



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

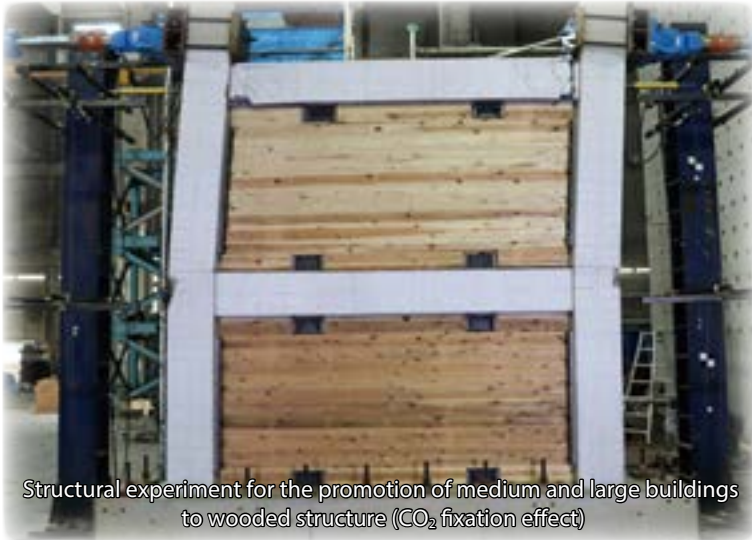
NILIM



Survey of damage to port facilities caused by the earthquake off the coast of Fukushima prefecture in March 2022



Survey of disasters caused by heavy rainfall that started on August 3, 2022



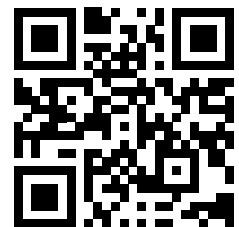
Structural experiment for the promotion of medium and large buildings to wooded structure (CO₂ fixation effect)



Field operational test on providing information to support merging into a main lane
- Field operational test of providing information to automated driving vehicles to support merging into a main lane

Research Institute that creates the society of the future

FY 2023



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

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Cover photo

(Upper left) Survey of damage to port facilities caused by the earthquake off the coast of Fukushima Prefecture in March 2022 (Port, Coastal and Marine Department)

(Upper right) Survey of damage caused by the heavy rain that started on August 3, 2022 (Road Structure Department)
→ Related: p. 8. [Technical support for disaster and accident responses](#)

(Bottom left) Structural experiment for the promotion of medium and large buildings to wooded structure (CO₂ fixation effect) (Building Department)
→ Related: p. 5. [Green challenge in land, infrastructure, transport, and tourism - Toward the realization of a green society - \(Promotion of the use of wood in medium- and large-scale buildings\)](#)

(Bottom right) Field operational test of providing information to support merging into a main lane - Field operational test of providing information to automated driving vehicles to support merging into a main lane (Road Traffic Department)
→ Related: p. 16. [Research to increase the productivity and growth potential of society \(5. Efforts to expand road sections where automated driving vehicles can fully utilize their automated driving functions through road support\)](#)

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, and management of data forming the technical basis of policy formation and return to society (p. 24)

Click here for the full research policy. →



Yokosuka Office



Asahi and Tachihara Offices

Organization

Organization, budget, and employees

Special feature

Introduction of research

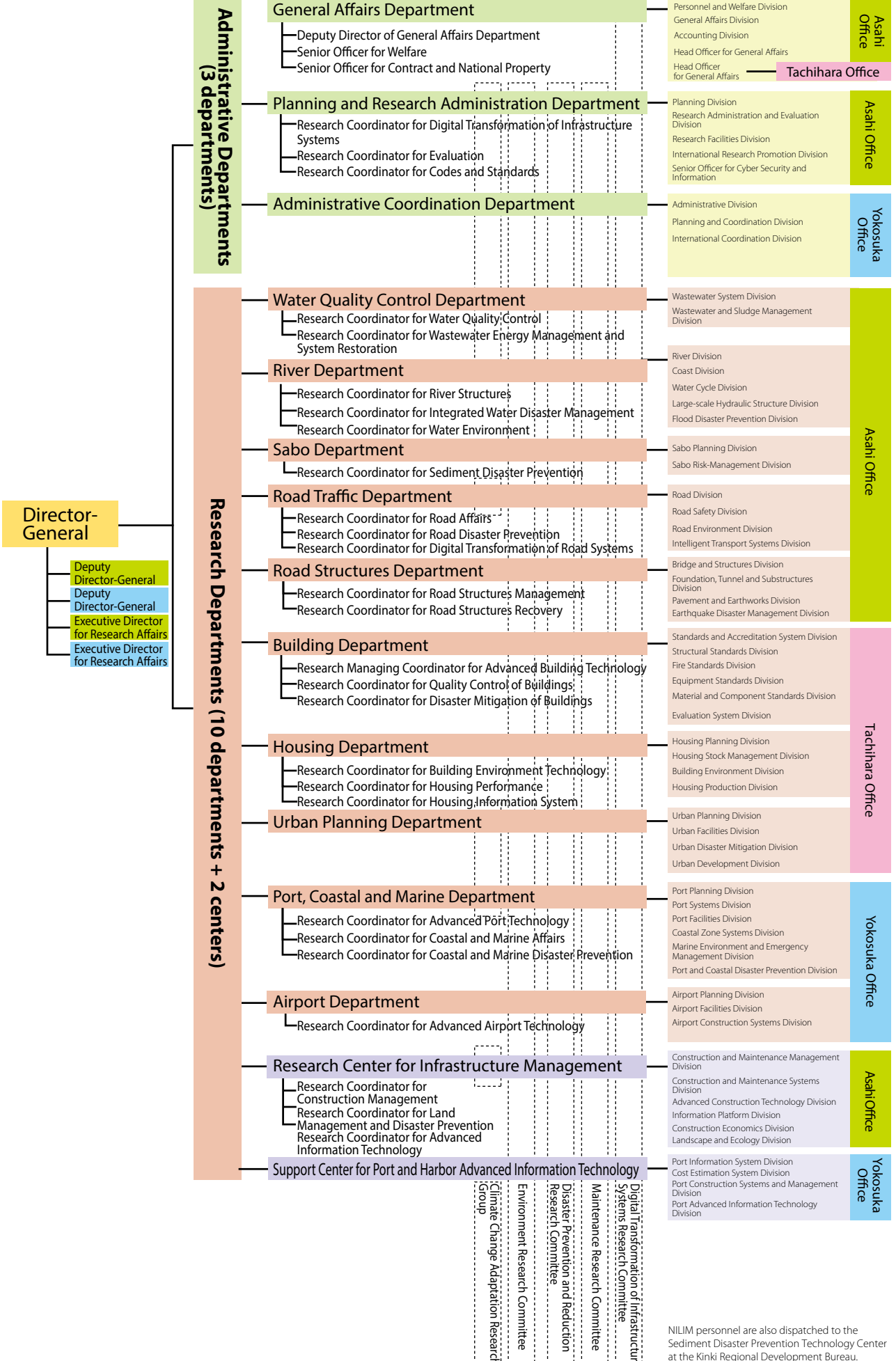
Support for accident and disaster responses

Support for field technology improvement

Beneficial use of field data

International expansion/
Public information activities

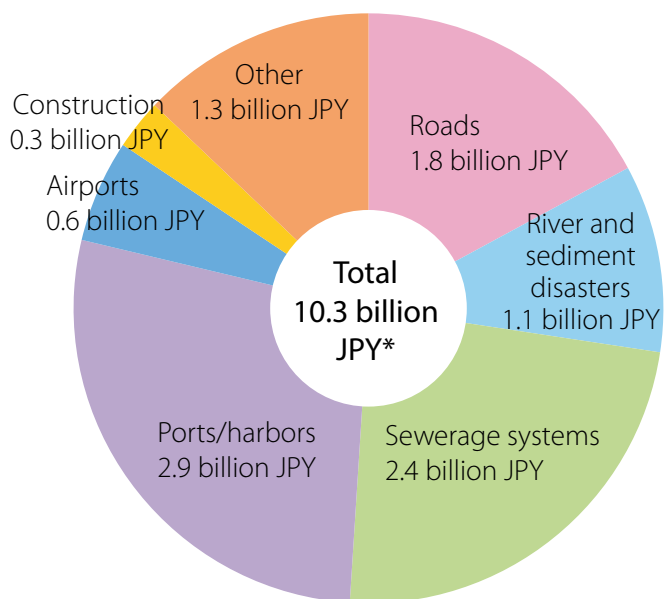
Introduction to facilities



NILIM personnel are also dispatched to the Sediment Disaster Prevention Technology Center at the Kinki Regional Development Bureau.

Research budget and employees

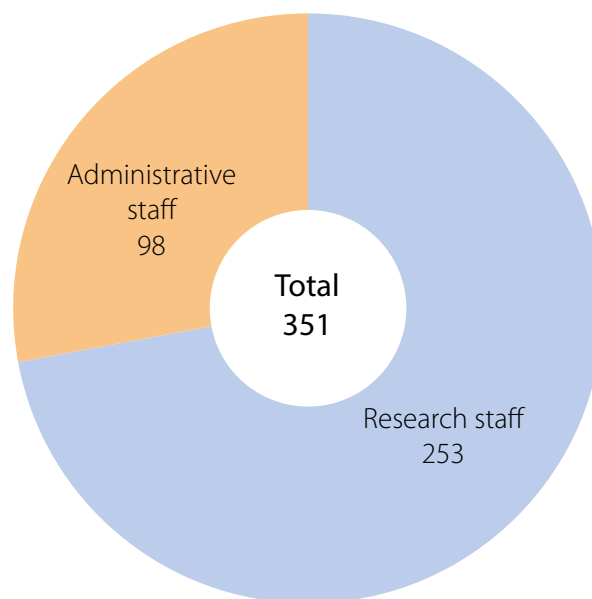
Research budget



Structure of research budget (initial budget for FY 2023)

*The total and the breakdowns do not match because no adjustment is made to the decimal places after rounding.

Employees

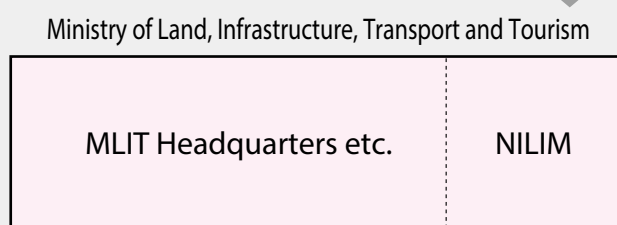
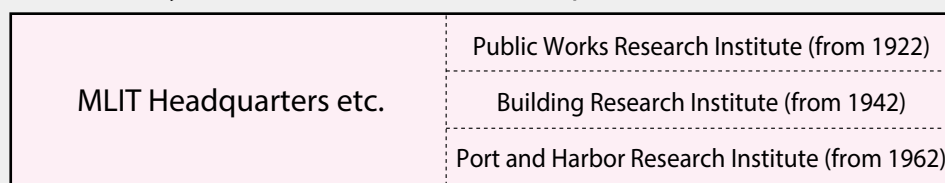


Structure of employees (as of April 2023)

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.

