



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

NILIM



Confirmation of road damage by automatic navigation UAV



Field survey of damage caused by debris flows



Demonstration of green slow mobility in a residential complex



Self-driving and labor-saving of airport snow removal vehicles

Research Institute that creates the society of the future

FY 2022



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

Table of Contents

■ Mission of the National Institute for Land and Infrastructure Management (NILIM)	2
■ Organization	3
■ Research budget and employees	4
■ Recent developments related to NILIM	
Disaster prevention and mitigation, national resilience	
- For increased strength and flexibility -	5
Infrastructure DX - Transforming society with digital technology -	6
Green challenge in land, infrastructure, transport, and tourism	
- Toward the realization of a green society -	7
Support to improve field technology throughout Japan	8
Renewed experimental facility	9
Dissemination of various information	10
■ Research and development that supports the planning, drafting, and spreading of the policy for land, infrastructure, transport, and tourism	
Research to improve national resilience and protect the lives and livelihood of the people	12
Research to increase the productivity and growth potential of society	15
Research to support comfortable and secure living	19
■ Advanced technical support for responses to disasters/accidents and improvement of countermeasure techniques	21
■ Competence in new technologies of in-house engineers on the frontline	23
■ Collection, analysis, management, and the providing of data to develop the technical foundation for formulating policies.	24
■ Introduction to facilities	25
■ International research activities	27
■ Management initiatives supporting high-quality research	28
■ To create a deeper understanding of NILIM	29
■ Access	30

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

As the only national research organization in the social infrastructure/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 the policy development of the Ministry of Land, Infrastructure, Transport and Tourism as a technical specialist taking into account the administrative perspective among other aspects
- Apply the advanced and comprehensive technical capabilities cultivated through research activities to the actual fields of work.
- Connect to the creation of new policy using insight into the future image of national land/society and through the 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. 11–20)
- Advanced technical support for response to disasters/accidents and improvement of countermeasure techniques (pp. 21–22)
- Competence in new technologies of in-house engineers on the frontline (p. 23)
- Collection, analysis, management, and the providing of data to develop the technical foundation for formulating policies. (p. 24)

Click here for the
full research policy. →

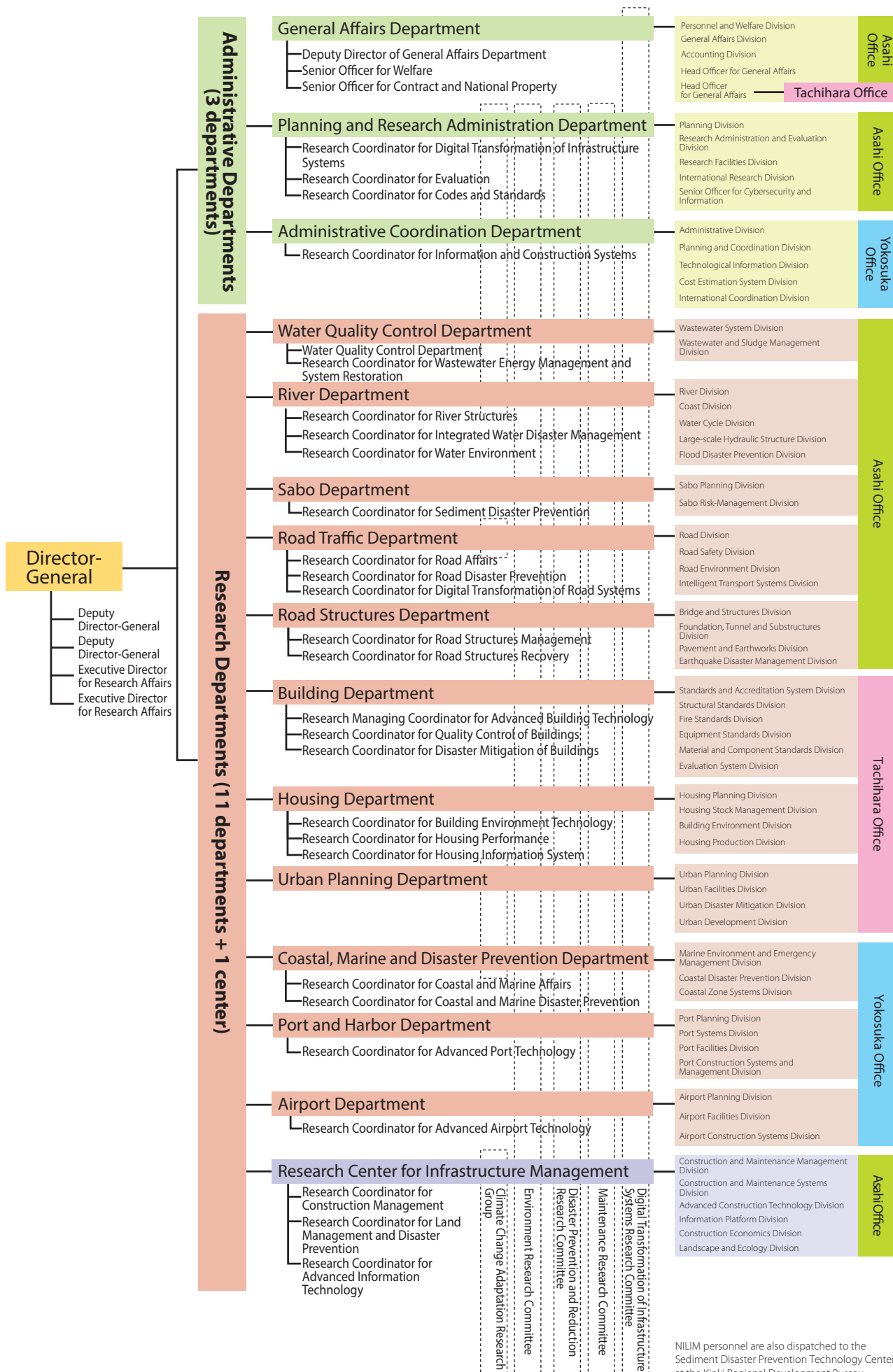


Yokosuka Office



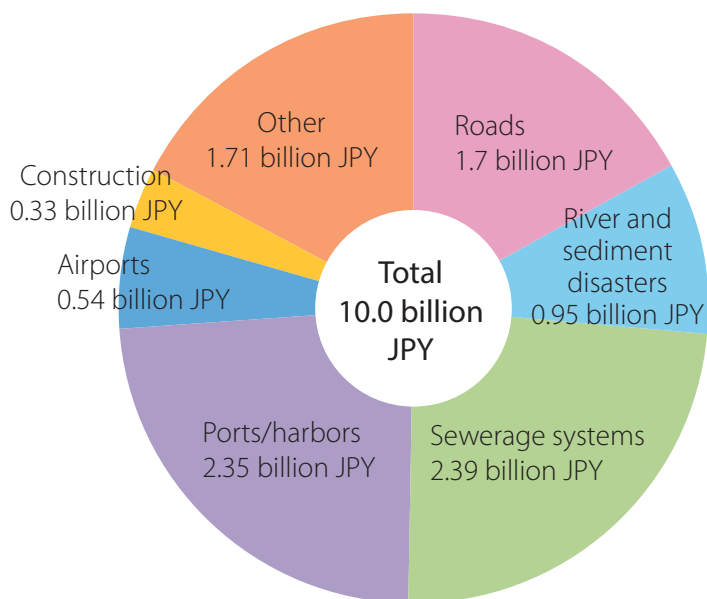
Asahi and Tachihara Offices

Organization



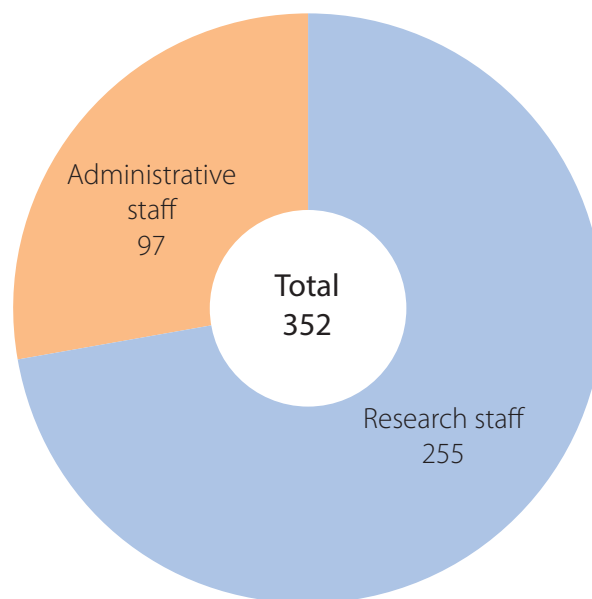
Research budget and employees

Research budget



Structure of research budget (initial budget for FY 2022)

Employees

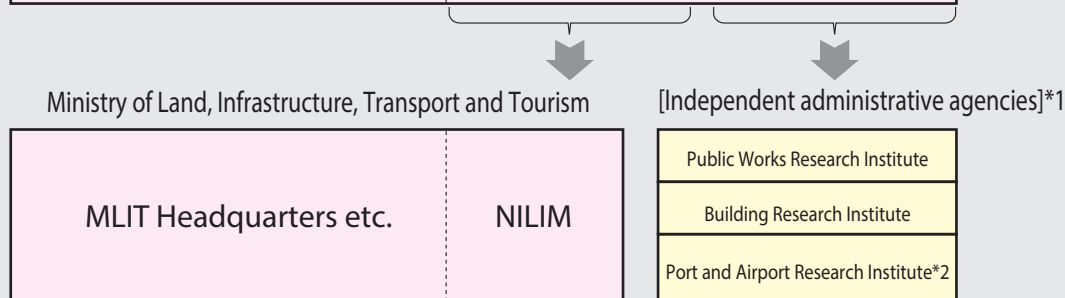
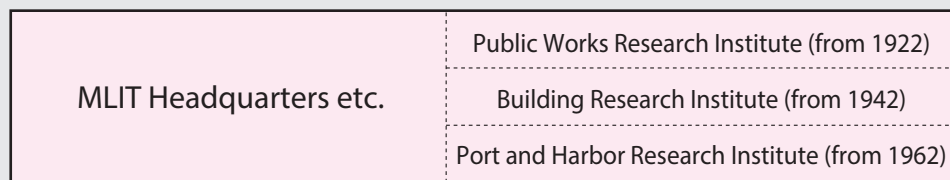


Structure of employees (as of April 2022)

Establishment of NILIM

- After the reorganization of ministries and agencies in January 2001, as part of the incorporated administrative agency system, sections that had been taking on operations that were inseparable from the Ministry of Land, Infrastructure, Transport and Tourism were merged in April 2001. In April 2021, NILIM celebrated its 20th anniversary.

Ministry of Land, Infrastructure, Transport and Tourism (MLIT)



Under Article 194 of the Order for the Organization of MLIT

Comprehensive surveying, testing, research and development, technology guidance, dissemination of achievements, and collection, organization, and provision of information regarding technologies related to the provision of the social infrastructure in order to utilize, develop, and preserve the national land and to the planning and proposal of policies that are under the jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism.

Under Article 2 of the Act on the General Rules for Independent Administrative Agencies

Survey and research and technological development that might fail to be implemented if left up to the private sector from among those that must be implemented from the perspective of public service and that the national government need not implement directly.

*1 With the April 2015 revision to the Act on the 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.

Recent developments related to NILIM

Disaster prevention and mitigation, national resilience - For increased strength and flexibility -

- In recent years, weather disasters have become more severe and frequent because of the effects of climate change.
- Infrastructure that was intensively developed during and after the high growth period will become obsolete at the same time in the future.



Levee breakage due to heavy rain in July 2018



Damage to the seawall caused by the storm waves of Typhoon Faxai in 2019

○ Three-year emergency measures for disaster prevention, disaster mitigation, and national land reinforcement (FY 2018–2020)

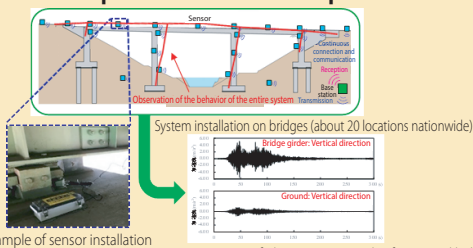
In light of the July 2018 heavy rains, the government of Japan will implement emergency measures over a three-year period, in addition to the existing measures.

[Examples of measures implemented throughout Japan]

■ Examples of measures implemented by NILIM



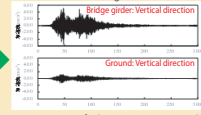
Construction of a Sabo dam with high capture capacity of sediment and driftwood trapping performance (Suzaka City, Nagano Prefecture)



Example of sensor installation on a bridge

Development of seismic monitoring systems that can identify the behavior of an entire infrastructure system during an earthquake

System installation on bridges (about 20 locations nationwide)



Acquisition of observation records of structural behavior



Construction of an experimental channel to enable the overflow experiments necessary to study the development of tenacious river levees.

○ Five-year emergency measures for disaster prevention, disaster mitigation, and national resilience (FY 2021–2025)

Further acceleration and deepening of the following areas implemented under the three-year emergency measures with focused and intensive measures

1. Measures to address increasingly severe wind and flood damage and large-scale earthquakes that can happen any time soon
2. Acceleration of measures to address aging infrastructures to shift to preventive maintenance of the infrastructures
3. Promotion of digitization etc. for efficient implementation of measures to increase national resilience

■ Examples of measures implemented by NILIM

Study for the development of persistent river levees

- Need to develop persistent river levees that are resistant to collapse and effective in mitigating damage in the event of water overflow.

