tsukuba Station, JR Tsukuba Station, JR Arakawa Station). A scale bar at the top right indicates distances from 0 to 4 km, and a north arrow is provided for orientation.

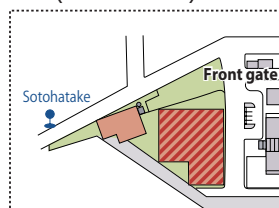
A map showing the entrance area of the NILIM Public Works Research Institute. The map includes a road labeled 'Front gate' and a building labeled 'NILIM Public Works Research Institute Entrance'. A blue pin marks the 'Public Works Research Institute' entrance, and another blue pin marks the 'Public Works Research Institute' building. A red hatched area is also shown.



The map illustrates the transportation network around Tsukuba Station. Key features include:

- Stations:** Akihabara Station, Ueno Station, Hitachino-Utsukhi Station, Tsukuba Station, and Tsukuba Yoshinuma Shuttle.
- Transportation Modes:**
 - Tokaido Shinkansen:** Lines connecting to Akihabara and Ueno stations.
 - JR Joban Line:** Connecting Ueno Station to Hitachino-Utsukhi Station (approx. 60 minutes).
 - Kantetsu Bus:** Multiple routes including:
 - For Tsukuba Center or University of Tsukuba (approx. 70 minutes).
 - For Tsukuba Center or University of Tsukuba (approx. 30 minutes).
 - For Tsukuba Center (approx. 30 minutes).
 - For Tsukuba Center (approx. 30 minutes).
 - Highway Bus:** Routes to Tokyo Station and Yaesu South Exit.
 - Air:** Ibaraki Airport, Haneda Airport, Narita International Airport, and Shuto Expressway.
 - Local:** Taxi services and local bus routes (e.g., Misato JCT, Yatabe IC).
- Facilities:** Asahi Office, Tachihara Office, Public Works Research Institute, and Building Research Institute or National Institute for School Teachers and Staff Development.

A detailed map of the Yokosuka area. The map shows the JR Tokaido Line running from the top left towards the bottom. Key stations include Kitakurihama Station, Kurihama Station, and Keikyū Kurihama Station. The Shonan Bridge is highlighted in green. Other landmarks include the Sahara IC, Entrance to Iwato Housing Complex, Yokosuka-Hayama Line, and the Yokosuka Office. The map also shows the Uraga Port, Kurihama Port, and the Naval Systems Research Center. A scale bar indicates 0 km and 1 km, and a north arrow is present.



Keiikyū Line

Shinagawa Station

Yokohama Station

Keiikyū Kurihama Station

For Nobi Coast

Kaikoku Bridge

Five-minute walk

Yokosuka Office

JR Yokosuka Line

Tokyo Station

Yokohama Station

Kurihama Station

For Chiyogasaki or For Uraga via Chiyogasaki

Sotohatake

One-minute walk

Yokosuka Office II

Ten-minute walk

Keikyu <https://www.keikyu.co.jp/index.html>

A detailed map of the Kumamoto Earthquake Recovery Division area. The map shows the Shikakawa River flowing through the region. Key locations marked include Ono Town Office, Kumamoto Higashi-cho, Seta, Tateno, Choyo, Kase, Asashimoda Station, Hakusuiogken Station, Nishihara Village Office, and Takamori. The Kumamoto Earthquake Recovery Division is highlighted in a red box. The map also shows the Kumamoto Airport, Mt. Aso, and the Aso Cline. A scale bar indicates distances of 0km, 5km, and 10km. A north arrow is located in the bottom left corner.

The diagram illustrates travel routes from two starting points on the left to two destinations on the right. The starting points are 'Kyushu Expressway' (green box) and 'Kumamoto Airport' (purple box). The destinations are 'Kumamoto IC' (green box) and 'Kumamoto Airport Mashiki IC' (green box). There are four horizontal lines representing routes:

- Top route: From Kyushu Expressway to Kumamoto IC. Labeled 'General road (Choyo Ohashi route)' and 'Approx. 35 minutes'.
- Second route: From Kyushu Expressway to Kumamoto Airport Mashiki IC. Labeled 'General road (Tawarayama tunnel route)' and 'Approx. 40 minutes'.
- Third route: From Kumamoto Airport to Kumamoto Airport Mashiki IC. Labeled 'General road (Tawarayama tunnel route)' and 'Approx. 30 minutes'.
- Bottom route: From Kumamoto Airport to Kumamoto IC. This route is not explicitly labeled with a road name or time, but it is represented by a grey line.

On the far right, the text 'Kumamoto Earthquake Recovery Division' is displayed in large orange letters.

Sanko Bus Portal Site
<https://www.kyusanko.co.jp/sankobus/>



NILIM is the English acronym for the National Institute for Land and Infrastructure Management.

The triangle indicates that the former rivers, roads and related fields, the city, housing etc. and related fields, and ports, and airports and related fields are linked to bear integrated housing and public capital provision.

The orange color represents our expectations that the National Institute for Land and Infrastructure Management will make many contributions to national land policy and create a bright Japan in preparation for the coming age of the 21st century.