[Independent administrative agencies]*1



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 Independent 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

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.

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



Realization of carbon neutrality in the port and maritime sector, promotion of greening

Example:

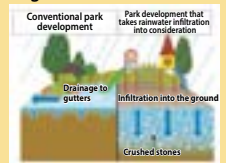
- Promotion of the development of carbon neutral port (CNP)
- Promotion of the installation of offshore wind power generation



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:

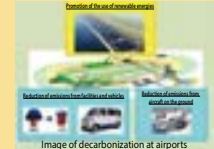
- Road traffic flow improvement measures from the perspectives of systems and infrastructures
- Promotion of green logistics



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

Example:

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



Examples of measures implemented by NILIM

Comprehensive study of sewerage technology toward carbon neutrality

- The Energy Management Subcommittee of the Research and Development Committee on Sewerage has been held to explore technologies needed for the sewerage system to achieve carbon neutrality by 2050 (e.g., effective use of energy derived from sewage and reduction of GHG emissions from sewerage).

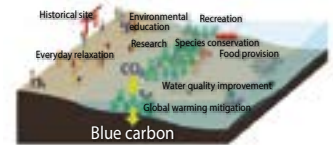


An example of the effective use of sewerage resources (technology of the B-DASH Project)

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 services, but their values are not properly recognized.

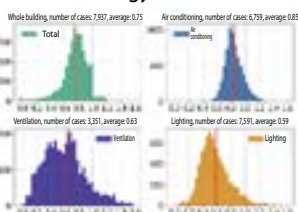
- A method to visualize multiple ecosystem services in coastal areas is developed.



Multiple ecosystem services of coastal areas

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.
- A large amount of energy conservation standard application data are analyzed to clarify actual energy conservation performance.
- The relationship between building design specifications and energy conservation performance is analyzed to support the formulation of energy conservation measures.



Distribution of energy conservation performance

Promotion of the use of wood in medium- and large-scale buildings

- To increase demand for wood, which has high carbon storage effects, medium- and large-scale buildings, where the use of wood has been slow to spread, need to be constructed with more wood through the use of CLT and other wooden materials.
- Prototypes feasible for actual applications are created, and various experiments and analyses are conducted from the perspectives of structure, fire safety, durability, and sound insulation.
- Various guidelines including trial designs are formulated.

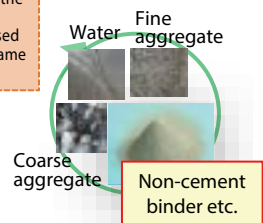


Example of a trial design of Prototype II (S + CLT wall)

Promotion of the use of concrete-based new materials for construction purposes

- The development of concrete-based new materials* that contribute to the reduction of CO₂ emissions is underway in the private sector. Yet, criteria required for ministerial approval to use this material as the main structural parts of buildings have not yet been established.
- Indicators of quality and performance required to comply with the Building Standards Act are examined to promote their uses in building constructions.

* Materials similar to ordinary concrete, an example being the zero-cement material that is under development to be used as a building material (the name is used within this project).



Example of concrete-based new material

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, Construction DX Experimental 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

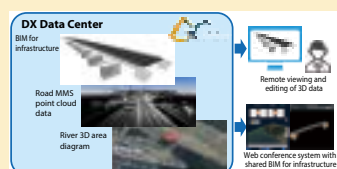
- Implementation of BIM for infrastructure training
- On-site demonstration of new technology etc.

■ 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.

- The DX Data Center was developed as a system to store 3D data so that clients and contractors can smoothly share information.

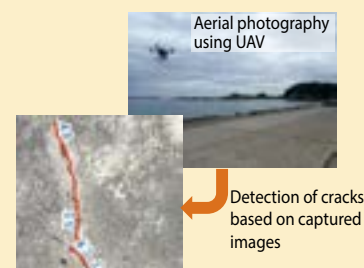


Conceptual diagram of utilizing the DX Data Center

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 efficient ways to acquire data for port facility inspections
- Development of a system to detect cracks and/or other deformations from acquired data by using AI



Example of crack detection

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 period of rapid economic growth 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)

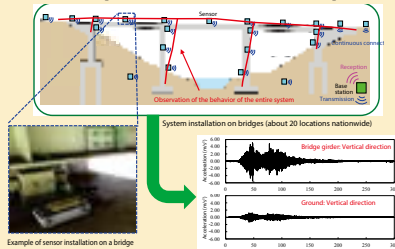
In light of the July 2018 heavy rains, the government of Japan will implement emergency measures over a three-year period, in addition to the existing measures.

[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)



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



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



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

■ Examples of measures implemented by NILIM

Study for the development of persistent river levees

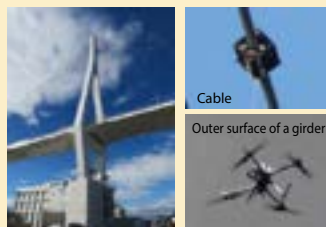
- Need to develop persistent river levees that are resistant to collapse and effective in mitigating damage in the event of water overflow.
- Verification of the effect of persistent river levees through experiments using hydraulic models to organize the concepts of selecting structures as drafts of technical references.



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)



Trial using an actual bridge to review guidelines

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.



Removing an existing pile

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

- 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 the ground including existing piles is established.

Technical support for disaster and accident responses

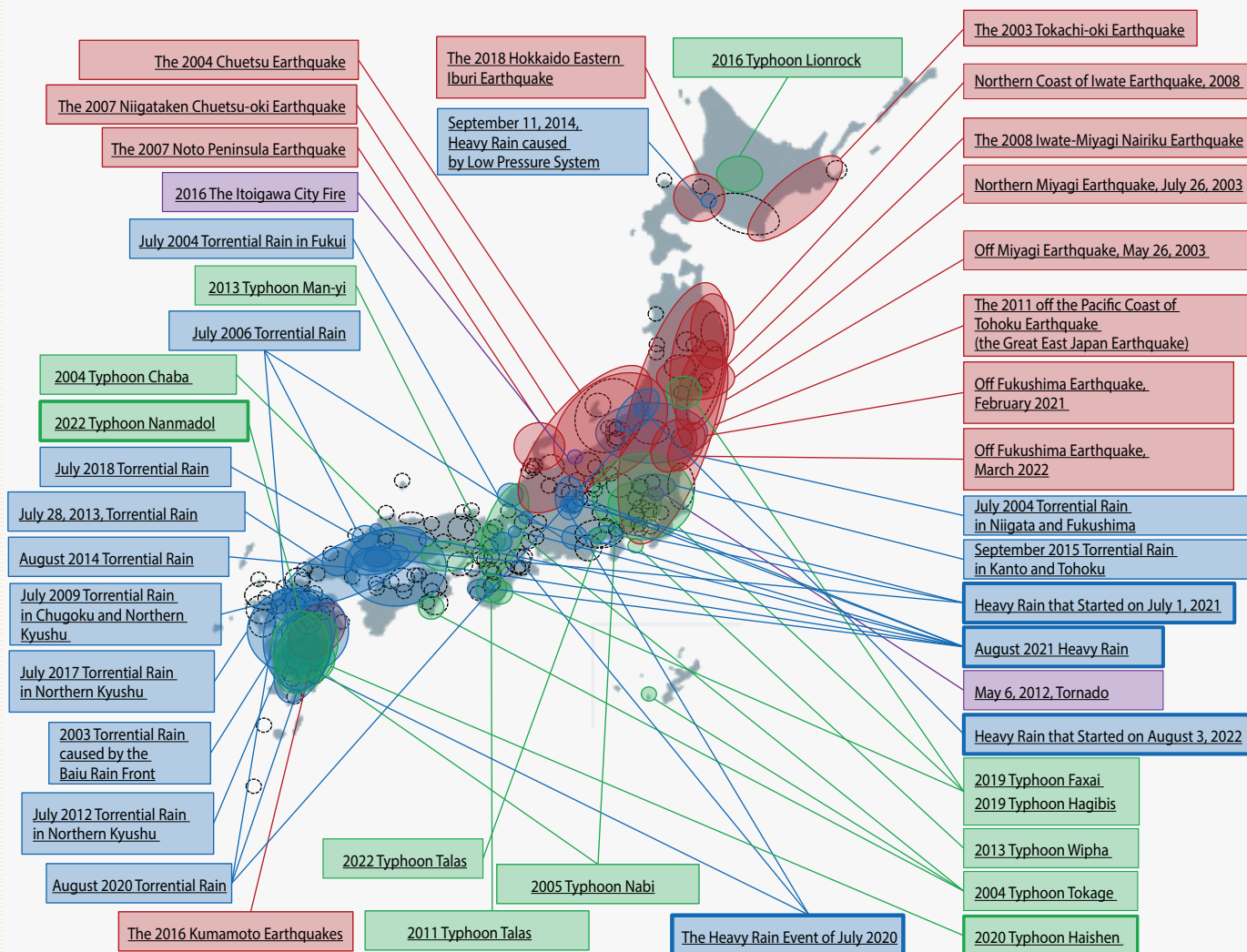
- In the event of a disaster, the NILIM dispatches experts with advanced technical knowledge in various fields to the affected areas upon request.
- Particularly in the event of a serious disaster, TEC-FORCE* and other experts are dispatched to provide strong support to the prevention of secondary disasters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

In recent years, experts were dispatched to areas with damage caused by the torrential rains in July 2020, Typhoon Haishen in 2020, heavy rains that started on July 1, 2021, heavy rains in August 2021, heavy rains that started on August 3, 2022, and Typhoon Nanmadol in 2022.

* Technical Emergency Control Force: The system to dispatch expert teams established in FY 2008 by the Ministry of Land, Infrastructure, Transport and Tourism in order to respond to extensive natural disasters by surveying disaster damage and providing local governments and other organizations in the disaster-hit areas with technical assistance.

○ Past dispatches

○ Legend
 Solid line: Disaster-hit areas to which the NILIM dispatched the TEC-FORCE
 Dashed line: Disaster-hit areas other than those mentioned above



[2023 Turkey-Syria Earthquake]

Antakya, Hatay Province, Turkey

* Expert teams were dispatched in this case by the Japan International Cooperation Agency (JICA) as the Government of the Republic of Turkey requested assistance from the Government of Japan.