- Verification of the effectiveness and stability of levee top protection works, back slope protection works, back slope edge protection works, etc. against overflowing water through hydraulic model experiments



Experiment with large-scale embankment model

Initiatives to shift to preventive maintenance

- The urgent issue is to improve the efficiency of inspections and repairs through the use of new technologies and other measures.
- Development of technologies to review inspection procedures and improve the quality of repairs (see p. 14)



Inspection work at heights

To strengthen cities against earthquakes



Damaged residential lots and housing

- Existing housing lots developed on sloping land have deteriorated retaining walls that are vulnerable to earthquakes.
- They affect speedy restoration and disaster relief activities in the event of an earthquake.

- A method for seismic diagnosis and reinforcement of existing residential retaining walls is established.



Example: Measures for river basin disaster resilience and sustainability by all



Removing an existing pile

- Renewal of aging buildings is needed to make a city more resilient.
- No reasonable method is available to evaluate existing piles of a previous building at the time of renewal, which has negative effects, such as requiring a long time to remove the piles.

- A rational way to use of the ground including existing piles is established.

Infrastructure DX - Transforming society with digital technology -

[DX in the infrastructure field]

In response to rapidly changing socioeconomic situations, the following is to be achieved in the infrastructure field using data and digital technology:

- transform social capital and public services based on the needs of the people, and
- transform operations, organization, processes, and the culture, climate, and work style of the construction industry and the Ministry of Land, Infrastructure, Transport, and Tourism, in order to improve public understanding of infrastructure and realize safe, secure, and prosperous lifestyles.

DX of Action

Observation of fields from anywhere



DX for knowledge and experience

Anyone can immediately start working on the field.



DX of Things

Anyone can easily understand diagrams.



Transformation of social capital and public services, organizations, processes, culture and climate, and ways of working

Realization of the improved public understanding toward infrastructure and safe, secure, and prosperous lifestyles

○ Promotion of DX in the infrastructure field

[Promotion system]

Ministry of Land, Infrastructure, Transport and Tourism

DX Promotion Headquarters in the infrastructure field

- Promotion of policy on data utilization
- Establishment of implementation policy for BIM for infrastructure promotion etc.

Cooperation

Research facilities

Collaboration among research facilities

- Cooperation agreement for DX signed with the Public Works Research Institute and Building Research Institute



DX Data Center, DX Experimental Field in the infrastructure field

- Centralized management and analysis of directly controlled BIM for infrastructure data
- Development of new technologies utilizing 3D data, 5G, etc.

Structure within NILIM: DX of Infrastructure Systems Research Committee

- Promotion of research through cross-disciplinary collaboration

Regional Development Bureaus

Human Resources Development Center

- Implementation of BIM for infrastructure training
- On-site demonstration of new technology etc.

■ Examples of measures implemented by NILIM

Development of DX Data Center

- 3D data, such as BIM for infrastructure is large in size, making information sharing difficult.
- Highly functional devices and expensive software are required, making it difficult for small-scale contractors to make use of the system.

- DX Data Center is constructed for centralized storage and utilization of 3D data.

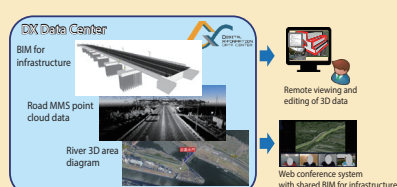
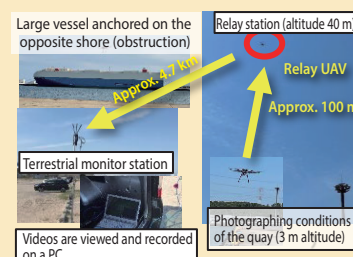


Image of utilizing the DX Data Center

Development of efficient ways to inspect port facilities using AI

- Responding to aging infrastructure and a shortage of workers, it is necessary to reduce labor and shorten the time required for port facility inspections.

- Development of AI to detect cracks and other damage from inspection data of port facilities
- Development to extend the distance of real-time image transmission, taking into account environments with many obstructions

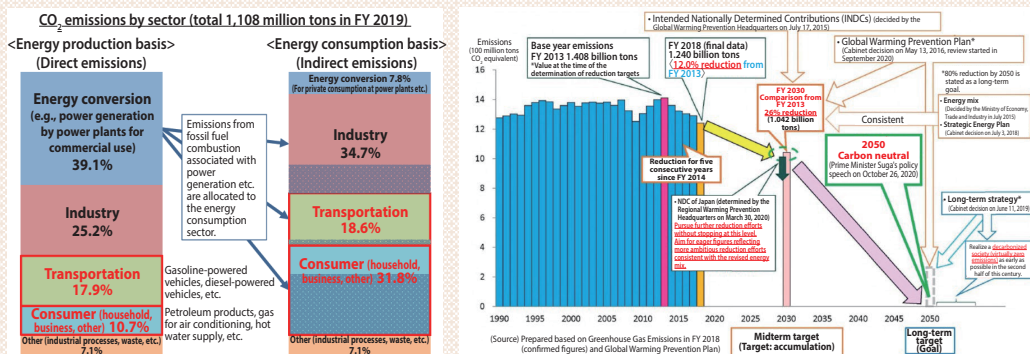


Remote image transmission system during experiment

Green challenge in land, infrastructure, transport, and tourism - Toward the realization of a green society -

[Green challenge in land, infrastructure, transport, and tourism]

- Transportation and consumer sectors under the jurisdiction of the Ministry of Land, Infrastructure, Transport and Tourism account for about 50% of Japan's CO₂ emissions.
- Moving toward carbon neutrality by 2050, review of related plans, formulation of growth strategies, etc. are gaining momentum.
- The Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has announced the green challenge in land, infrastructure, transport, and tourism, containing six priority projects to be intensively implemented by 2030 in the environmental field of the MLIT from the perspective of cross-sectoral and public-private collaboration to realize a green society.



Source: 5th Green Society WG document

Smart and resilient lifestyles and urban development that will increase energy conservation and renewable energies

Example:

- Further reinforcement of energy conservation measures for homes and buildings
- Expansion of the installation and use of regional renewable energy through the use of infrastructure etc.



Construction of transportation, logistics, and infrastructure systems to accommodate the electrification of automobiles

Example:

- Promotion of the spread of next-generation vehicles and improvement of fuel efficiency of automobiles
- Promotion of transportation and logistics services utilizing electric vehicles etc.



Carbon neutrality in the port and maritime sector, promotion of greening

Example:

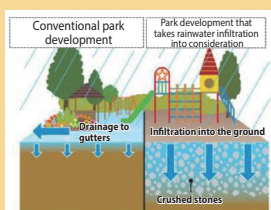
- Promotion of the development of carbon neutral port (CNP)
- Promotion of the introduction of offshore wind power generation



Development of a community that coexists with nature through the use of green infrastructure

Example:

- Promotion of the use of green infrastructure in watershed flood control etc.



Development of sustainable transportation and logistics services through digitalization and greening

Example:

- Road traffic flow countermeasures from the perspectives of systems and infrastructures
- Promotion of green logistics



Realization of a carbon-neutral, recycling-oriented society throughout the entire life cycle of infrastructure

Example:

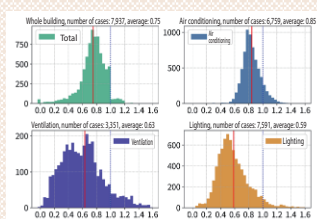
- Energy conservation and technological innovation in the field of construction work
- Promotion of energy conservation in infrastructure services



■ Examples of measures implemented by NILIM

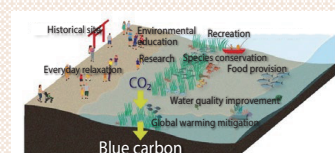
Support for planning of energy conservation measures

- A mandatory system of compliance with energy conservation standards is in operation under the Act on the Rational Use of Energy, which was revised to further improve the energy-saving performance of buildings.
- Analysis of a vast amount of energy conservation standard application data to clarify the reality of energy conservation performance
- Support for energy conservation measures by analyzing the relationship between building design specifications and energy conservation performance etc.



Ecosystem services of blue carbon ecosystem

- Blue carbon (BC) is attracting attention as a sink for greenhouse gases in coastal areas.
- BC ecosystems have multiple ecosystem services, but their magnitude is not recognized.
- Development of a method to visualize multiple ecosystem services in coastal areas



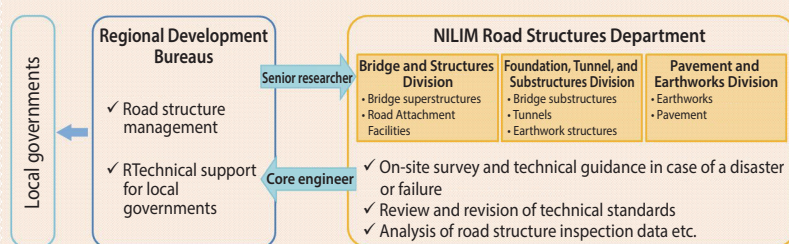
Multiple ecosystem services of coastal areas

Support to improve on-site technical capabilities throughout Japan

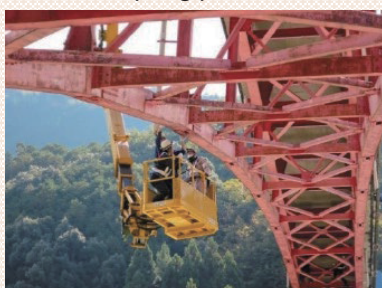
- NILIM supports improvement of on-site technical capabilities with the aim of developing an accurate understanding of technical standards and the technical capabilities to deal with technical issues. Specific measures include accepting staff from Regional Development Bureaus and providing training.

- Support to improve on-site technical capabilities in the field of road structures -

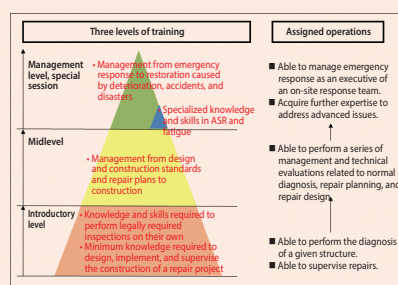
- NILIM is accepting staff from Regional Development Bureaus for the Road Structures Department and trains them to be leading engineers of the Bureaus by preparing drafts of technical standards and joining field surveys and training programs.
- In FY 2022, Research Coordinator for Road Structures Recovery was assigned to reinforce the system for technical support regarding disasters and deterioration.



Accepting personnel from Regional Development Bureaus



On-site survey



Training structure

- Program for promoting the capacity building of regional development bureau staff members for sediment disaster investigation -

- On-the-job training (OJT) is provided to Regional Development Bureau staff members who engage in assignments related to sediment disasters in their respective areas. This training is about nine months long, consisting of training and visits to actual disaster sites. The training will thereby help Regional Development Bureaus improve their technical capabilities.



Training for staff members of Regional Development Bureaus



OJT at a landslide site (2017, Ono District, Hita City, Oita Prefecture)



OJT at a debris flow disaster site (2020, Haido District, Takashima City, Shiga Prefecture)

(Reference) Data of past training

[Members of divisions for Sabo] 74 persons
[Members of divisions for road management] 27 persons
Total 101 persons

Renewed experimental facility

- NILIM has several large-scale experimental facilities, most of which were constructed in 1979 when NILIM moved to Tsukuba Science City. We have been updating and improving the experimental facilities to meet the changing research themes of the times.

Construction DX experimental field

This research facility was constructed to verify the various new technologies, such as remotely operable construction machineries and local 5G, for the promotion of infrastructure DX. It is expected to contribute to further speeding up technological development by enabling technological verification without the limitations of actual sites.



General view of the construction DX experimental field



Remotely operable construction machinery

Test course

The first major renovation of the test course (see p. 25 for details) since 1979 was completed in 2021, giving it new features. The test course is used to study and develop the functions and performance required of roads, which change with the times. Video footage of the experiment on the test course and the renovation work is available on YouTube.



Bank paving work

River experimental facility

The aged river model experimental facility was renovated to a facility that can respond to recent technological issues related to flood control.

In FY 2020, an experimental channel with a large-scale embankment model (see p. 26 for details) was constructed to conduct full-scale levee overflow experiments. It can be used to study the resistance performance of persistent levee structures against water overflow.



Experimental channel with large-scale embankment model

VR experimental equipment etc.

A large 4KVR stereoscopic driving simulator has been introduced, enabling highly immersive driving simulations on a large four-sided screen. This equipment enables cross-disciplinary use within and outside the organization, such as road traffic research using BIM for infrastructure data, verification of infrastructure structure inspection technology, and development of remote operation technology using VR/AR.



Large 4KVR stereoscopic driving simulator

Dissemination of various information

NILIM webpage

NILIM provides an overview of its organization, the activities of its research divisions, and publications of research results on its website. This is to promote awareness of NILIM's role in society and to promptly disseminate information on its activities during disasters.



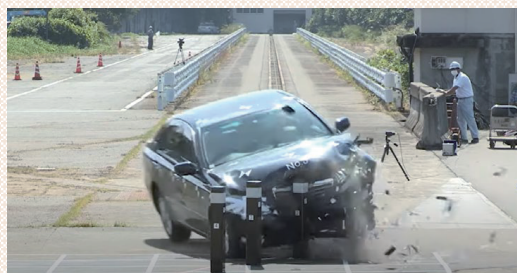
NILIM webpage



About TEC-FORCE dispatching

NILIM YouTube channel

NILIM has the official YouTube channel. Please watch the videos introducing NILIM's research facilities, experiments, and research projects in an easy-to-understand manner.



Introduction of the collision experiment facility



FY 2021 NILIM Lectures



VR NILIM

The VR NILIM, which virtually recreates NILIM premise in a VR space, is available on NILIM website. The VR NILIM allows users to freely tour and walk around the premises of NILIM. Links to videos that introduce various experimental facilities and research outcomes are also available. This is a great opportunity to make the facilities of NILIM widely known to those who are unable to visit because of the spread of COVID-19 or because they live too far away.