**FY 2022: 20 disasters
149 person-days**

**FY 2021: 12 disasters
82 person-days**

**FY 2020: 9 disasters
105 person-days**

[2022 Wind and flood damage]

(Heavy rain that started on August 3, 2022)

Yonezawa City,
Yamagata Prefecture

Morotsuka Village, Higashiusuki District,
Miyazaki Prefecture

(2022 Typhoon Talas)

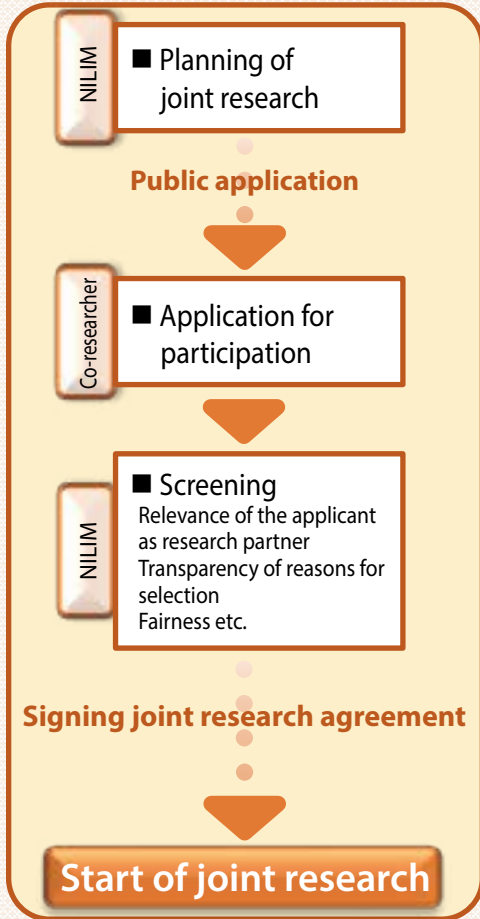
Nishiki Town, Kuma District,
Kumamoto Prefecture



Utilization of the joint research program - For the industry-academia-government collaboration -

The NILIM is conducting joint research on common issues where collaboration with other organizations is expected to produce better results more efficiently.

■ Flow to the start of joint research ■ Results in recent years

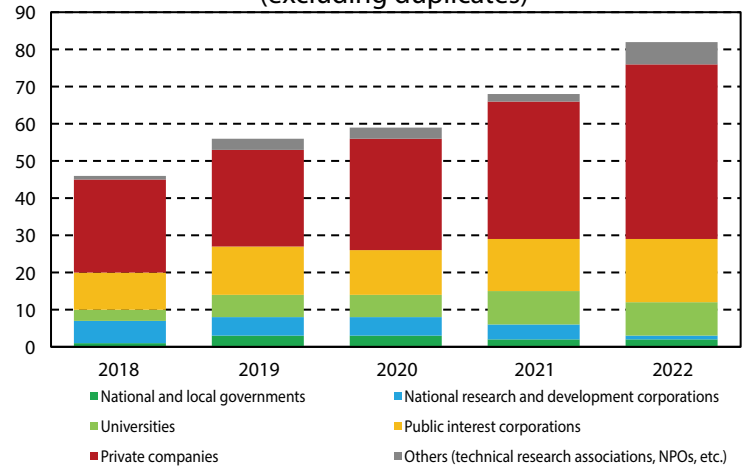


- The NILIM has been conducting joint research in collaboration with various institutions, including the national and local governments, national research and development corporations, universities, and public interest corporations.
- The NILIM is collaborating and conducting joint research with more than 50 institutions every year.

Number of joint research projects conducted in the last five years.

	2018	2019	2020	2021	2022
New	5	7	3	3	9
Continuation	9	13	17	16	7
Total number	14	20	20	19	16

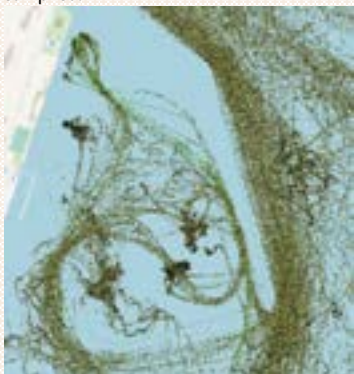
Number of collaborating institutions in the last five years (excluding duplicates)



■ Examples of research

Joint research on optimizing the operation, including carbon neutrality, of work vessels in offshore civil engineering work

[Collaborating institution] Specialists Center of Port and Airport Engineering
 [Research period] April 2023 to March 2026 (in progress)
 [Outline of the research]
 Characteristics of the movement of work vessels that emit large amounts of CO₂ emissions in offshore construction work are analyzed using AIS data to study efficient ways to operate the vessels. Efficient ways to operate work vessels and ways to improve the tracking ability of their movements will be compiled.



Example of work vessel movement (AIS data)

Joint research on performance evaluation of exterior wall ventilation methods for wooden buildings

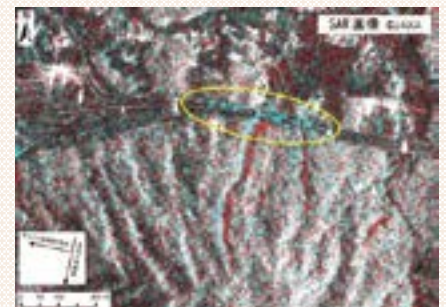
[Collaborating institution] Institute of Technologists and 11 others
 [Research period] March 2022 to March 2025 (in progress)
 [Outline of the research]
 Increased use of wooden buildings and ensuring their long-term durability are positioned as important issues in achieving carbon neutrality goals. In this joint research, outdoor exposure tests of actual buildings (experimental house) are conducted to study performance evaluations of exterior wall ventilation methods of wooden buildings in regard to their long-term durability.



Experimental house

Joint research on the development of sediment disaster monitoring method using the Daichi-2 satellite

[Collaborating institution] Japan Aerospace Exploration Agency (JAXA)
 [Research period] July 2017 to March 2022
 [Outline of the research]
 Sediment disaster management requires technologies that can quickly identify the location and extent of a disaster in order to sophisticate initial responses after the onset of a disaster. In this joint research, a method to acquire such information using synthetic aperture radar images acquired by the satellite *Daichi-2* in an emergency.

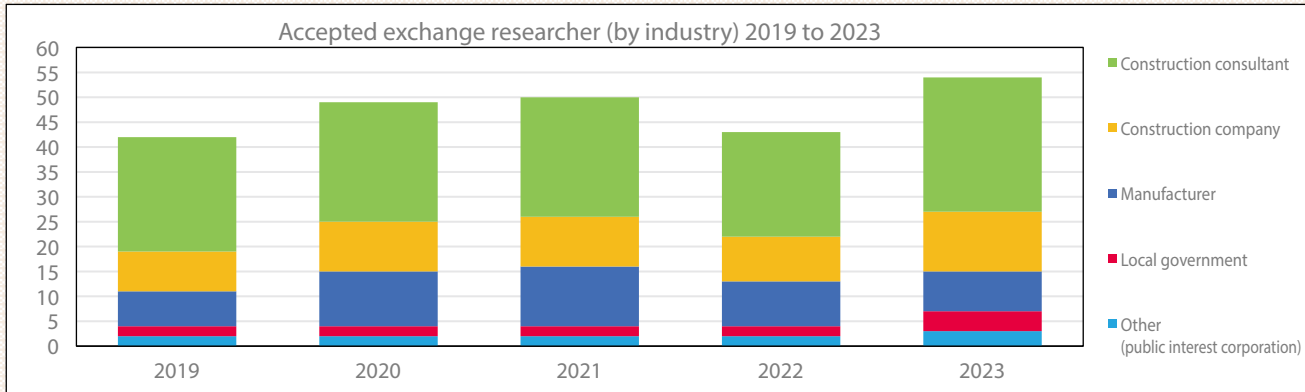


Sediment and driftwood generated by a mountainside collapse accumulate on the road.


Introduction of researcher exchange program

- The NILIM is conducting [the researcher exchange program] to accept experts from outside organizations such as local governments and private companies as NILIM researchers.
- They can gain knowledge and experience in planning and drafting policies and technical standards related to housing and social infrastructure development under the guidance of the head of the research office and senior researchers of the NILIM.

Accepted experts



Comments from the alumni of the researcher exchange program



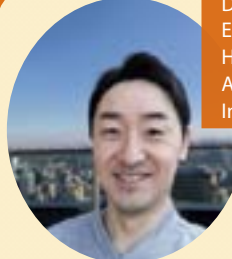
Sara Kagami
Enrollment period: 2021–2022
Home organization: Nihonkai Consultant
Assigned section: Road Traffic Department (at that time)

I was assigned to the research and development of a system to assist the use of ETC2.0 probe data on residential roads and the research on methods to detect traffic problems in winter. The ETC2.0 probe data is the big data of traffic that the Ministry of Land, Infrastructure, Transport and Tourism is gathering. NILIM is at the forefront of the effort to further expand the application of the information. The Road Safety Division is working on the use of the ETC2.0 probe data to assist traffic safety measures on residential roads. It was a valuable experience for me to be there during the transitional period when the application was expanding as the usability of the data was improving. I also gained multifaceted and wide-ranging knowledge to address the social issue of traffic problems in winter, ranging from characteristics of existing data and on-site needs of road management while I explored ways to use the ETC2.0 probe data and other types of data. When I go back to my company, I am going to explore the possibility of utilizing the ETC2.0 probe data and many other kinds of data to identify and solve problems based on my experience at NILIM.



Shintaro Mashiko
Enrollment period: 2022–
Home organization: Dia Nippon Engineering Consultants Co., Ltd.
Assigned section: Urban Planning Department

I am conducting research on technologies to improve the mobility environment focusing on improving traffic services within the greater framework developing technologies to revitalize suburban residential areas. In the suburbs, the aging of the population and the decline in the level of service provided by the existing public transportation system have made it problematic for many residents to get around on a daily basis. I thus conducted a social experiment using Green Slow Mobility, a new type of mobility, to collect and analyze the data from vehicles actually driving on residential roads with passengers on board. Based on the data I collected, I clarified how the new type of mobility should be used according to regional characteristics, organized ideas into a paper, and submitted it to academic societies. This was a very difficult task for me because I had no such opportunity back at my company. However, I was relieved when I received the incentive award as a tangible achievement. I also gained the know-how of how to build consensus with relevant organizations and how to work on social implementation processes through the valuable experience from the standpoint of a client.



Daisuke Yamaoka
Enrollment period: 2015–2016
Home organization: Fujitsu
Assigned section: Research Center for Infrastructure Management (at that time)

I worked at Information Platform Division for two years from FY 2015 as an exchange researcher. This was my first assignment outside of my home company, and I did not know what to do. But thanks to the tremendous support I received from the staff members at the lab and other exchange researchers, I was able to quickly adjust to the environment here. In the lab, I was involved in the research on the use of CIM in maintenance and management operations. One example is the development of the standard of 3D data model required for CIM and various standards related to i-Construction, which was in its initial phase. Both were major changes, and it was a very valuable experience to be assigned to these important tasks at this time. The experience of interacting with people from various industries with which I had no direct contact before and gaining a broader perspective of the entire country and industry was beneficial to my current work. The exchange program was a great opportunity for me to grow. Looking back on it now, I feel that it was the most intense two years of my career.



Kanta Okamoto
Enrollment period: 2021–2022
Home organization: Alpha Hydraulic Engineering Consultants
Assigned section: Coastal, Marine and Disaster Prevention Department (at that time)

I was assigned to Coastal Disaster Prevention Division, Coastal, Marine and Disaster Prevention Department) of the NILIM (Yokosuka Office) as an exchange researcher in April 2021. The assignment I was working on at that time was the study of design method of port facilities based on future storm surge and wave forecasts in relation to climate change adaptation measures at ports and harbors. It was a golden opportunity for me to experience the responsibility that my study results might be used to review design standards, which I had been on the user side, and the sense of accomplishment when it was realized. Also, although it was during the COVID-19 pandemic, I was able to interact with many people at the NILIM, Port and Airport Research Institute, and university faculties mainly through my work. When I return to my company, I would like to apply the knowledge and experience I gained at the NILIM to actual operations by using various approaches to address issues that I can find thanks to my experience at the NILIM.

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

Main research themes of the NILIM in FY 2023

- 1. Research to improve national resilience and protect the life and livelihood of the people ... 12 – 14
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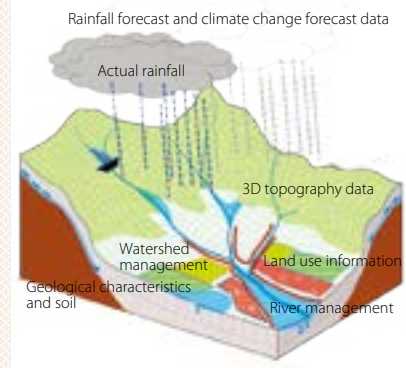
- 3. Research to support comfortable and secure living ... 18 – 20
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1. Research to improve national resilience and protect the life and livelihood of the people

1 Development of an experimental site using a digital twin to drastically improve the disaster prevention capacity in a river basin

Developing Digital Testbed, the experimental platform that reproduces river basins in cyberspace, contributes to the acceleration of technology developments for visualizing the effectiveness of flood control measures and next-generation flood forecasting through the public-private partnership.

- It is necessary to communicate risk among various stakeholders and to establish preparedness for disasters before a disaster occurs in order to promote River Basin Disaster Resilience and Sustainability by All.
- Risk communication requires visualizing the effectiveness of measures, and the establishment of the disaster prevention system in advance requires taking advantage of the forecast information.
- The experimental platform that reproduced a watershed was developed in cyberspace using open data such as 3D data that has been developed in recent years; It will start operation in FY 2025.
- Using the experimental platform, this study aims to develop technology to visualize the effectiveness of flood control measures in the basin and next-generation flood forecasting technology through the public-private partnership.



(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.
- It is important to share detailed information of disasters such as situations of slope failures with disaster response headquarters in a remote location as data for them to make decisions.
- Experiments are conducted to verify the effectiveness of UAVs with automatic navigation functions in assessing the damage to actual roads.
- A system to share detailed information such as disaster situations linked with maps with a disaster response headquarters in a remote location was developed.

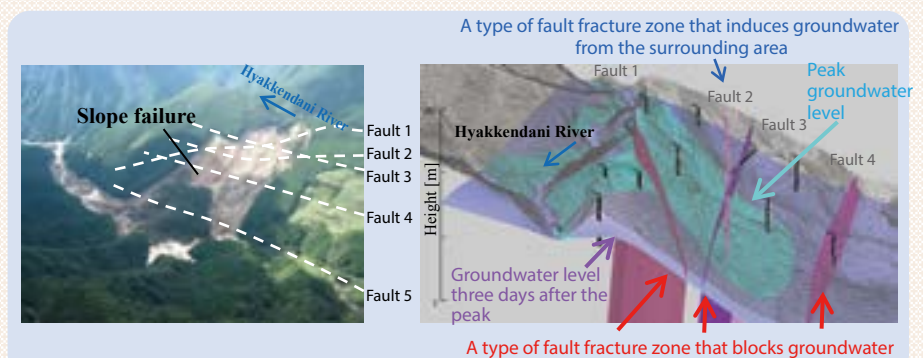


(Road Structures Department)

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 survey and field survey to three-dimensionally investigate the relationship between the presence 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 sewer attribute conditions with high risks of damage in order to support local governments in preparing effective earthquake resilience plans for sewers.

- The priority of earthquake resilience for sewers should be determined based on comprehensive reviewing of their importance, impact of secondary disasters, vulnerability to damage, and earthquake resistant performance.
- How to regard the importance of sewers and the risks when damaged have been organized, yet there is a lack of information on vulnerable sewer attribute conditions (pipe types, microtopography classification, etc.). This may hinder local governments from appropriately preparing earthquake resilience plans for sewers.



Manhole floating from liquefaction

(Water Quality Control Department)

- Technical documents on the sewer damage ratio by sewer attribute conditions are provided.
- Local governments prepare effective earthquake resilience plans for sewers using the technical documents.

5 Efforts to **mitigate damage at ports** during typhoons

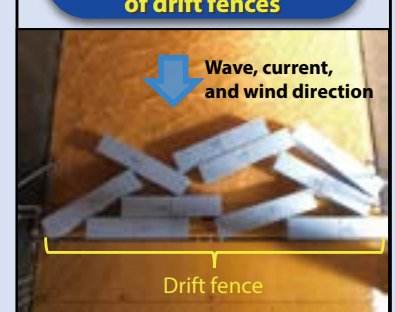
Container drifting experiments in a wind wave channel is resulting in efficient and effective pre-drift countermeasures against expected storm surges, high waves, and strong winds. This research helps to reduce port damage during typhoons.

- 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 fence using container models.
- Appropriate drift fence design method for expected wind speed, wave height, and tide level is proposed.

Experiment on impact acting on the posts of drift fences



Experiment on the trapping capabilities of drift fences



(Port, Coastal, and Marine Department)

6 Efforts to **prevent and reduce the damage from earthquakes in existing urban areas** by improving regional disaster preparedness

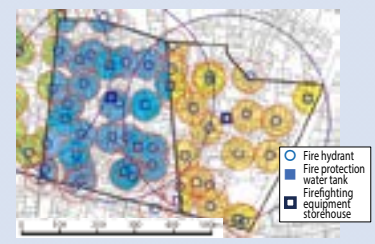
To improve regional disaster preparedness and evaluate the disaster management performance of urban areas, methodologies are developed to ensure the safety of existing urban areas, including densely built urban areas, on the basis of emerging technologies.

- In order to enhance regional disaster preparedness, it is necessary to elaborate soft measures by precisely gathering and sharing disaster information.
- The current approach to evaluate disaster prevention performance in densely built urban areas only considers the effects of hard measures such as improvement of roads and open spaces.
- They do not consider the effects of soft measures such as initial firefighting activities by local residents.

- Methods to verify and evaluate effectiveness of new soft measures are developed. The soft measures include interconnected fire alarm systems, AI cameras that detect the occurrences of fires and building collapses, and ICT-based disaster management tools.
- A method to evaluate the integrated disaster management performance of urban areas that can reflect the effects of both soft and hard measures is developed.



Detection of fires and other types of disasters using AI cameras



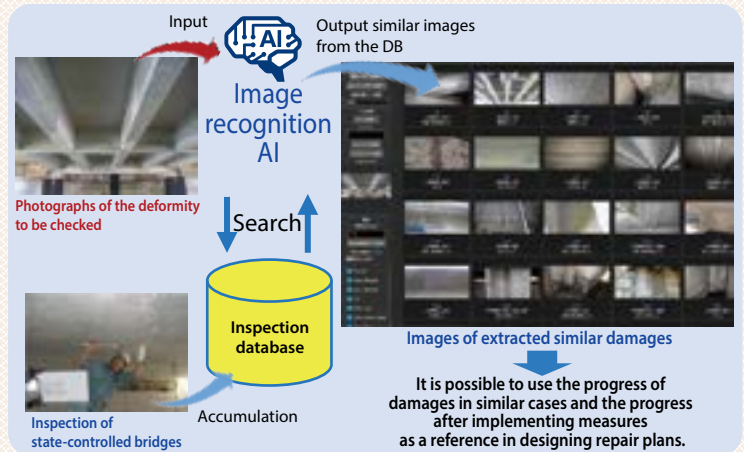
The range of effective initial firefighting is visualized to evaluate regional disaster preparedness.

(Urban Planning Department, Building Department)

7 Efforts to improve the quality of road management through the use of new technologies

The quality of road management will be improved through more effective repairs using new technologies, including AI.

- Processes and causes of bridge deterioration and damage vary depending on their specifications and the environment in which the bridge is located, and the effectiveness of countermeasures also varies.
- In repair planning, it is effective to know various examples of damages and countermeasures. Up until now, the common practice has been to collect information from limited sources such as a compiled record of damages.
- Research conducted jointly with the Development Bureau revealed that searching and tracking similar damages and repairs can help administrators make decisions in repair planning.
- It also found that image recognition AI and other technologies can be used to search cases from a large amount of past inspection data.
- Studies will be continued to explore the use of new technologies and procurement processes for better road management.

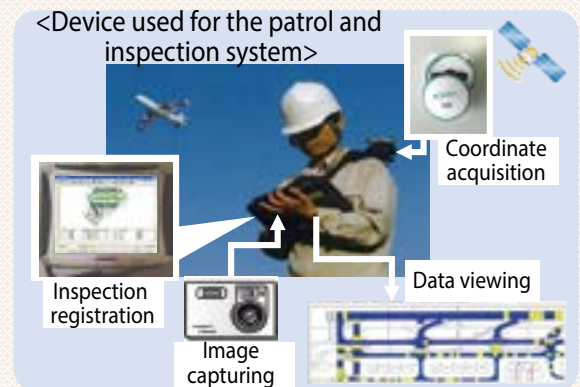


(Road Structures Department)

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.