Main research building of NILIM on the VR NILIM

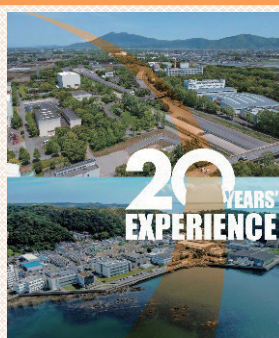


VR NILIM

Can be viewed on a Web browser

20 Years' Experience - the National Institute for Land and Infrastructure Management

Last year marked the 20th anniversary of NILIM since its establishment on April 1, 2001. To mark this milestone, NILIM published "20 Years' Experience • the National Institute for Land and Infrastructure Management," which is the compilation of activities that NILIM has engaged in over the 20 years. This article describes the progress that NILIM has made to date along with larger changes and trends of the society. The article is available to everyone on NILIM website.



20 Years' Experience - the National Institute for Land and Infrastructure Management



Structure

- Words on publication
- Outline of NILIM
- Research and development that supports policies on land and infrastructure technologies
- Contribution to field operations using technologies
- Establishment of the environment that supports research
- Appendix

Details of the contents

Research and development that supports the planning, drafting, and spreading of the policy for land, infrastructure, transport, and tourism

The main research themes of NILIM in FY 2022

1. Research to improve national resilience and protect the life and livelihood of the people ... 12 ~ 14

P. 12 Longer and more accurate flood forecasting for early evacuation of residents and establishment of disaster management systems

P. 12 Realization of rapid recovery from disasters through the use of new technologies

P. 12 Protection of lives and livelihoods from large-scale sediment disasters

P. 13 Efforts to reinforce sewer pipelines against earthquakes

P. 13 Efforts to mitigate damage at ports during typhoons

P. 13 Efforts to improve functional continuity of housing and buildings in the event of disasters

P. 14 Improvement of the quality of bridge repairs through the use of AI

P. 14 Efforts to improve efficiency and sophistication of airport pavement inspection operations

P. 14 Improvement of the quality of dam maintenance management through AI analysis of measured data

2. Research to increase the productivity and growth potential of society ... 15 ~ 18

P. 15 Production of innovation by developing a Data Platform for Land, Infrastructure, Transport and Tourism

P. 15 Improvement of productivity and work style reform at construction sites through the use of ICT

P. 16 Improvement of the efficiency of maintenance and management through the use of BIM models for public rental housing stock

P. 16 Improvement of productivity in the port sector through the use of ICT and BIM for infrastructure

P. 17 Efforts to expand the road sections where automated vehicles can fully apply their automated driving on expressways

P. 17 Efforts toward self-driving and labor-saving airport snow removal vehicles

P. 18 Realization of effective traffic congestion countermeasures through the use of big data

P. 18 Efforts to plan and propose port policies that reflect future changes in the market

3. Research to support comfortable and secure living ... 19 ~ 20

P. 19 Efforts to reduce greenhouse gas emissions from the sewerage system

P. 19 Study for coastal ecosystem restoration

P. 19 Improvement of comfort through proper maintenance and management of roadside plantings

P. 20 Tubless bathrooms in residential bathrooms to reduce drowning accidents

P. 20 Efforts to improve efficiency of reducing vacant houses

P. 20 Solution to urban problems by supporting the development of smart cities



Water Quality Control Department



River Department



Sabo Department



Road Traffic Department



Road Structures Department



Building Department



Housing Department



Urban Planning Department



Coastal, Marine and Disaster Prevention Department



Port and Harbor Department



Airport Department



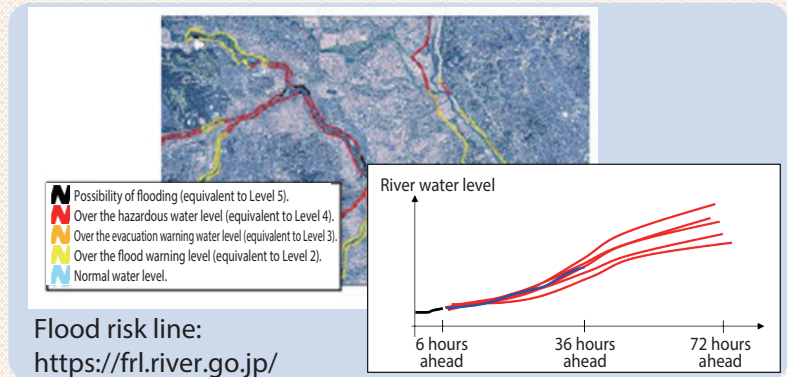
Research Center for Infrastructure Management

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

1 Longer and more accurate flood forecasting for early evacuation of residents and establishment of disaster management systems

We have further improved the system (Flood Risk Line) that forecasts river water levels and displays flood risks on both banks of a river. This improved system will contribute to prompt evacuation of residents and establishment of disaster management systems by enabling longer forecasting periods and improving the accuracy of the forecasts.

- Long-range flood forecasting is necessary to issue evacuation information before sunset and to establish a disaster management system at an early stage.
- We realized flood forecasting 84 hours in advance by utilizing ensemble rainfall forecast data from the Japan Meteorological Agency and other sources to indicate future uncertainties as a range of water level forecasts.
- To improve the accuracy of forecasts, we introduced a runoff model considering inundation and a high accuracy channel model, and developed a data assimilation technique for integrating observed values from a crisis-management-type water-level gauge into the forecast.



(River Department)

2 Realization of rapid recovery from disasters through the use of new technologies

We propose a rapid disaster survey system that utilizes remote sensing technology to help assess the damage caused by earthquakes, torrential rains, and other disasters and to improve the efficiency of road restoration.

- When roads are cut off or congested during a disaster, it becomes difficult for road patrol vehicles to quickly assess the damage.
- Inspection by road patrol vehicles cannot assess detailed damage, such as slope collapse from outside of the road area.
- The measurement accuracy and applicability of various remote sensing technologies in disaster surveys are quantitatively evaluated. These evaluations are then used to employ these technologies in the field.
- Experiments are conducted to verify the effectiveness of UAVs with automatic navigation functions in assessing the damage to actual roads.

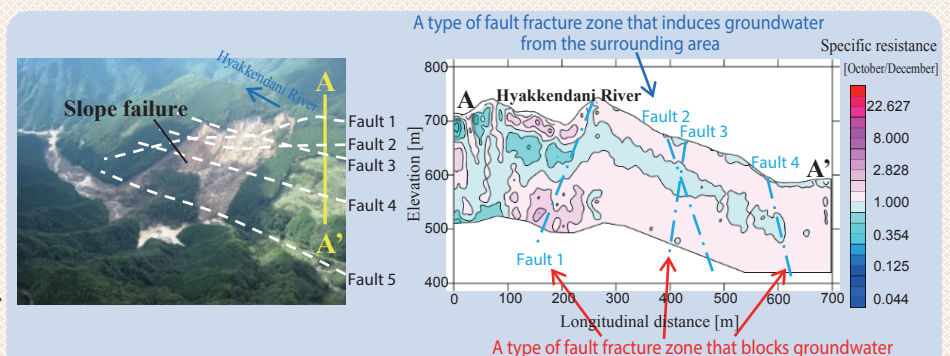


(Road Structures Department)

3 Protection of lives and livelihoods from large-scale sediment disasters

Studies are conducted to visualize subsurface geology and hydrology with geophysical exploration technologies and to clarify the mechanisms of large-scale sediment movement phenomena caused by a deep-seated landslide (DSL) etc. These studies contribute to the accurate assessment of the risk level of DSL-prone mountain slopes.

- Technology is needed to identify in advance the areas at risk of large-scale sediment movement phenomena caused by DSL.
- Airborne electromagnetic survey technology using helicopters and drones is combined with electrical surveys and field surveys to investigate the relationship between the availability of slip surfaces and faults in slopes and groundwater behavior during heavy rainfall.
- DSL risk level evaluation method is proposed by clarifying the mechanism of large-scale sediment movement phenomena caused by DSL etc.



(Sabo Department)

4 Efforts to reinforce sewers against earthquakes

Earthquake damage to sewers is estimated by identifying the sewer attribute conditions with high risk of damage. This supports local governments in preparing effective earthquake resilience plans for sewers.

- The priorities of the earthquake resilience of sewers should be set comprehensively based on the importance of the sewer functions, the impact of secondary disasters, vulnerability to damage, and earthquake resistant performance.
- How to set the importance of sewers and the risk when they are damaged is already organized. Yet, there is a lack of information on the attributes of vulnerable sewers (pipe types, microtopography classification, etc.). This may hinder the appropriate preparation of earthquake resilience plans for sewers based on comprehensive consideration.
- NILIM is to make a technical document on the damage ratio of sewers by attribute conditions.
- Local governments can effectively and efficiently prepare earthquake resilience plans for sewers using the technical document.



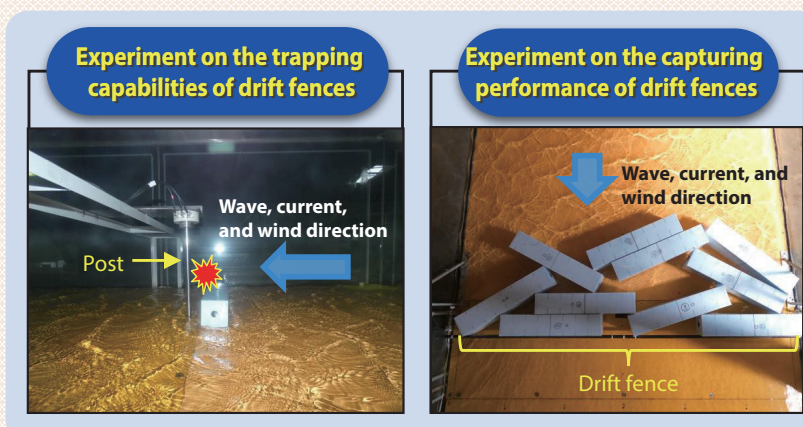
Manhole floating from liquefaction

(Water Quality Control Department)

5 Efforts to mitigate damage at ports during typhoons

Container drifting experiments in a wind wave channel is resulting in efficient and effective pre-drift countermeasures against expected storm surges, high waves, and strong winds. This research helps to reduce port damage during typhoons.

- Many containers were washed away and drifted during Typhoon Melor in 2009 and Typhoon Jebi in 2018.
- It is important to implement measures against drifting containers in advance in preparation for typhoons etc.
- Experiments are conducted to study the impact acting on drift fences, the trapping capabilities of the drift fences, and the required crown height of the fence using container models.
- Appropriate drift fence design method for expected wind speed, wave height, and tide level is proposed.

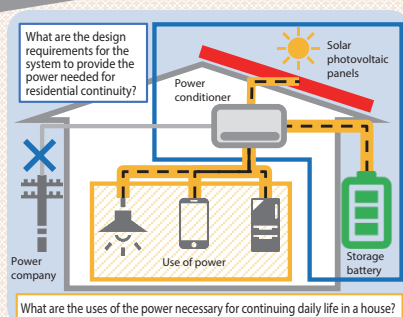


(Coastal, Marine, and Disaster Prevention Department)

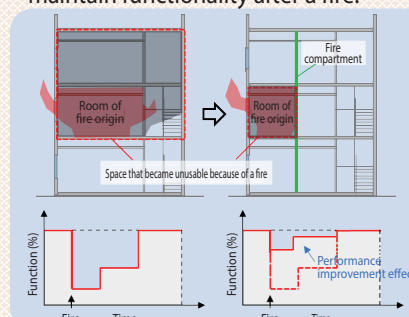
6 Efforts to improve the functional continuity of housing and buildings in the event of disasters

Design targets for self-sustaining energy systems that allow occupants to continue daily life in their homes during power outages and performance indicators focused on maintaining building functionality during fires are developed. These studies will contribute to the improvement of functional continuity of houses and buildings in the event of a disaster.

- Design targets for self-sustaining energy systems (combination of solar photovoltaic power generation and storage batteries) that take into account the residential continuity in the event of a power outage have not been developed. Thus, the adequacy of the systems cannot be determined.
- Design targets are proposed for self-sustaining energy systems in housing design by organizing results from studies on the use of the power necessary for residential continuity and the design requirements for the systems to continue daily life in a house during power outages.
- Fire protection performance that exceeds the requirements of the Building Standard Law must be available in order to avoid large-scale fire damage to buildings.
- A performance index is developed focusing on the ability to maintain functionality after a fire.



(Housing Department)



(Building Department)

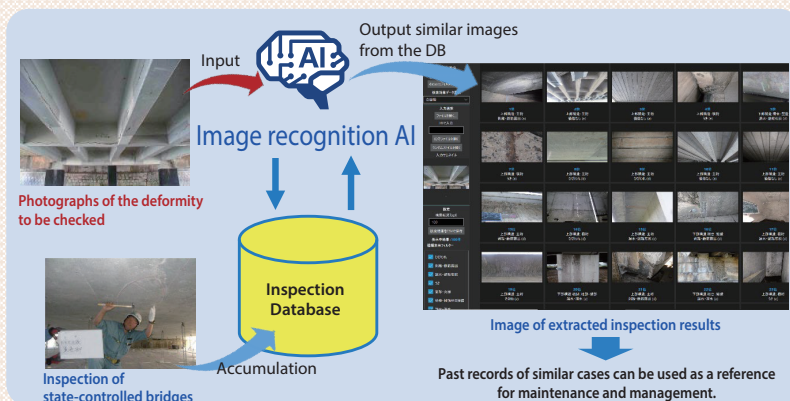
Example: Improvement of performance using fire compartments
The addition of a fire compartment will minimize the space that will be unusable after a fire, reducing the extent and duration of the loss of functionality.