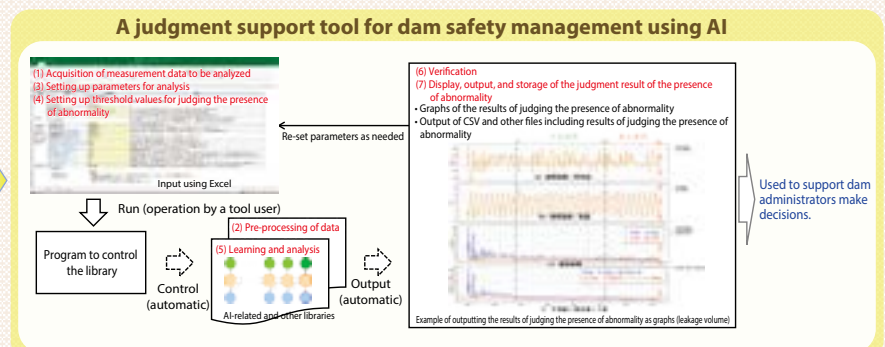


(Airport Department)

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 judgment based on experience, and there will be a shortage of skilled personnel in the future.
- A tool was thus developed to use AI to analyze changes in the long-term behavior of dams and effects of earthquakes to detect possible abnormalities



(River Department)

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

1 Production of innovation by developing a **Data Platform for Land, Infrastructure, Transport and Tourism**

A platform was built to enable the linkage of the various data held by the government and private sectors. This will contribute to the efficiency of operations, the sophistication of the MLIT policies, and the creation of innovations through industry-academia-government collaboration.

- In order to promote the utilization of data by the government and private sectors, it is necessary to establish a platform to realize a digital twin that reproduces physical (real) events in cyberspace by linking data held by the MLIT with data from the private sector and others.
- There is a need to promote technological development and R&D to link and utilize the various data held by the government and private sectors. This is to use the infrastructure data to improve productivity in the field of construction and non-construction fields such as disaster management and logistics.
- We have built a Data Platform for Land Infrastructure, Transport and Tourism with functions for searching, displaying, and downloading data across the board by linking APIs with the various databases owned by the government and private sectors.
- In FY 2022, we conducted research and development of technology to automatically create 3D models from 2D drawings of existing structures and technology to automatically create metadata for efficient retrieval of electronic deliverables etc.



(Research Center for Infrastructure Management)

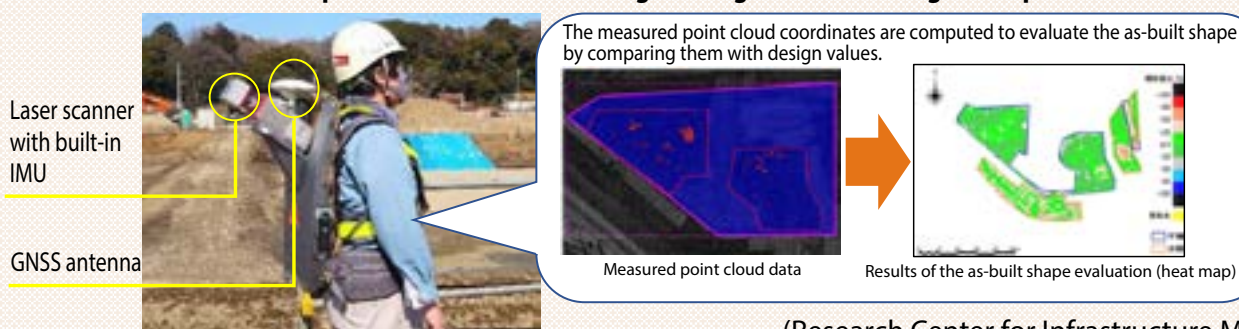
2 Improvement of **productivity and work style reform at construction sites** through the use of ICT

This study is contributing to the improvement of productivity and work-style reform in the construction industry by establishing rules for the use of ICT-based construction and measurement technologies in the management of as-built shapes* in public works.

*A practice to confirm whether the height, length, width, slope, flatness, and other shapes of constructed civil structures meet specified values.

- With regard to ICT construction, which is the main initiative of the i-Construction project that started in FY 2016, the applicable construction types and technologies are gradually being expanded based on the progress of technological development in the private sector.
- While taking into account proposals from private sector organizations, we are continuing to improve the standards so that they can be properly applied to the as-built shape management of public works.
- In FY 2022, we prepared drafts of various standards that work with new measurement technologies (three work types and six technologies), including the as-built management of civil engineering work using a laser scanner (backpack-type LS) that can perform high-precision point cloud measurement while wearing the device on the back and walking, and a measurement technology that can improve productivity by eliminating the stand-by time in operations.

As-built shape measurement of civil engineering structures using a backpack laser scanner

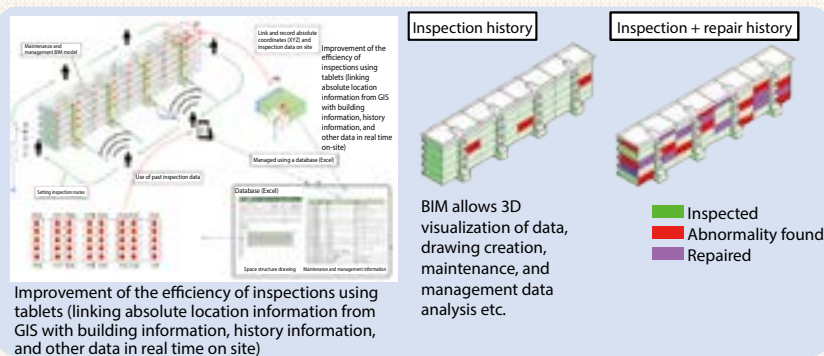


(Research Center for Infrastructure Management)

Improvement of the efficiency of maintenance and management of condominiums and other building stocks **using BIM and other data**

An integrated management method for the maintenance and management BIM for condominiums and other building stocks and maintenance and management data such as inspection and repair data, is developed to improve the efficiency of housing stock maintenance and management.

- DX needs to be accelerated in all stages of the housing process from design and construction of housing to the maintenance and management to perform housing production and management processes using IT and improve the productivity by using BIM.
- A simple maintenance and management BIM for condominiums and other housing stocks is developed to create a method to improve the efficiency of maintenance and management through the digitalization of information, including construction drawings and inspection and repair history and the integrated management of maintenance and management data linked with BIM.

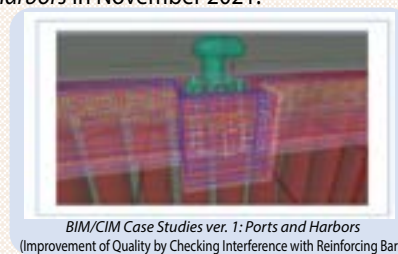
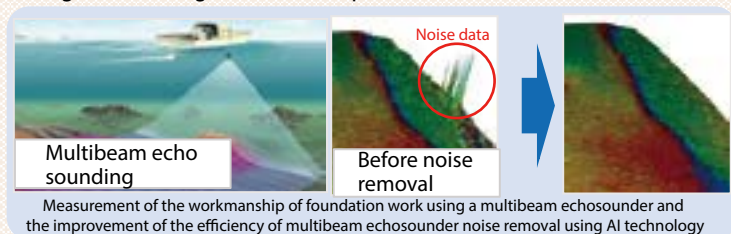


(Housing Department)

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.



(Support Center for Port and Harbor Advanced Information Technology)

Efforts to expand road sections where automated driving vehicles can fully utilize their **automated driving functions** through road support

Creating a draft indicator to examine maintenance and management of lane markings for automated driving on expressways will promote an expansion of automated driving.

- An on-board sensor in automated driving vehicles cannot detect faint lane markings, and lane keeping assist system (LKAS) does not work.
- On a test track, a relationship between a faint level of lane markings and an operational status of lane keeping assist system (LKAS) is analyzed.
- A draft index to examine maintenance and management of lane markings will be created from the perspective of operating lane keeping assist system (LKAS) properly.

Image of lane markings detection



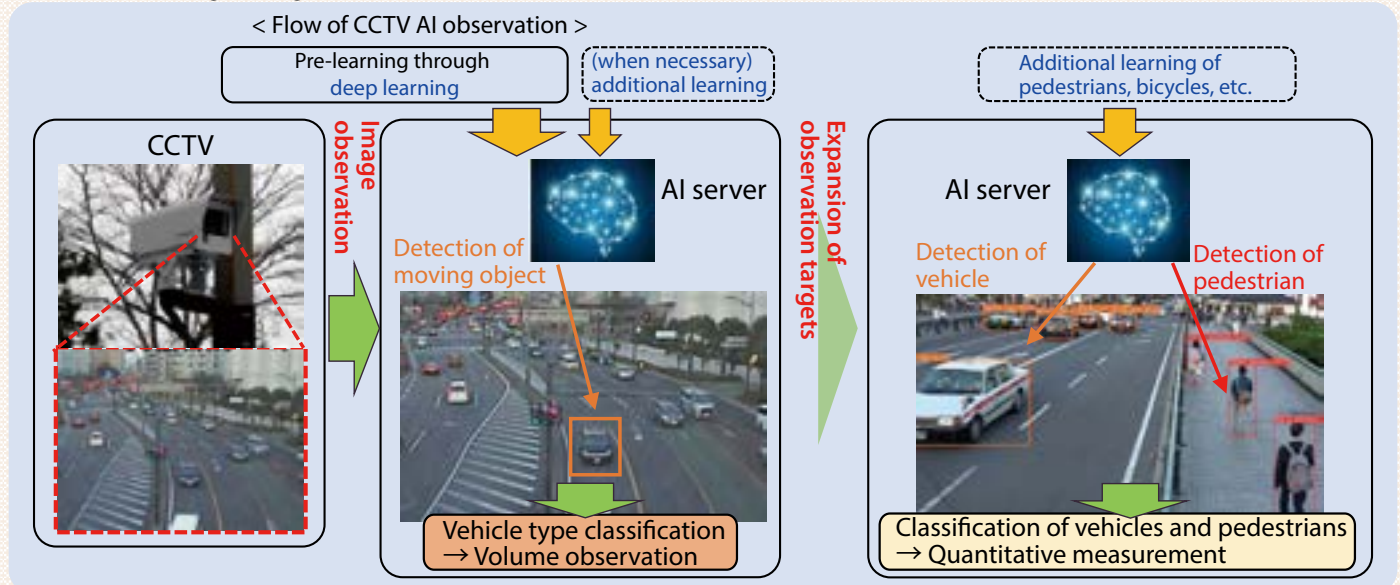
Lane keeping assist system (LKAS): A system in which an on-board sensor detects lane markings and controls a steering wheel to keep a vehicle in the center of a lane automatically.