7 Improvement of the quality of bridge repairs through the use of AI

By having AI learn from photos of deformities accumulated through periodic inspections of road bridges, we developed a technology that can search for and find bridges with similar cases from the image of a deformity. This development will contribute to the improvement of the quality of repair designs.

- The process and causes of bridge deterioration and damage vary depending on the specifications and the environment in which the bridge is constructed. The effectiveness of the measures also varies.
- Knowledge of various cases and their progress contributes to creating effective repair methods.

- A search system as shown in the figure on the right is developed.
- By inputting images of the deformation to be checked, the system allows the user to search the information on bridges with similar deformations from the records accumulated through periodic inspections.
- The road administrator can use the output to monitor the progress of deformations and repair methods, as well as their subsequent progress, as a reference for future observation and repair design.

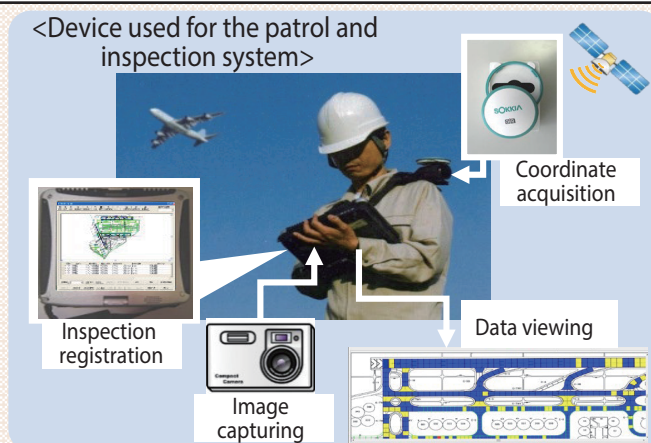


(Road Structures Department)

8 Efforts to improve efficiency and sophistication of airport pavement inspection operations

The functions of the airport pavement patrol and inspection system, which has been developed and operated to improve the efficiency and sophistication of airport pavement inspection work, are improved. The improved functions will contribute to the improved efficiency of maintenance and management work.

- Preventive maintenance and management are necessary to ensure the safety and punctuality of aircraft operations.
- Prompt reporting of runway failures, accidents, and disasters is required
- The system is newly equipped with a function to view periodic inspection information (PRI information) and a function to register repair information, in addition to the conventional inspection registration function and the function to determine the necessity of repairs for each type of abnormality.
- The system is also newly equipped with a function to report an accident and disaster that enables quick and easy reporting of runway failures etc., as well as sharing and viewing of accident and disaster information.

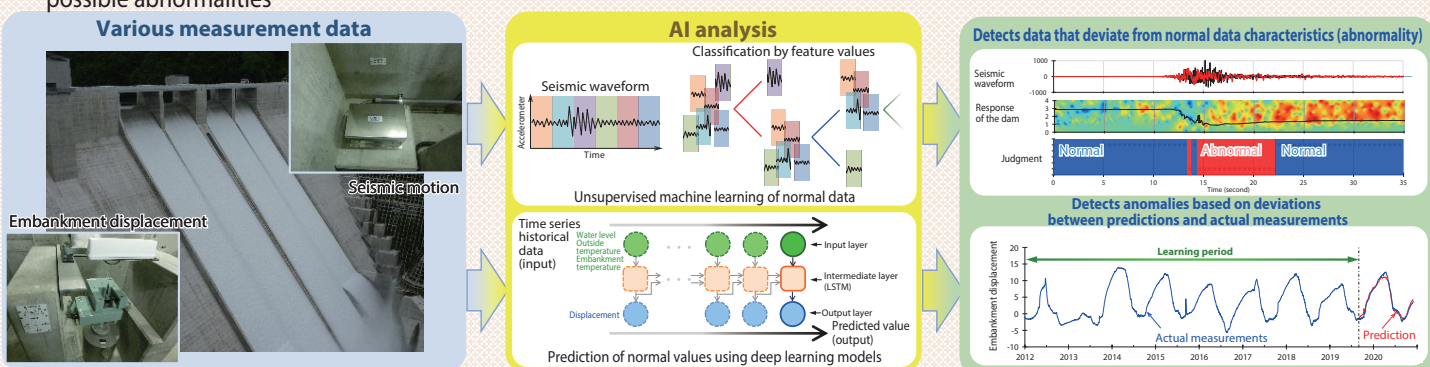


(Airport Department)

9 Improvement of the quality of dam maintenance management through AI analysis of measured data

AI is used to analyze various measurement data acquired for safety management at dams. The system uses the analyses to support inspections conducted by on-site personnel and contributes to improving the quality of dam maintenance and management.

- In the maintenance and management of dams, early identification of abnormalities is required based on various measurement data obtained from inspections. However, such process requires decision-making based on experience, and there will be a shortage of skilled personnel in the future.
- Technology was thus developed to use AI to analyze changes in the long-term behavior of dams and the effects of earthquakes to detect possible abnormalities



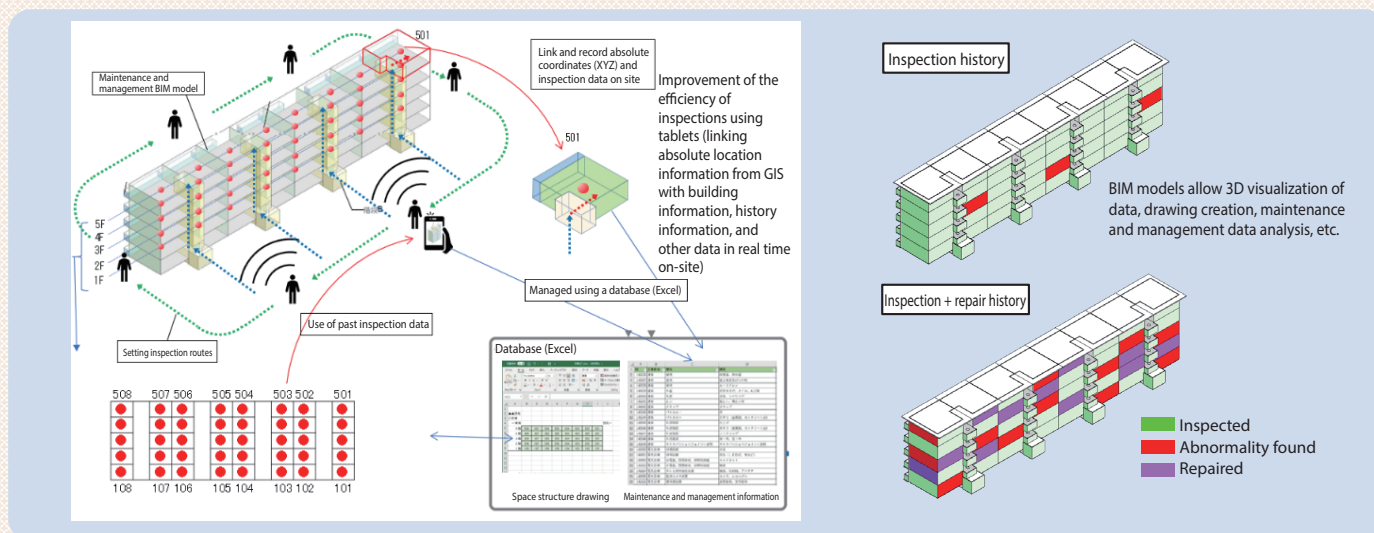
(River Department)

Improvement of the efficiency of maintenance and management through the use of BIM models for public rental housing stock

By developing maintenance management BIM models and smartphone-based inspection methods for public rental housing stock and other apartment buildings, this study will contribute to improving the efficiency of data-based preventive maintenance of stock and other activities.

- The use of BIM*1 is being promoted under the i-Construction initiative, which aims to improve the productivity of the entire construction production system.
- A BIM model that combines building attribute information in addition to 3D shape information is developed. Then, verification experiments concerning the coordination with inspection information etc. using tablets is conducted, and a guideline for the use of BIM in the maintenance management phase is drafted.

*1 Building Information Modeling

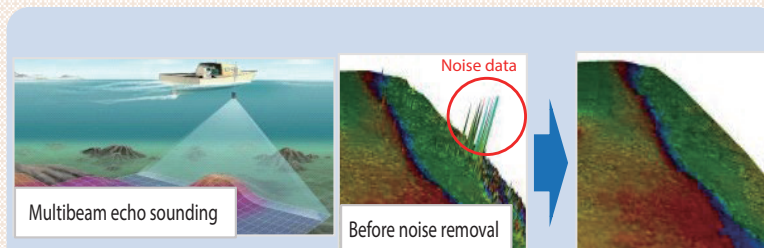


(Housing Department)

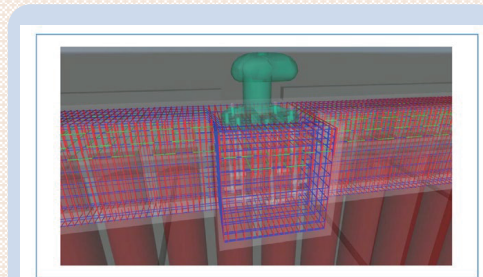
Improvement of productivity in the port sector through the use of ICT and BIM for infrastructure

Methods and standards are developed and organized to facilitate the use of ICT and BIM for infrastructure in the maintenance of port facilities. This contributes to increased efficiency and safety in design and construction sites.

- Measurement of workmanship of foundation work (rubble leveling) is easily affected by marine conditions because divers manually measure the workmanship in the sea. There is also room for improvement in productivity and safety. On the other hand, multibeam echosounders take time to remove noise.
- Field tests were conducted on the workmanship measurement of foundation works using ICT, such as multibeam echosounders. The measurement accuracy and the workmanship management standards were then verified. At the same time, a method to efficiently remove the noise from the multibeam echosounder data using AI technologies was developed.
- In promoting the use of BIM for infrastructure, there is a lack of sharing of information on the problems faced when using BIM for infrastructure, know-how on how to solve these problems, and the benefits of using BIM for infrastructure in the design and construction fields.
- Twenty-one cases were extracted from operations and construction projects using BIM for infrastructure that had already been implemented. They were organized and analyzed by main purpose of using the BIM for infrastructure. Findings were published as *BIM/CIM Case Studies ver. 1: Ports and Harbors* in November 2021.



Measurement of the workmanship of foundation work using a multibeam echosounder and the improvement of the efficiency of multibeam echosounder noise removal using AI technology



BIM/CIM Case Studies ver. 1: Ports and Harbors
(Improvement of Quality by Checking Interference with Reinforcing Bars)

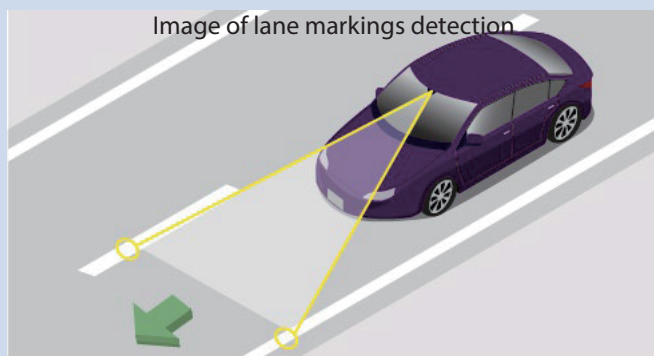
(Port and Harbor Department)

5

Efforts to expand the road sections where automated vehicles can fully apply their automated driving on expressways

The spread and expansion of automated driving will be promoted by creating “a draft index to guide the maintenance and management of lane markings” suitable for the automated driving on expressways.

- On-board sensors in automated vehicles cannot detect the faint lane markings, and the lane keeping assist system (LKAS) does not work.
- An analysis was conducted on the relationship between the corresponding faint level of lane markings and the detection status by on-board cameras.
- A draft index to guide the maintenance and management of lane markings will be created from the perspective of operating the lane keeping assist system (LKAS) properly operational.



Lane keeping assist system (LKAS): A system in which on-board sensors detect the lane markings and control the steering wheel to keep the vehicle in the center of the lane automatically.

(Road Traffic Department)

6

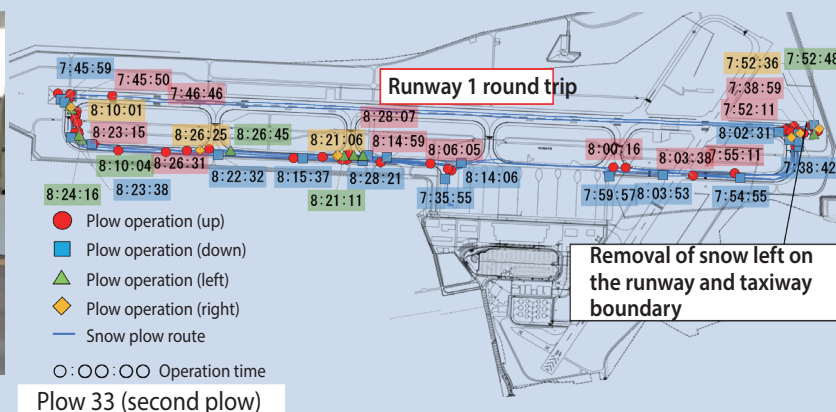
Efforts toward self-driving and labor-saving airport snow removal vehicles

In order to cope with the shortage of drivers operating airport snow removal vehicles, we will aim to identify technical issues with self-driving and labor-saving airport snow removal vehicles and develop operational and evaluation methods when this new technology is introduced.