(Road Traffic Department)

6 Sophistication and improvement of the efficiency of road traffic data acquisition using AI

The AI-based traffic observation method is developed to expand sections where continuous traffic data is observed and to enable efficient data acquisition.

- Detailed analysis using big data will be increased to assist traffic congestion and accident reduction measures and to promote the efficient use of road spaces.
- To do so, ICT-based road traffic data observation sections and survey targets such as vehicles, pedestrians, and bicycles, need to be expanded.
- AI is introduced to analyze images captured by already installed CCTV (*) to realize a low-cost continuous traffic volume observation system.
- Expansion of survey targets such as vehicles, pedestrians, and bicycles, as well as survey items such as traffic volume, speed, and movement tracking is being considered.



*Abbreviation for Closed Circuit Television

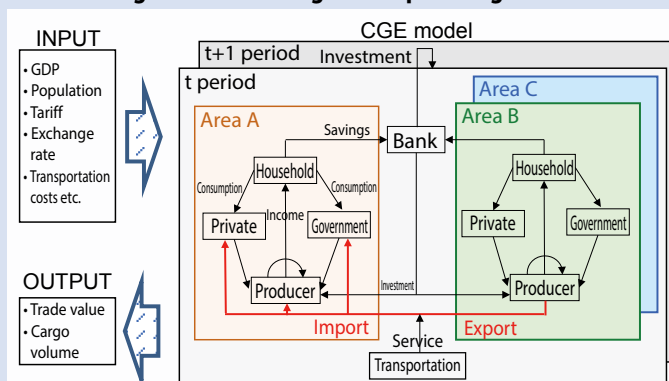
(Road Traffic Department)

7 Efforts to plan and propose port policies that reflect future changes in the market

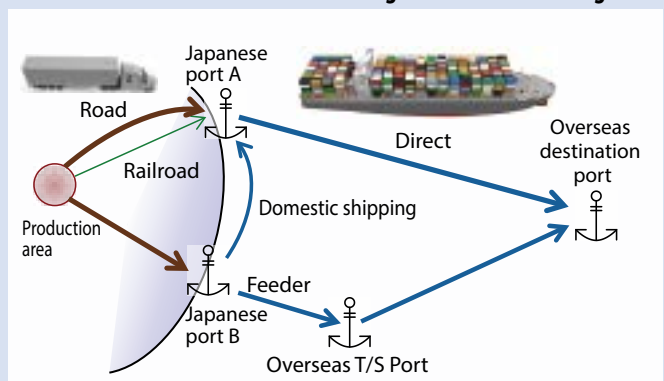
We developed future cargo volume forecasts that accurately reflect changes in the global economic and social conditions and the container transport market. This will support the planning and formulation of national port policies and the revision of port plans by port management bodies.

- 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>



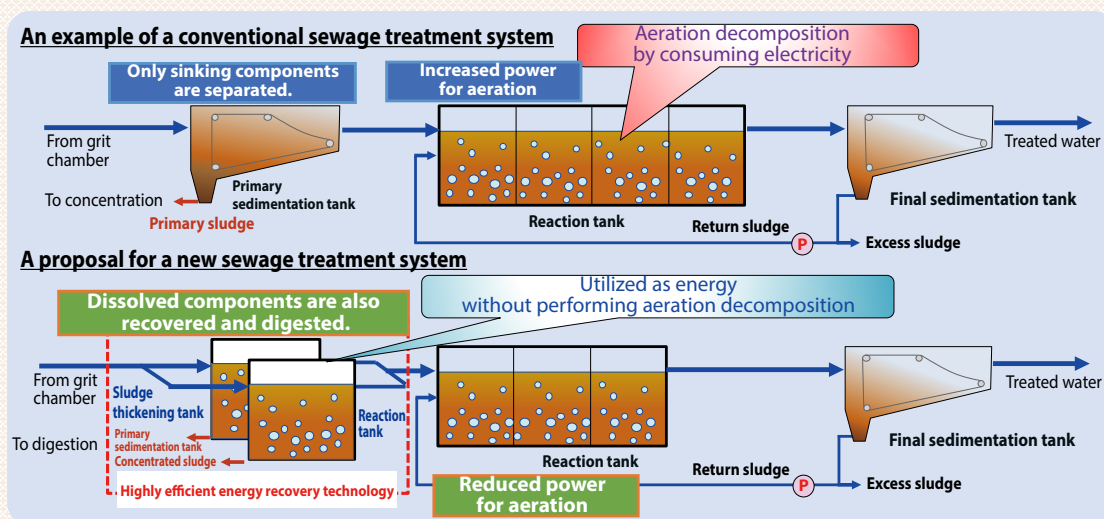
(Port, Coastal, and Marine Department)

3. Research to support comfortable and secure living

1 Efforts to **reduce greenhouse gas emissions** from the 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.



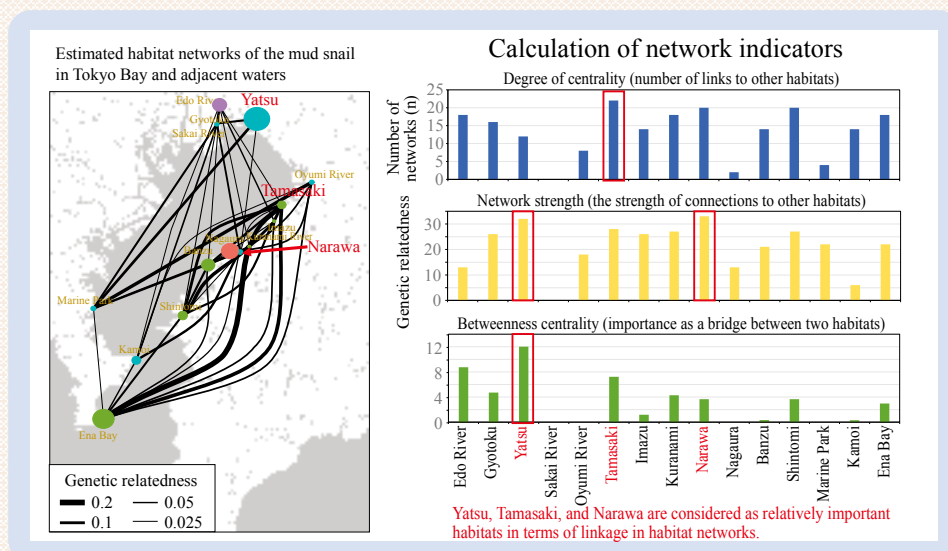
(Water Quality Control Department)

2 Study for **coastal ecosystem restoration**

This study aims to make new connectivity in habitat networks of coastal organisms by creating habitats in shallow water areas using dredged soil from harbor and port development. The development of technologies that properly understand the network structure will contribute to the natural restoration of the marine environments with rich biodiversity.

- Understanding the network structure is helpful to consider habitat design.

- Development of a DNA analysis method for understanding the spatial scale of habitat networks
- Development of a method for parent-child identification to estimate connectivity between habitats and the strength.



(Port, Coastal, and Marine 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.

Prevention of infrastructure damage by street tree roots

(1) Cutting the root system (2) Placing root growth prevention sheets

(3) Expansion of planting area (4) Updating

Weed control methods

(1) Weed growth prevention sheet (2) Mulching with recycled materials (waste roof tiles)

(3) Ground cover plants (4) Allelopathic plants

(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.

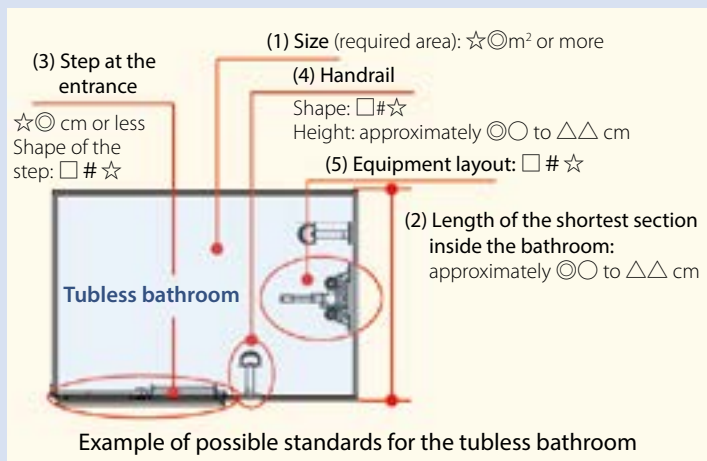


Image of verification experiment of handrail positions and shapes

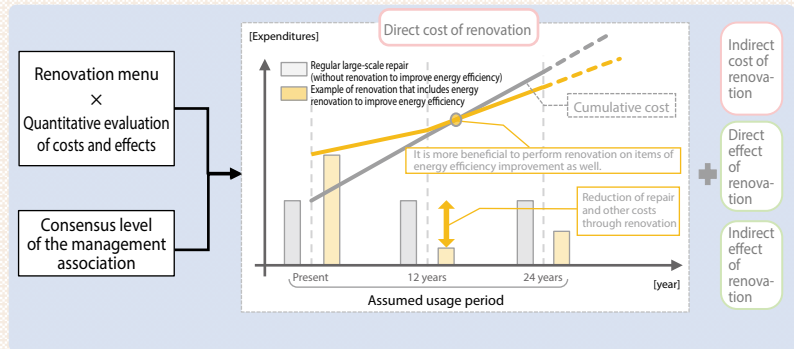
(Housing Department)

5 Efforts to improve the energy efficiency of existing building stocks

This study contributes to the realization of a carbon neutral society by accelerating the improvement of the energy efficiency of existing building stocks through the development of technologies related to the renovation of existing condominiums and office buildings to improve energy efficiency.

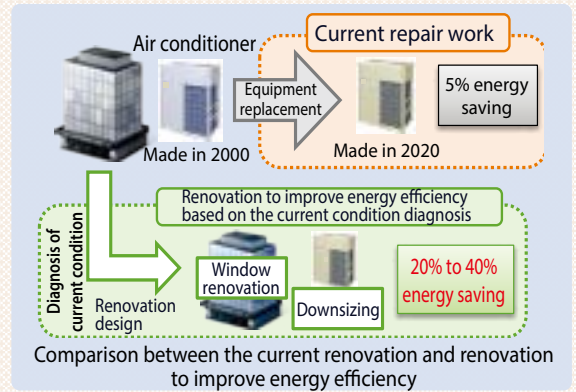
- Many existing condominiums have poor thermal insulation performance and need renovation to improve their energy efficiencies.