- As the Japan's working-age population decreases, it is anticipated that it will become difficult to secure operators in the future due to a fall in and the progressing age of operators of snow removal vehicles. This poses a problem in maintaining the necessary framework for snow removal at our airports.
- In order to address this issue, the introduction of automation and labor-saving technologies for airport snow removal is under consideration as part of the Aviation Innovation utilizing advanced technologies and systems in the aviation field.
- We have collected data on the running position, route, running speed, and the vehicle operation of each snow plow currently in service (see the figure below right) in order to identify work that may possibly be performed by self-driving snow plows.
- Based on trends in technology development, we aim to revise operating standards required for the introduction of automation/labor-saving technologies and devise a method for quantitatively evaluating benefits achieved in the area of labor savings and work efficiency.



Snowplow

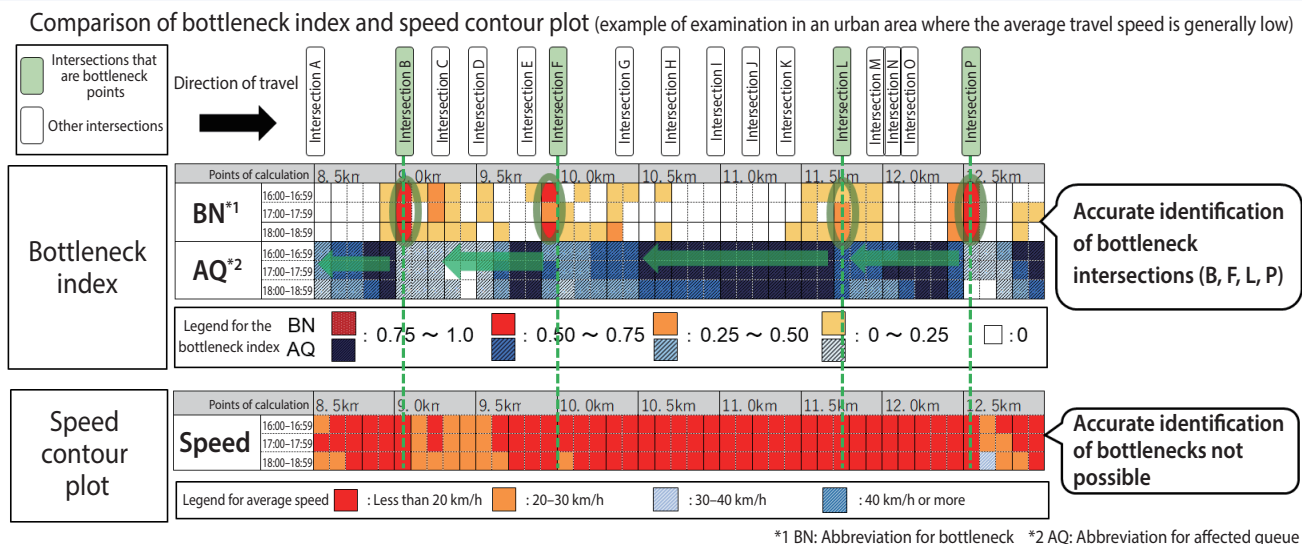


Example of data collected on snow plow operation

(Airport Department)

ETC 2.0 probe data, one of the big data sources, is used to calculate a bottleneck index to identify the starting points of traffic congestion, which helps to reduce traffic congestion.

- In order to propose effective countermeasures to reduce traffic congestion, it is necessary to accurately identify the starting points of traffic congestion (bottleneck points).
- However, with the conventional method of using average travel speeds (speed contour plot), it is sometimes difficult to accurately identify bottleneck points in urban areas where congestion occurs continuously, and average travel speeds are generally low.
- A bottleneck index was developed based on ETC 2.0 probe data. In this index, speed reductions are divided into two categories: those caused at the starting point of the congestion (BN¹) and those caused by the effect of the starting point (AQ²). This has made it easier to identify bottleneck points.

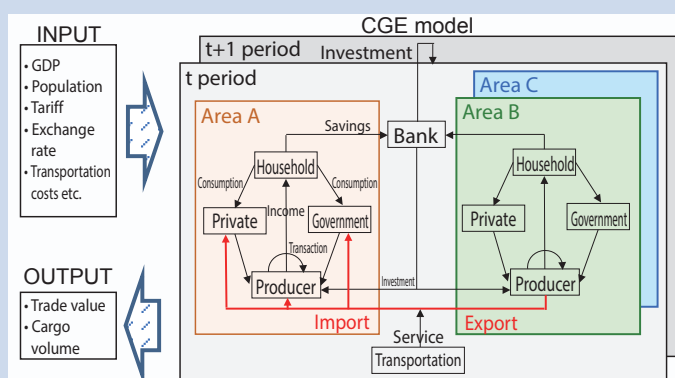


(Road Traffic Department)

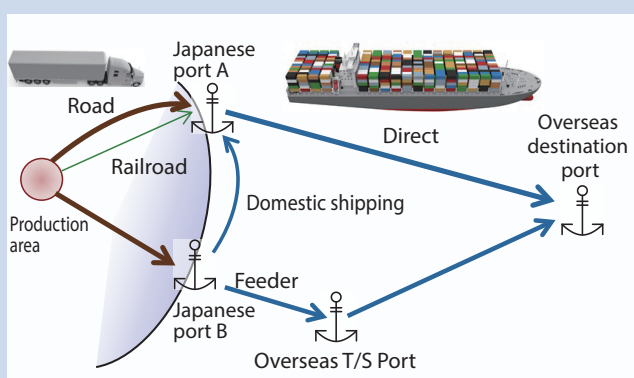
We developed future cargo volume forecasts that accurately reflect changes in the global economic and social conditions and the container transport market. This will support the planning and formulation of national port policies and the revision of port plans by port management bodies.

- Accurate estimation of future port cargo volumes is necessary for planning and formulating port policies and revising port plans.
- It is now difficult to foresee the future because of the impact of the spread of COVID-19, the movement toward a zero-emission society, the progress of the mega-EPA and the rise of protectionism, the supply chain crisis due to tight international container transport capacity, and other factors.
- The forecasting model for Japan's overall foreign trade port cargo volume and the port and route choice model for foreign trade container cargo are continuously improved to calculate future forecasts.
- Quantitative evaluation is conducted on the impact of recent rapid changes that existing models cannot take into account, such as changes caused by COVID-19 and the movement toward a zero-emission society. The evaluation is used to develop a method that reflects these changes in future forecasts.

<Forecasting model for foreign trade port cargo volume>



<Port and route choice model for foreign trade container cargo>



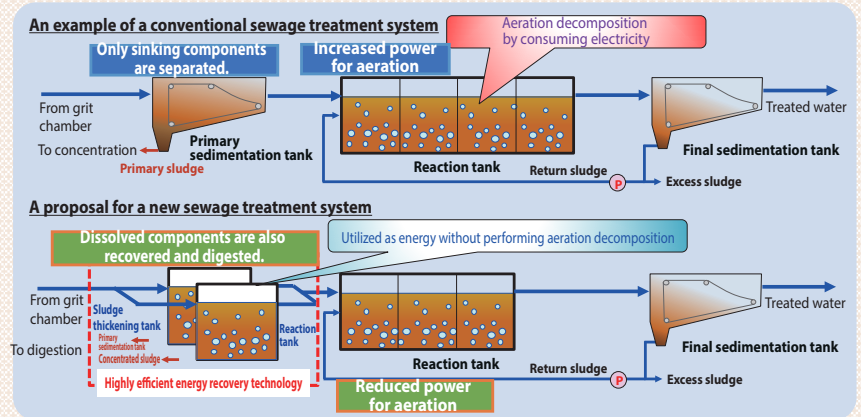
(Port and Harbor Department)

3. Research to support comfortable and secure living

1 Efforts to reduce greenhouse gas emissions from sewerage system

The development of energy recovery technology using the primary sedimentation tank will increase the amount of biogas generated and reduce the amount of electricity consumed by the reaction tank. This thereby contributes to the reduction of greenhouse gas emissions from the sewerage system.

- In conventional sewage treatment, solids are collected in the primary sedimentation tank and then aerated in a reaction tank to decompose dissolved components. (Power consumption is an issue.)
- Biogas is generated from solids (sludge) in the digestion process and used as fuel.
- Under the Breakthrough by Dynamic Approach in Sewage High Technology Project (the B-DASH Project), the technology to recover dissolved components in the primary sedimentation tank is developed.
- Electricity used for aeration of the reaction tank can be reduced. Also, biogas generation increases because of an increase in the amount of sludge collected in the primary sedimentation tank.

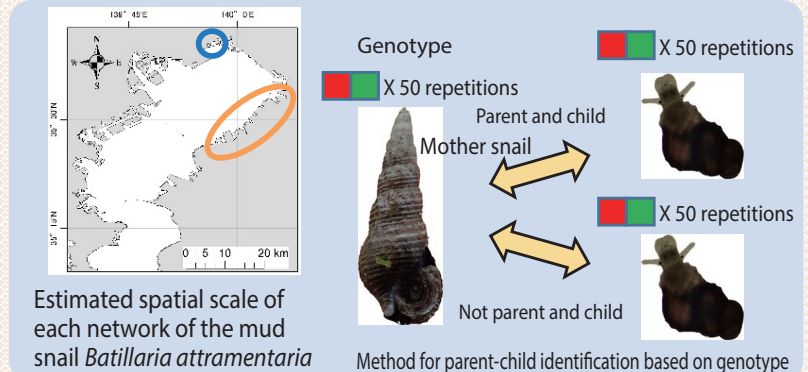


(Water Quality Control Department)

2 Study for coastal ecosystem restoration

Development of the technology to promote an understand the network structure (spatial scale of network and linkage between habitats and the thickness of each linkage) among habitats of living organisms in the sea contributes to a sea rich in living organisms.

- Understanding the network structure is helpful to determine effective habitat allocation.
- Development of a DNA analysis method for understanding the spatial scale of habitat network
- Development of a method for parent-child identification to determine the linkage between habitats and the thickness of each linkage.



(Coastal, Marine and Disaster Prevention Department)

3 Improvement of comfort through proper maintenance and management of roadside plantings

By presenting on-site application methods for preventing infrastructure damage by street tree roots and weed control of street trees, beautiful plantings are maintained without interfering with road traffic and contribute to the improvement of comfort in the road space and roadside environment.

- In areas with planting along roads, traffic obstruction due to infrastructure damage by street tree roots, obstruction of visibility due to the overgrowth of weeds, and deterioration of the landscape occur.
- High-quality greening that can comprehensively demonstrate greening functions while maintaining road traffic functions is necessary.
- The effectiveness of each measure is verified through test constructions and case studies.
- Methods and points to note for on-site application are organized and reflected in the maintenance and management guidelines for road greening.

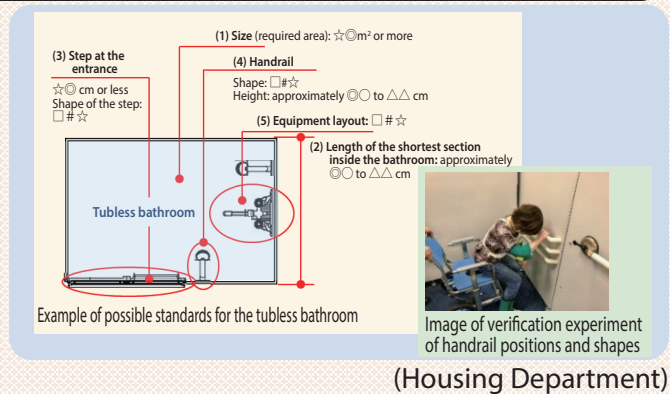


(Research Center for Infrastructure Management)

4 Tubless bathrooms in residential bathrooms to reduce drowning accidents

Through the development of barrier-free standards for tubless bathrooms, we will contribute to the reduction of drowning accidents among the elderly at home and the reduction in the caregivers' burden.

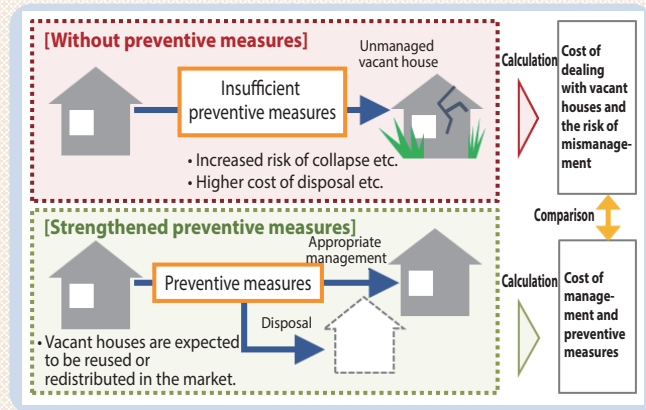
- The number of accidents involving the drowning of elderly people while bathing at home is increasing, and there is an urgent need for such measures as tubless bathrooms.
- There are no technical standards for functions and performance required for tubless bathrooms, bathroom size, handrail position, etc.
- Using a full-scale test model, basic data, such as bathroom types and bathing behavior based on user characteristics, are gathered and verified.
- A draft barrier-free standard for tubless bathrooms is developed, covering safety and the autonomy of users and ease of assistance.



5 Efforts to improve efficiency of reducing vacant houses

Through research on preventive measures against the mismanagement of vacant houses, we will contribute to reducing the cost of vacant house management for the government.

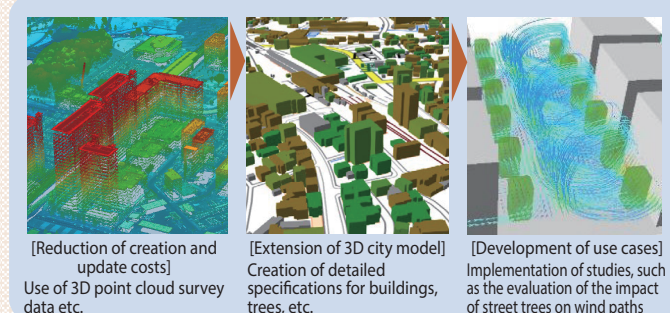
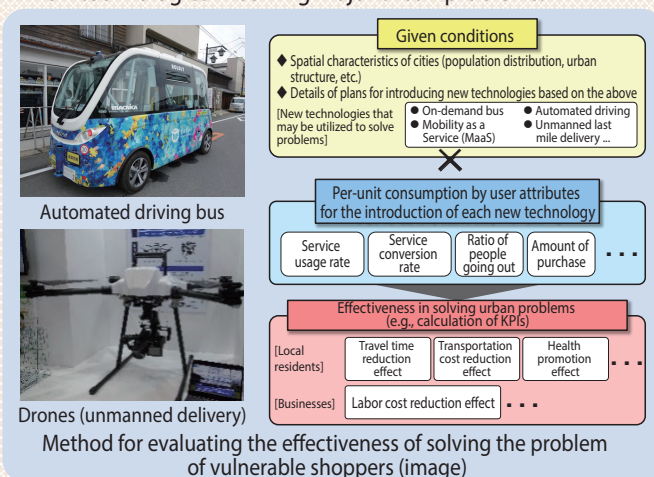
- There are concerns about the future increase in vacant houses. There are also limits to dealing with mismanaged vacant houses later.
- It is necessary to strengthen and promote preventive measures to prevent vacant houses from being left unmanaged.
- The cost of dealing with vacant houses in the municipalities and the cost for owners to manage the vacant houses are calculated based on cases where preventive measures are implemented and where they are not.
- A tool to quantitatively evaluate the effectiveness of preventive measures against mismanagement is developed.



6 Solution to urban problems by supporting the development of smart cities

We contribute to the formation of efficient and sustainable smart cities through the use of new technologies to solve urban problems and the development of technologies for the use of 3D urban models.

- The theme of a smart city is multidisciplinary, covering transportation, lifestyle support, and disaster prevention. Available new technologies are also diverse.
- Support is needed for local governments to turn their cities into smart cities.
- New technologies that can be used to solve urban problems are systematically organized.
- A planning evaluation method is developed to measure the effectiveness of new technologies in solving major urban problems.
- Promotion of the development of 3D city models as basic data for smart cities is necessary.
- Challenges include the reduction of the creation and update costs and development of diverse use cases.
- A low-cost method that uses existing data is developed.
- Use cases for running advanced simulation of urban environment, disaster prevention, etc. are developed by extending common specifications.



Advanced technical support and countermeasures for accident

TEC-FORCE and other dispatches by NILIM over the past three years

In the event of a disaster, NILIM dispatches experts with advanced technical knowledge in various fields to the affected areas upon request. In particular, in the event of an extensive disaster, the TEC-FORCE* and other teams are dispatched to provide strong support for the prevention of secondary disasters and the restoration of disaster-stricken areas.

In recent years, we have dispatched experts to areas devastated by Typhoons Faxai (#15) and Hagibis (#19) in 2019, torrential rain in July 2020, Typhoon Haishen (#10) in 2020, heavy rain that lasted from July 1, 2021, and torrential rain in August 2021.

* Technical Emergency Control Force

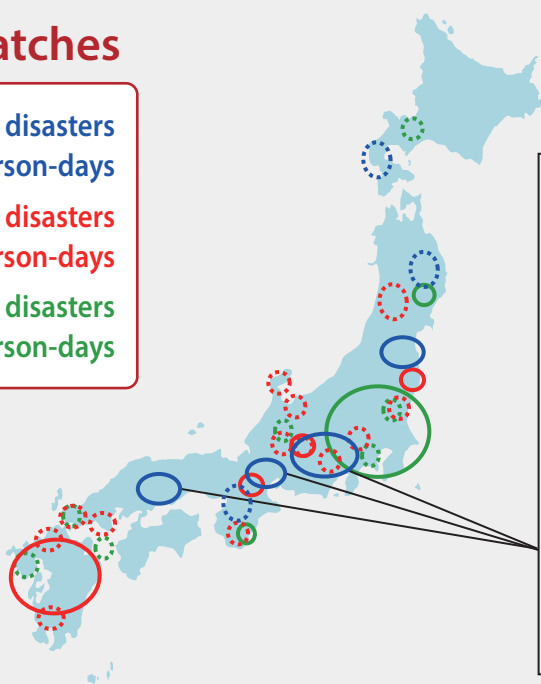
TEC-FORCE is a dispatch team organized by the Ministry of Land, Infrastructure, Transport and Tourism in FY 2008 to survey the damage and provide technical support to local governments in affected areas in the event of a large-scale natural disaster.

○ Past dispatches

FY 2021: 12 disasters
82 person-days

FY 2020: 9 disasters
105 person-days

FY 2019: 8 disasters
156 person-days



○ Legend

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

[Disasters caused by torrential rains in 2021]

(Heavy rain that lasted from July 1 and heavy rain in August)

Atami City, Numazu City, Shimizu Town, and Shizuoka City in Shizuoka Prefecture
Nagano City, Okaya City, and Agematsu Town in Nagano Prefecture
Nakatsugawa City in Gifu Prefecture
Otsu City in Shiga Prefecture
Mihara City and Akitakata City in Hiroshima etc.

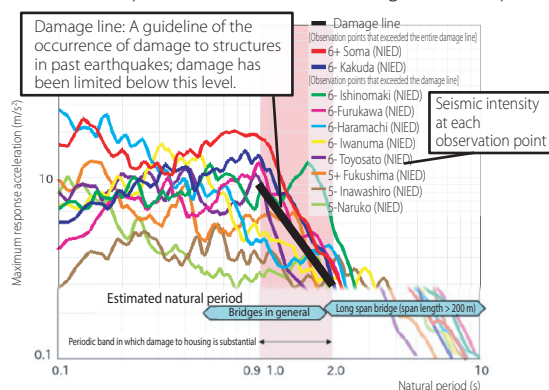


Advancement of disaster Response technologies

We will contribute to the advancement of disaster response technologies by researching the effective use of existing facilities, such as CCTV cameras and satellites, in the event of a large-scale disaster, as well as preventive measures against strong winds.

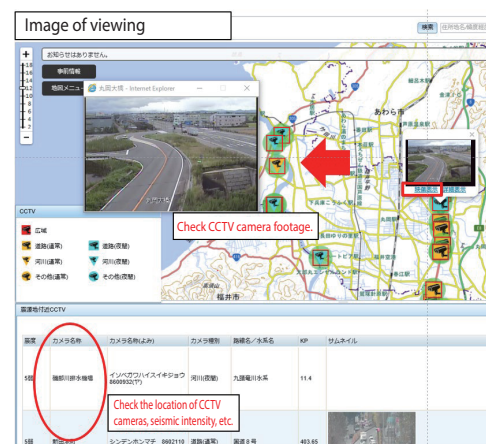
■ Spectrum analysis information

Estimation of the scale and extent of damage during the period immediately after an earthquake by comparing the acceleration response spectrum of the earthquake with the damage line created on the basis of previous earthquakes. This is utilized during the initial phase of disaster response.



■ List of CCTV cameras

Cameras in areas where strong tremors were observed are extracted and used to quickly assess the situation.

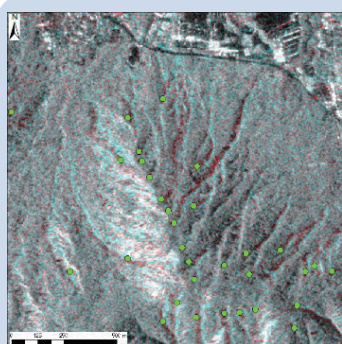


and disaster response Advancement of technologies

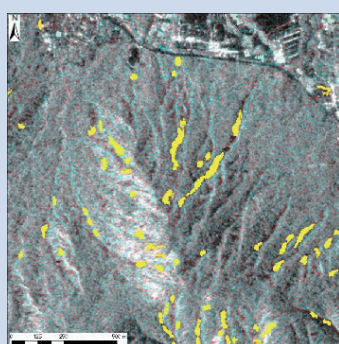
■ Research on a method for estimating landslide areas from satellite SAR images

Satellite SAR images, which can be taken at night and in bad weather, are used to quickly identify areas where landslides have occurred.

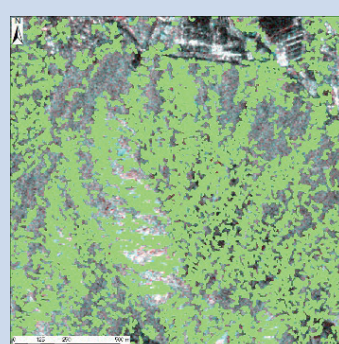
- The observation range of Daichi-4 (ALOS-4) is expanded compared to that of the SAR satellite Daichi-2 (ALOS-2) currently in use. This increases the amount of data to be processed, and the efficiency of the process of interpreting SAR images, for example, needs to be increased.
- The reliability of estimating the location of landslide was compared between multiple methods that excel in the processing of SAR data of wide area observation, and methods that use visual interpretation.



Visual interpretation



Intensity difference analysis



Coherence analysis



Orthophoto

Example of estimation results for each method (Torrential rain in July 2018 in Higashihiroshima City)

■ Study to promote retrofitting of strong roofs against high winds

We will develop methods for evaluating wind-resistance diagnostics and wind-resistance reinforcement technologies for existing roofing materials to promote repairs. This will contribute to improving the wind resistance performance of the existing building stocks as a whole and to ensuring occupancy and business continuity in the event of high winds.

- Recent typhoons have scattered roofing materials and blown wind and rain indoors, making it difficult to continue living in the residence or operating a business.
- An analysis of damage caused by Typhoon Faxai on the Boso Peninsula in 2019 revealed that roofs built using older construction methods tended to suffer greater damage.



Example of damage to tile roofs caused by a typhoon (Typhoon Faxai in 2019)

- We developed a wind-resistance diagnostic method that reliably identifies vulnerable roofing materials by using factors that affect the risk of high wind damage to roofing materials as an indicator.
- The wind resistance performance level is clarified for repair methods of various roofing materials. In addition, evaluation methods for wind-resistant reinforcement technologies are proposed using strength tests and other means.

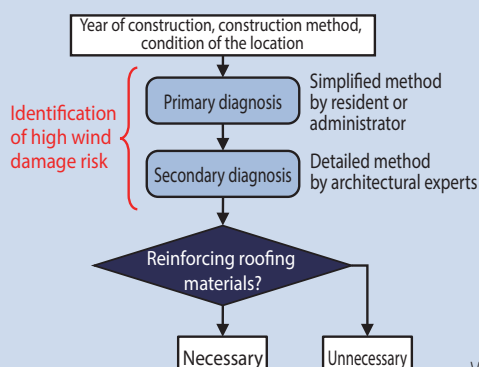


Image of wind resistance diagnostic method for existing roofing materials



Wind pressure resistance test of metal plate roofing



Loading test on joints of folded plate roofs

Example of a test conducted in FY 2021 on the overlay method for a steel plate roofing

Hosting of personnel

- Accepting people from 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. (Number of exchange researchers accepted: 43 as of April 2022)

- Accepting officials from Regional Development Bureaus

We accept officials 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. The officials who have acquired technical skills would return to their Regional Development Bureaus and actively work as core technicians in their respective regions.

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. (Dispatch of lecturers in FY 2020: 287 cases as of the end of March 2022) (Number of training courses in FY 2021: 32 courses with 1,266 participants [Yokosuka Office No. 2])



Airport Estimation and Facility CALS Course

Support for local issues

NILIM works with local offices and other local agencies to resolve issues that arise in the field.

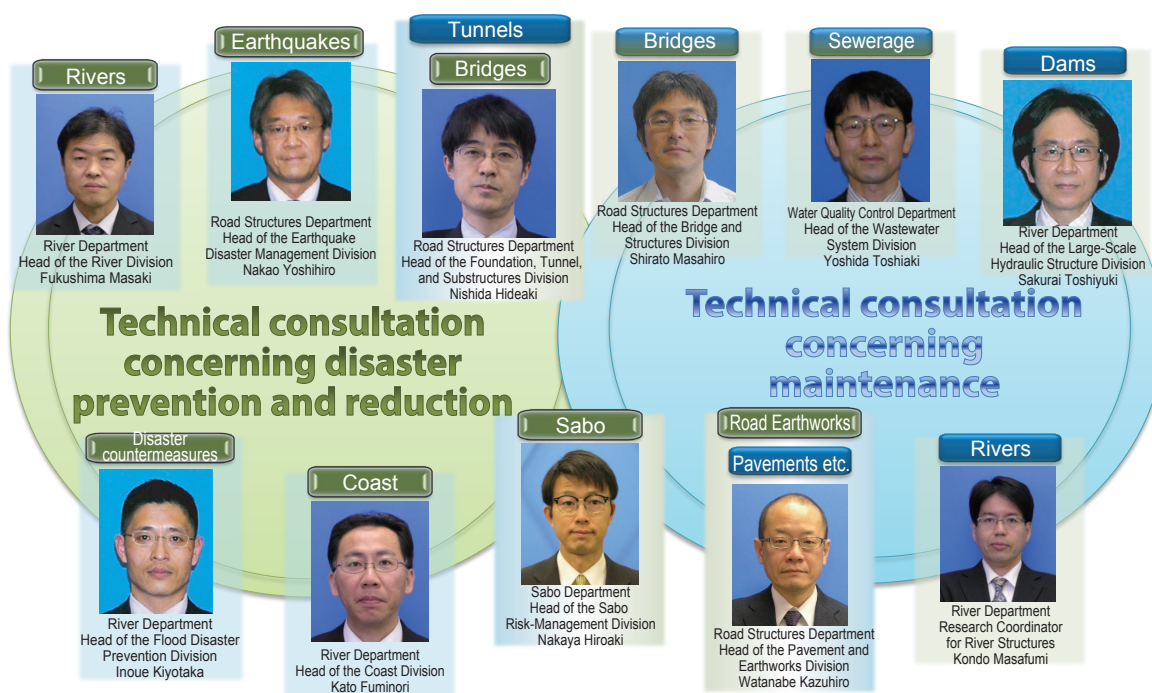
NILIM dispatches personnel to the Sediment Disaster Prevention Technology Center of the Kinki Regional Development Bureau to perform research and technical development concerning large-scale sediment disasters.