- (1) Selection of renovation menu based on condominium type
- (2) Development of a method for estimating the cost and effectiveness of renovation for energy efficiency improvement
- (3) Development of a method for quantifying cost effectiveness



- Facilities at office buildings often tend to be replaced without giving much thought.
- Energy-saving renovation design based on on-site survey can drastically improve energy efficiency, but its method has not been established.

- (1) Development of a method to design renovation based on the diagnosis of current conditions
- (2) Development of a simple method for predicting the cost-effectiveness of the renovation
- (3) Verification of the effectiveness of the developed method by applying it to actual buildings



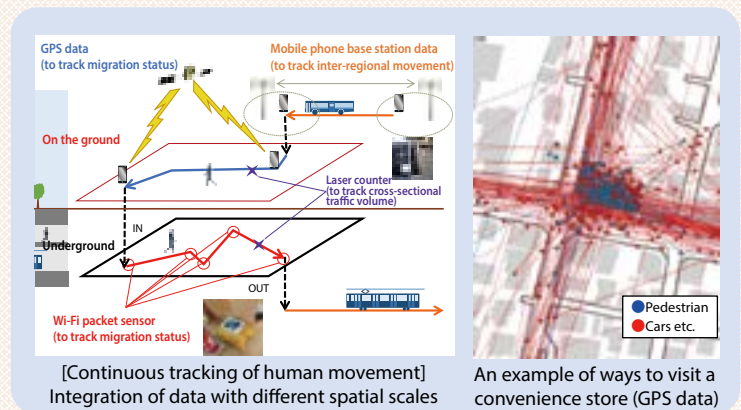
(Housing Department)

6 Initiatives to make cities smarter with digital technology

In urban planning, technologies for effectively using traffic and human mobility big data and 3D city models are developed to contribute to the development of smart cities.

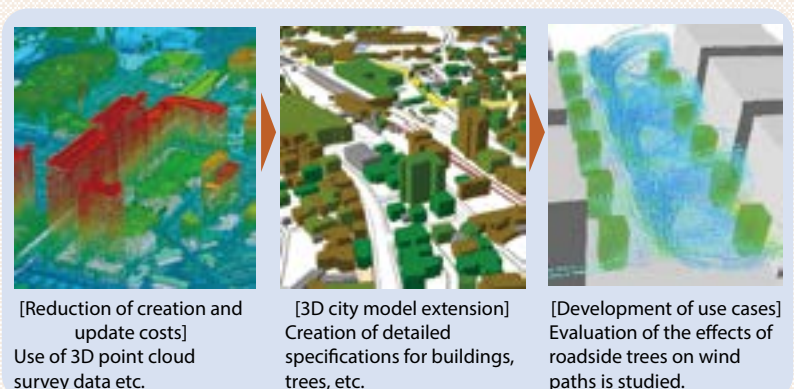
- The use of digital technologies such as big data is effective for local governments to create urban planning and solve urban problems.

- Technology for effectively using big data (GPS and data from mobile base station etc.) that support person trip surveys is developed.
- A method that uses human mobility big data to evaluate the impact of the installation of a building with restricted uses is developed.



- Promotion of the development of 3D city models as basic data for smart cities is necessary.
- Challenges include the reduction of creation and update costs and development of diverse use cases.

- A low-cost creation and updating 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.



(Urban Planning Department)

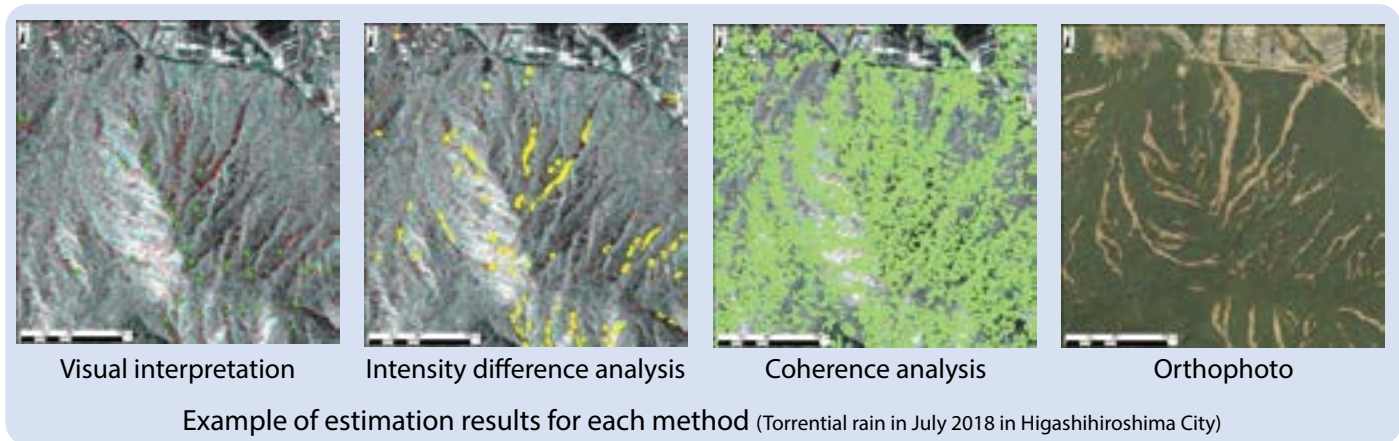
Advanced technical support and countermeasures for

Study on ways to estimate a location of landslide based on satellite SAR images

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

- The observation range of Daichi-4 (ALOS-4) satellite is expanded compared to that of the SAR satellite Daichi-2 (ALOS-2) that is currently in use.
- Since this increases the amount of data to be processed, the efficiency of the process of interpreting SAR images, for example, needs to be increased.

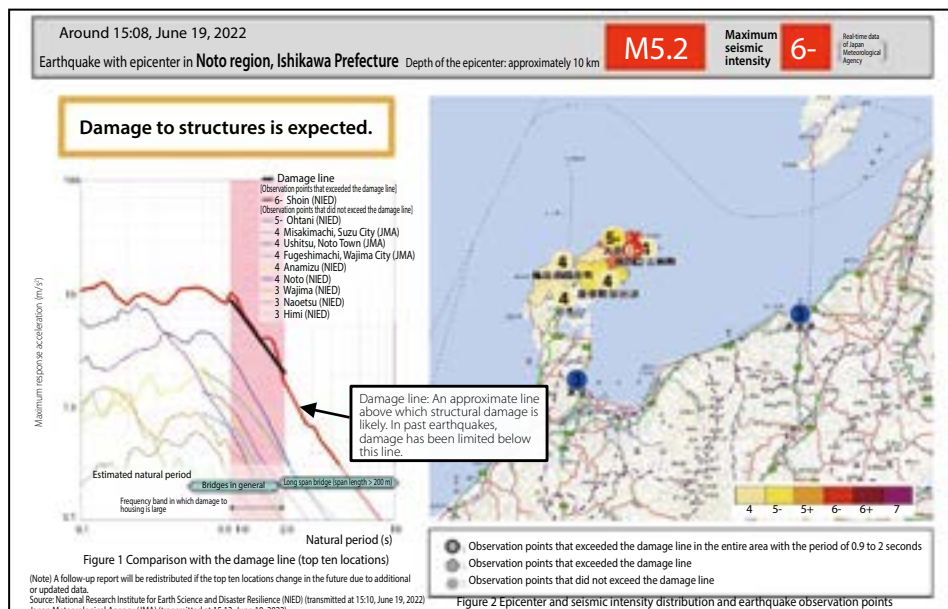
- The reliability of estimating the location of a landslide was compared among multiple methods that excel in processing SAR data of wide area observations and methods that use visual interpretation.



Spectrum analysis information

Studies on spectrum analysis information in the event of a large-scale disaster, effective use of existing facilities such as satellites and preventive measures against strong winds will contribute to the advancement of disaster response technologies.

- The scale and extent of structural damage can be estimated immediately after the onset of an earthquake by comparing the acceleration response spectrum of the earthquake and the damage line created on the basis of past earthquakes.
- This can be used during the initial disaster response phase.
- In the earthquake that occurred in the Noto region of Ishikawa Prefecture on June 19, 2022, the spectrum analysis information on the figure below was automatically distributed eight minutes after the onset of the earthquake.



Technical basis for estimating the scale of damage is posted on the website (NILIM reference No. 1204).



accident and disaster response

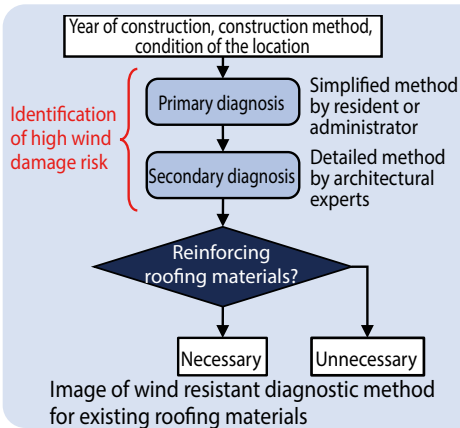
Study to promote retrofitting of strong roofs against high winds

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

- Recent typhoons 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 in 2019 revealed that roofs built using older construction methods tended to suffer greater damage.
- We developed a wind resistant diagnostic method that identifies vulnerable roofing materials by using factors that affect the risk of high wind damage to roofing materials as an indicator.
- The wind resistant performance level is clarified for repair methods of various roofing materials. In addition, evaluation methods for wind resistant reinforcement methods are proposed mainly using strength tests.



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



Wind pressure resistance test of metal roofing



Loading test on joints of folded plate roofs

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

Development of an information sharing tool for safe and effective flood fighting

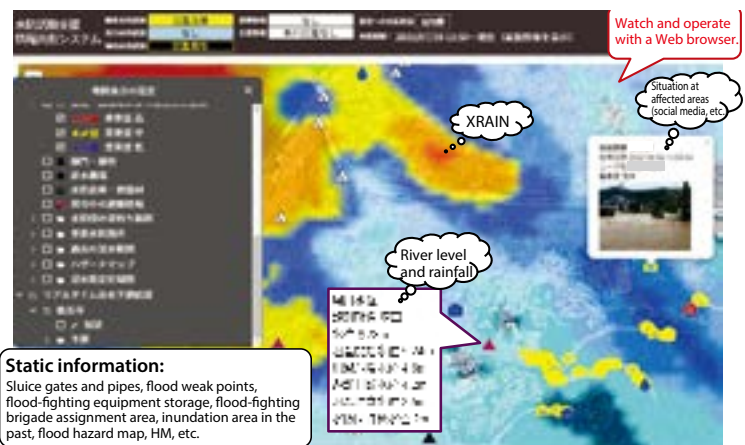
Focusing on the flood-fighting activities of the flood-fighting brigade composed of local residents, local governments, and fire departments, this system makes it possible to quickly check and share necessary information for efficient and effective flood-fighting activities.