Technology consultation

NILIM constantly provides national government agencies, local governments, and other organizations 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 the 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

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



■ Contact (Email: nil-gijutsusoudan@gxb.mlit.go.jp)
Manager of the Planning Division,
Rural Area Policy Planning Department (Tel: 029-864-4343)

■ Website URL
<http://www.nilim.go.jp/lab/bbg/tec-soudan>



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

NILIM is reorganizing housing and social infrastructure-related data collected for administrative purposes and using it for research and to support on-site operations.

Supporting the establishment of a maintenance cycle for road bridges

Deterioration analysis data of road bridges managed by the national government, obtained through periodic inspections, were organized based on deterioration characteristics under 272 conditions and posted on the website as NILIM Reference Data No. 985.

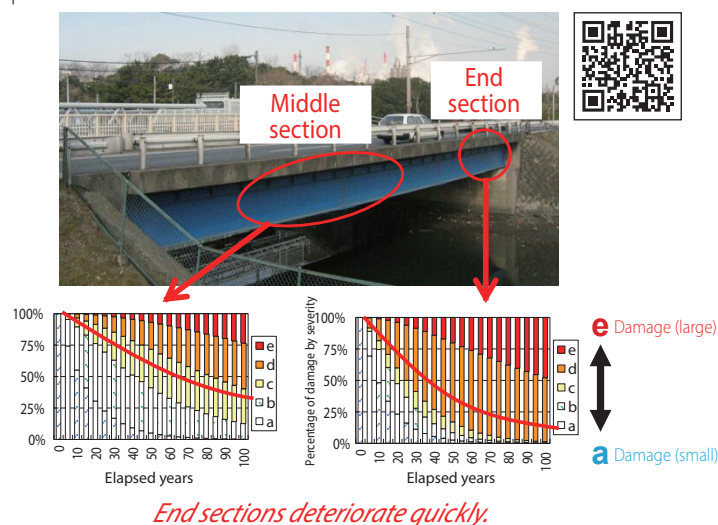


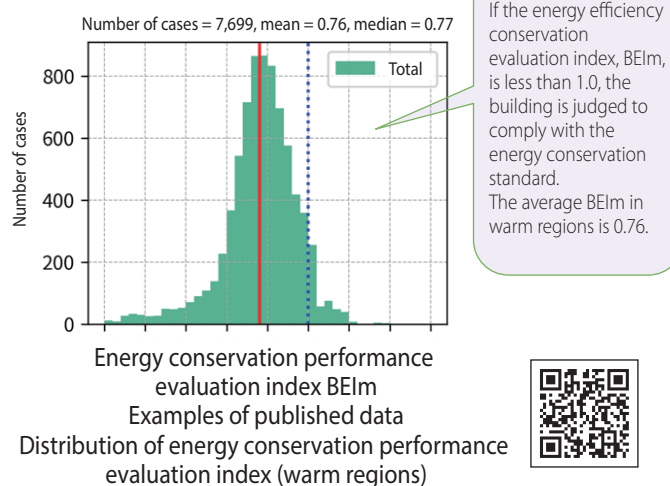
Image of inspection data of 24,000 bridges managed by the government

Support for planning of energy conservation measures for office buildings etc.

Information related to applications for energy conservation standards based on the Act on the Rational Use of Energy (15,000 cases/year).

Energy conservation performance and design specifications (heat insulation performance, efficiency of air-conditioning equipment, etc.) were organized for office buildings etc. and posted on the website as NILIM Reference Data No. 1143.

The study also contributes to the promotion of the government's energy-saving measures established in response to the 2050 Declaration on Carbon Neutrality.



Support for promoting physical asset management of sewerage

The database of sewer pipe deterioration, which collects the results of inspections by local governments and organizes information such as deterioration assessment results, is made available to the public. The database covers approximately 310,000 spans from 60 local governments as of May 2021.

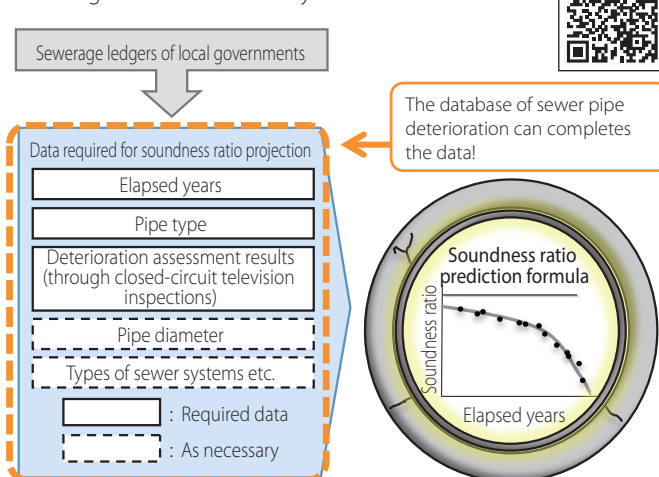
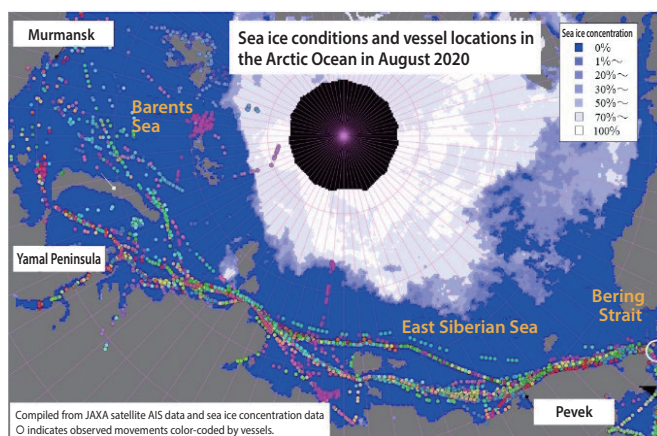


Image of the database of sewer pipe deterioration

Support for port policies through the analysis of maritime big data

Maritime big data, such as global ship dimension data (Lloyd's data), ship location data (land-based and satellite-based AIS data), and cargo flow data (PIERS data) are analyzed, and the results are published as needed.

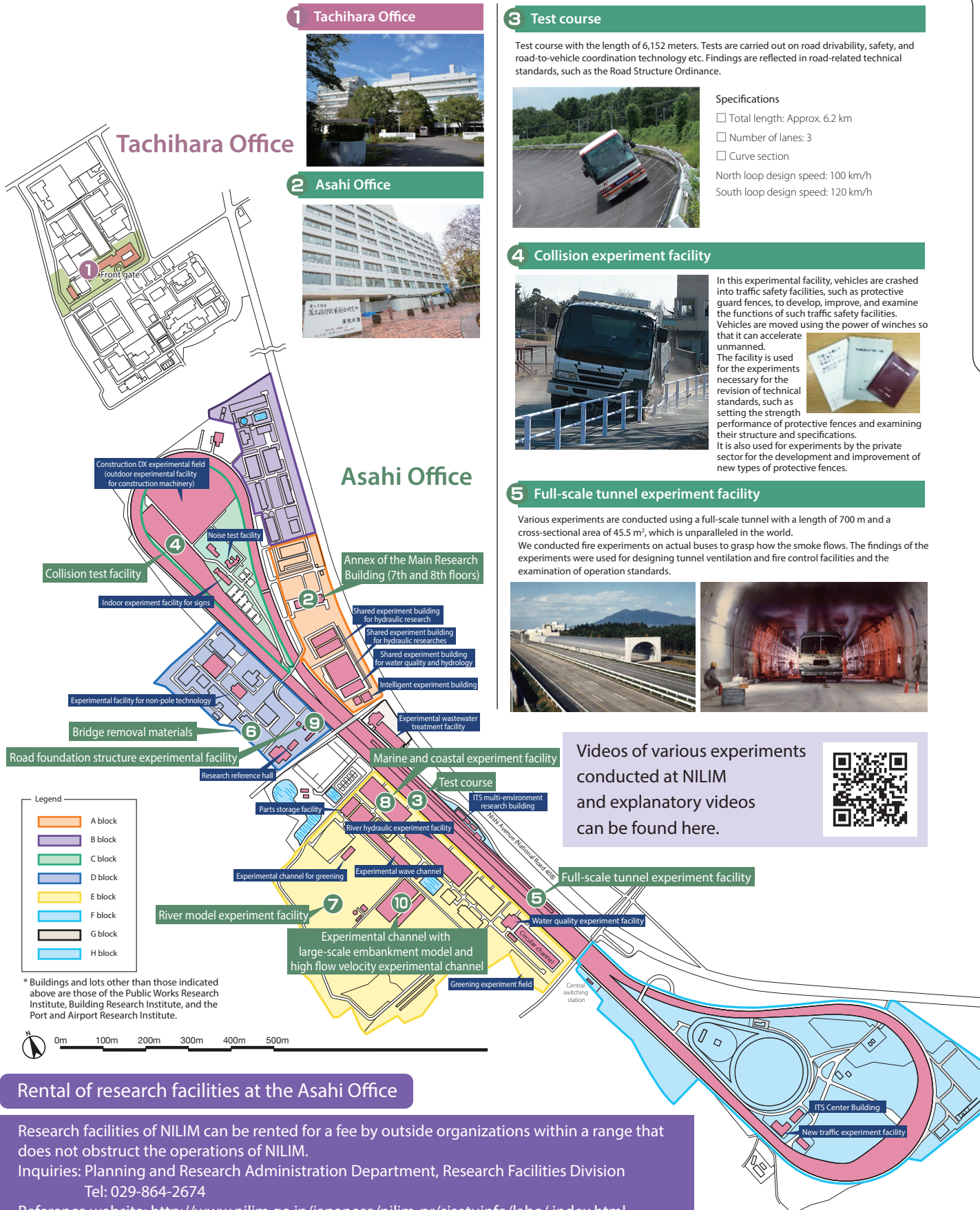


Example of vessel movements along the Northern Sea Route using satellite AIS data

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.



Rental of research facilities at the Asahi Office

Research facilities of NILIM can be rented for a fee by outside organizations within a range that does not obstruct the operations of NILIM.
Inquiries: Planning and Research Administration Department, Research Facilities Division
Tel: 029-864-2674
Reference website: <http://www.nilim.go.jp/japanese/nilim-pr/sisetuinfo/labo/index.html>

Yokosuka Office

1 Yokosuka Office

The main building was completed in April 2004. It has a light court in an atrium to allow natural ventilation and natural lighting to enter the research laboratories. The building also has solar panels and rooftop greening. These and other features are designed to protect the global environment.



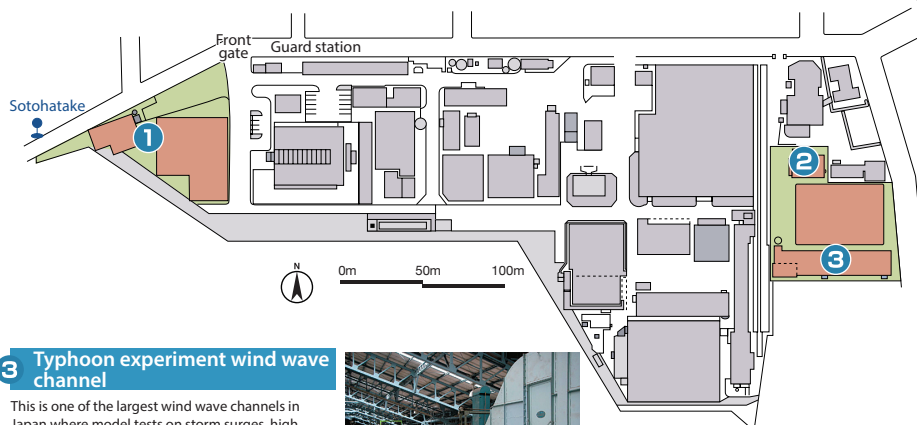
2 Aircraft load simulator

Various experiments on airport pavements, such as runways, taxiways, and aprons, are conducted using equipment that runs the same load as a real aircraft (B747-400).



3 Typhoon experiment wind wave channel

This is one of the largest wind wave channels in Japan where model tests on storm surges, high waves, strong winds, and tsunamis are conducted. We are conducting research to protect large cities and ports from natural disasters using a wind blower, a wave maker, and a pump to generate typhoon-level winds, waves, and currents.



6 Bridge removal materials

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.

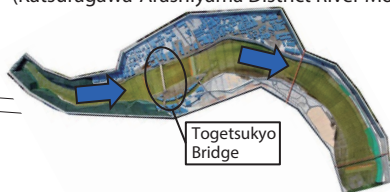


7 River model experiment facility



This is a sprawling 15-hectare facility located outdoors. Up to 15 river models can be set up on the site. 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 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)



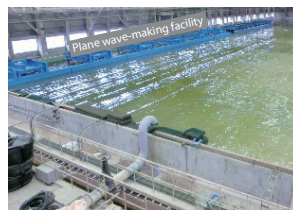
In normal times

In the event of heavy rains

Model

8 Marine 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 Road foundation structure experiment facility

This facility reproduces damage to roads (such as the generation of road surface bumps) and uneven subsidence during earthquakes to verify road technology that is resistant to ground deformation.



10 Experimental channel with large-scale embankment model



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

● Hydraulic experiment on the reinforcement of slopes



Other facilities include a sediment hydraulic test channel, a river hydraulic model test facility, a high velocity test channel, and a full-scale aeration test facility.

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”.

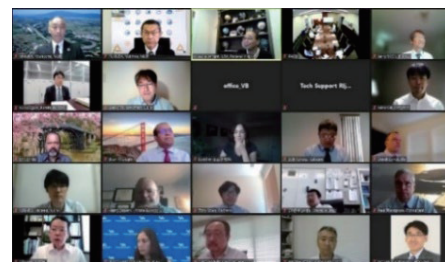
Technical contribution to domestic policy

Activities as international consortium: Sabo Department

As a member of the consortium launched in FY 2020, NILIM takes part in international forums and in technical documents editing. These activities are conducive in identifying trends of landslide early warning systems in various countries, including permission of the right to issue advisories to the private sector, and domestic studies of sediment, and Landslide Alert Information.

Discussion on highway bridges: Road Structures Department

The U.S.-Japan Bridge Engineering Workshop was held based on the Japan-U.S. Memorandum of Cooperation on Traffic Infrastructure. New knowledge obtained on seismic design and repair/reinforcement projects, as well as new construction methods and materials, is being used for study of guidelines and standards for design of new road structures and bridge inspections, repair, and reinforcement.

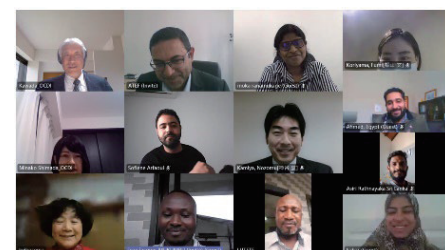


The U.S.-Japan Bridge Engineering Workshop

Technical cooperation with developing countries

Cooperation with JICA projects and training: River Department, Research Center for Infrastructure Management, and Administrative Coordination Department

Four training sessions were conducted online in FY 2021, including dam safety management, project management in social infrastructure construction and maintenance, and port maintenance.

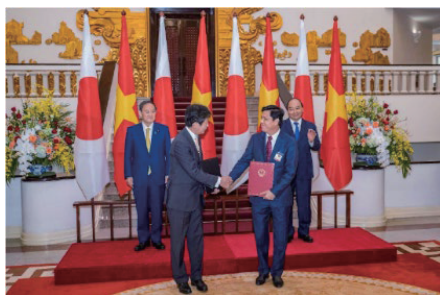


Training on port development and planning
(for port engineers)

Overseas deployment of infrastructure systems

Cooperation in the development of the national technical standards for port and harbour facilities of the Socialist Republic of Viet Nam: Port and Harbor Department

- Cooperation in the development of the national technical standards of the Socialist Republic of Viet Nam based on the memorandum of understanding signed between the Ministry of Land, Infrastructure, Transport and Tourism of Japan and the Ministry of Transport of the Socialist Republic of Viet Nam.
- Based on the above MOU, which was renewed in FY 2020, Web workshops were held in FY 2021.



Exchange of the memorandum (October 19, 2020)



Web workshop with the Viet Nam counterpart

Activities related to ISO:

Water Quality Control Department, Building Department, Research Center for Infrastructure Management, etc. Participated in TC to review and discuss the respective standards

Management initiatives supporting high-quality research

Cooperation with external organizations

By implementing joint research, contract research, calls for technologies, and social experiments and by 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.

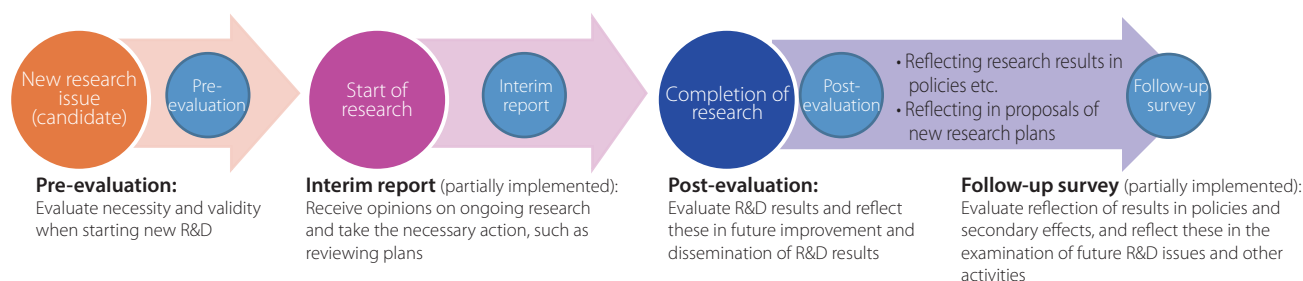
- **Domestic cooperation**
The aim is to develop education and research on the university side and to contribute to the activities of NILIM through coordination and cooperation between universities and NILIM.
University of Tsukuba, Kansai University, Tokyo University of Science, etc.
- **International cooperation**
The aim is 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 subjects, 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 subjects

NILIM strives to improve the quality of research results by introducing systems allowing external experts to evaluate individual research subjects 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

The research and administrative divisions work together to effectively combine off-JT and OJT to systematically develop young personnel. In-house research presentation sessions are held for young researchers who have little experience in presenting their research. Study groups led by young researchers are also held to strengthen their 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 of research ethics to prevent misconduct (fabrication, falsification, and plagiarizing).

To create a deeper understanding of NILIM

Website

NILIM actively provides information, including an outline of NILIM, direction of research activities, research subjects, results, and event information.

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

(URL: <http://www.nilim.go.jp/>)



NILIM YouTube channel

Videos of experiments and lectures in the field of housing and social capital of NILIM are available on YouTube with easy-to-understand explanations.



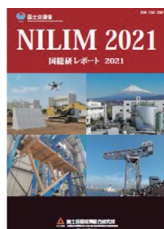
Email service

Emails are usually sent twice a month to provide brief and timely information on the activities and research outcomes of NILIM. You can register to receive our email service by using the QR code on the right.



NILIM Report

This annual publication introduces and explains research trends and examples of how they are reflected in policies and compiles recommendations for technological policy issues. (The full report is published on NILIM website.)



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 560 papers per year and receives awards for papers in many fields from both inside and outside of Japan.

• Road Engineering Association of Asia and Australasia (REAAA)
Katahira Award for Outstanding Paper (September 2021)

• Pavement Engineering Committee, Japan Society of Civil Engineers
Pavement Engineering Paper Encouragement Award (December 2021)



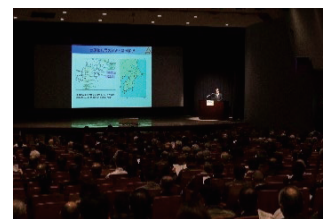
Lectures

NILIM Lectures

NILIM Lectures are held annually to introduce the activities of NILIM, such as presenting its research outcomes and making recommendations to solve technology-related policy challenges.

The lectures have been held online via YouTube since FY 2020.

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



NILIM Lectures (December 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.

Online lectures are also available in order to prevent the spread of COVID-19.

(Lectures given in FY 2021: 29 lectures)



View of a lecture



Open house and facility tour

Open houses are held to introduce NILIM facilities and research projects to visitors.

Facility tours are also available at any time to introduce our research facilities and research projects.

Open houses are being suspended for the time being in order to prevent the spread of COVID-19.



Contest for making bridges out of cardboard (the award ceremony)



Facility tour

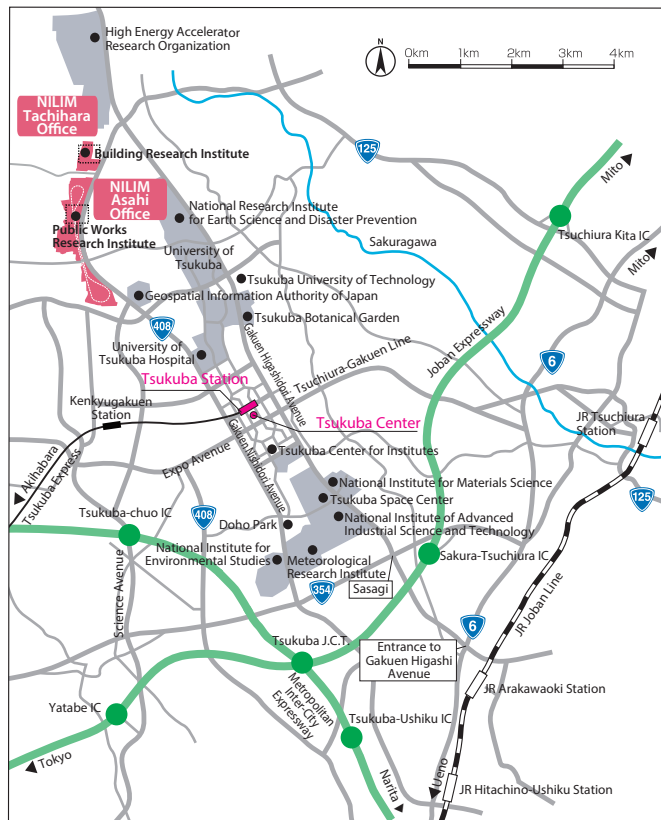
Recruiting activities

NILIM is recruiting people who work with us to realize a safe, reliable, vibrant, and attractive national land and society.

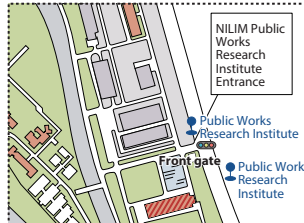
Please visit our website for the latest information.



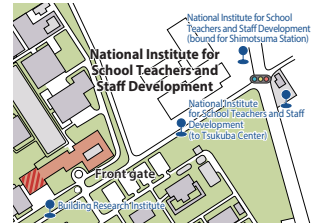
National Institute for Land and Infrastructure Management (Tsukuba)



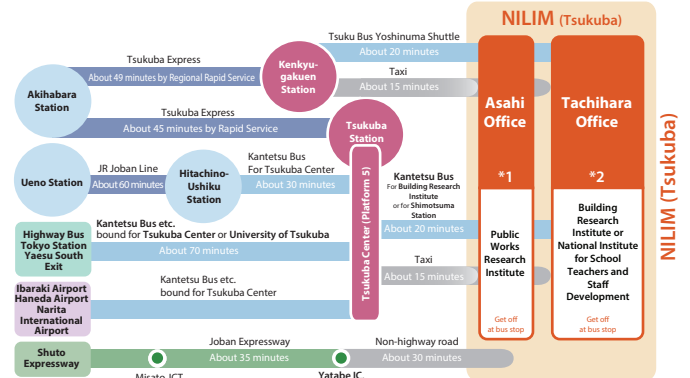
● **Asahi Office**
1 Asahi, Tsukuba City,
Ibaraki 305-0804 Japan
Tel: 029-864-2211



● **Tachihara Office**
1 Tachihara, Tsukuba City,
Ibaraki 305-0802 Japan
Tel: 029-864-3742

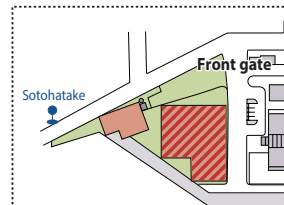
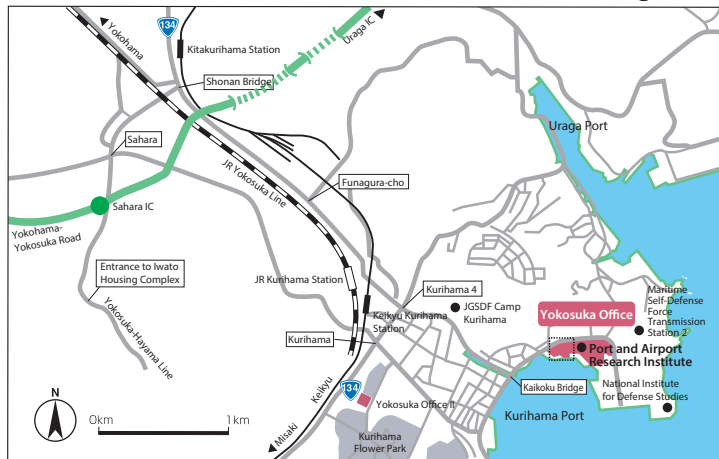


Transportation guide to NILIM (Tsukuba)



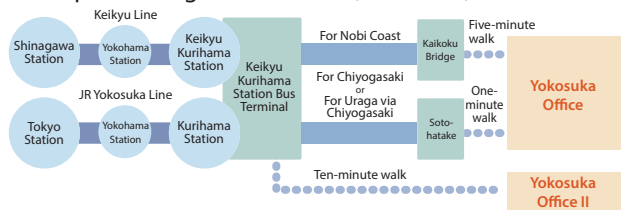
Tsukuba Express <http://www.mir.co.jp/>
Kanto Testudo (Kantetsu Bus) <http://www.kantetsu.co.jp/>
Tsuku Bus (Tsukuba City Hall) <http://www.city.tsukuba.ibaraki.jp/>

National Institute for Land and Infrastructure Management (Yokosuka)



● **Yokosuka Office**
3-1-1 Nagase, Yokosuka City,
Kanagawa 239-0826 Japan
Tel: 046-844-5006

Transportation guide to NILIM (Yokosuka)



Keikyū <https://www.keikyū.co.jp/index.html>

NILIM logo



All Rights Reserved © 2001
National Institute for Land and Infrastructure Management

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

The triangle indicates three fields covered by the former organization: the field related to rivers and roads, the field related to the city and housing, and the field related to ports and airports. The logo represents our commitment to be in charge of housing and social infrastructure development through the cooperation of these three fields.

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.