- Flood-fighting control activities are labor intensive because of the diverse items to address.
- It takes time to report situations from areas covered by the flood-fighting activities and communicate responses and instructions back to the area.
- Information required to identify situations and make decisions on responses is scattered.



- Quick and easy uploading of photos of areas covered by flood-fighting activities and location information using a smartphone or tablet (only takes about a minute!)

Efficient integration, communication, and sharing of information improve regional safety.



- A variety of information such as photos of affected areas, water levels and rainfall, sluice gates and pipes, and inundation areas in the past is randomly selected and superimposed on a map.
- Can be watched and shared anytime and anywhere instantly with a Web browser and shared instantly.

Hosting of personnel

- **Accepting people from local governments and private businesses**

The 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: 54 as of April 2023)

- **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 2022: 243 cases as of the end of March 2022)

(Number of training courses in FY 2022: 35 courses with 1,494 participants [Yokosuka Office No. 2])



Lecture (online)

On-site training (face-to-face)

New port engineer course

Support for local issues

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

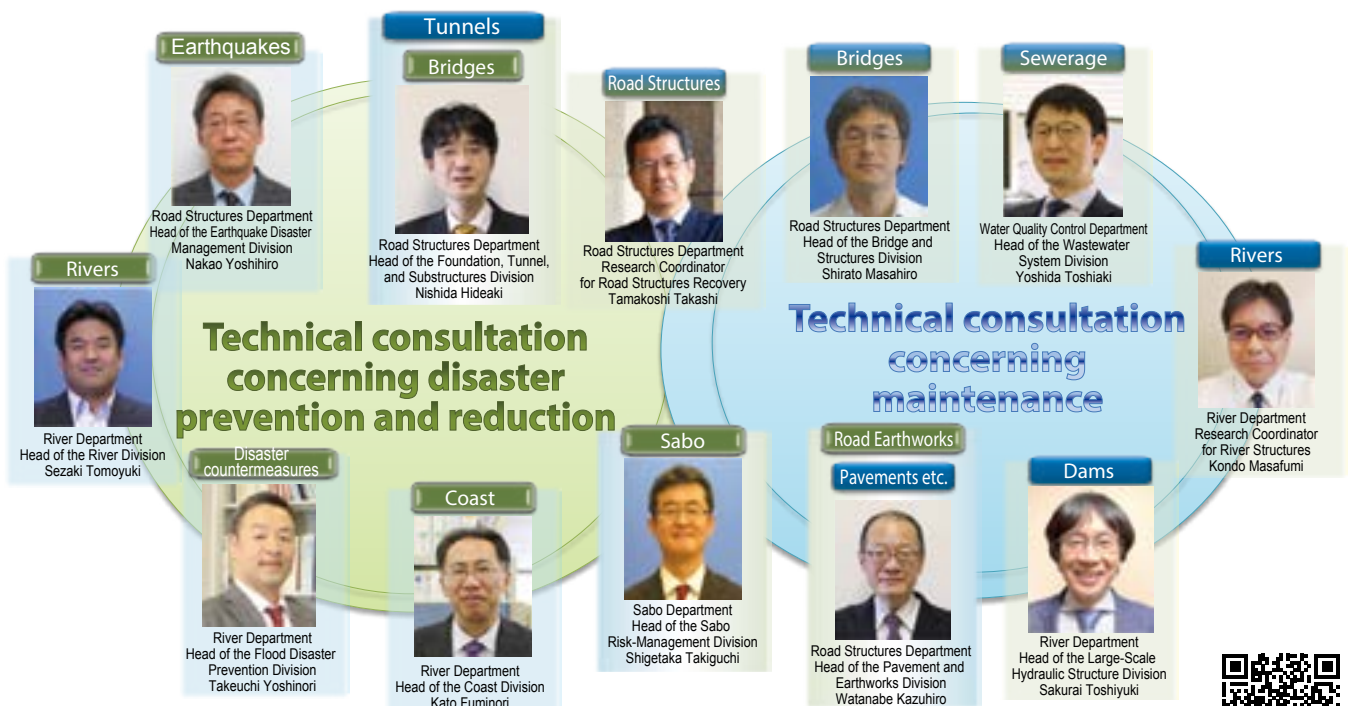
NILIM dispatches personnel to the Sediment Disaster Prevention Technology Center of the Kinki Regional Development Bureau to perform research and technical development concerning large-scale sediment disasters.

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 (E-mail: nil-soudanmadoguchi-gijyutu@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>



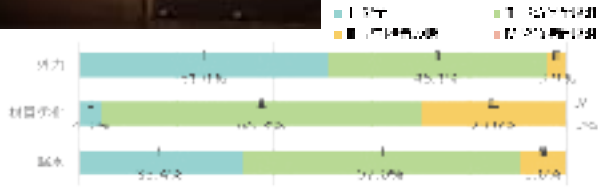
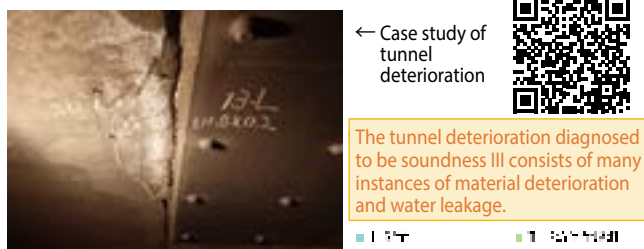
Collection, analysis, and management of data forming the technical basis of policy formation and return to society

In addition to our initiative to promote infrastructure DX, the NILIM is reorganizing data related to housing and social capital collected for administrative purposes and using them for research and to support field operations.

Support for the maintenance of road structures

Results of the period inspection of road runnels, sheds, large culverts, and other structures are organized and analyzed to find the tendency of deformation depending on construction methods and year of completion. The findings are published in the NILIM Reference No. 1145 and 1175 on the NILIM webpage.

Case studies of deformations in road tunnels and specific road earthwork structures are compiled and published in the NILIM Reference No. 1206 and 1234 on the NILIM webpage. These are used as references when performing inspections and soundness diagnosis.



Ratio of soundness diagnosis classification by deterioration types (road tunnels managed by the national government)

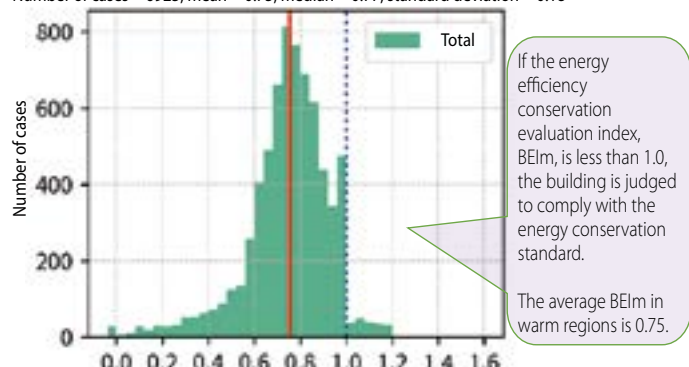
Support for planning of energy conservation measures for office buildings etc.

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 the NILIM Reference Data No. 1229.

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

Number of cases = 6925, mean = 0.75, median = 0.77, standard deviation = 0.18



Energy conservation performance evaluation index BEIm
Examples of published data
Distribution of energy conservation performance evaluation index (warm regions)

Support for promoting physical asset management of sewerage

The database of sewers 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.

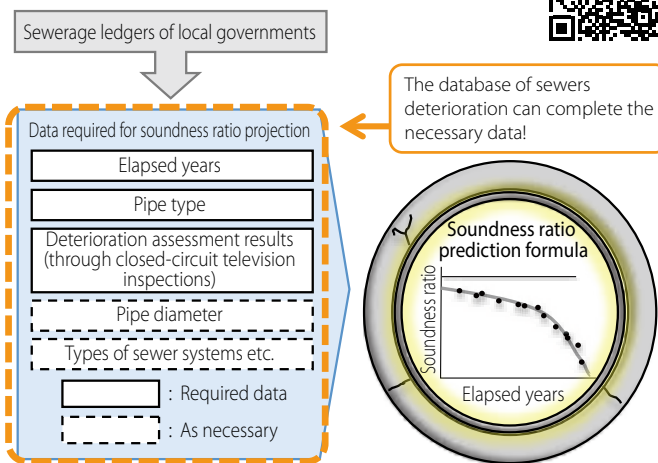
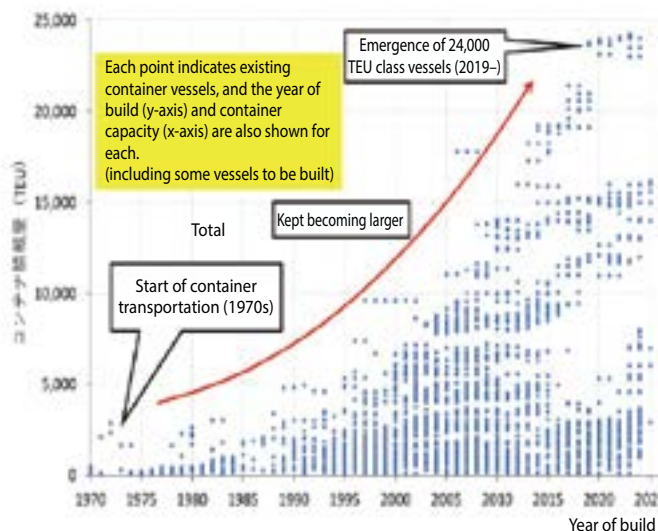


Image of the database of sewers deterioration

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.



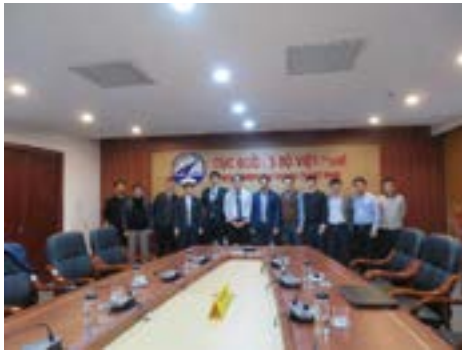
Example of maritime data analysis (trend toward larger container vessels)

International research activities

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

Technical cooperation on maintenance, management, and other operations of road bridges

- A meeting with the Directorate for Roads of Vietnam (DRVN) was held in accordance with the memorandum of cooperation to strengthen scientific and technical cooperation of the two parties on the design, construction, maintenance, and management of road bridges.
- Knowledge gained through discussions and exchanges of opinions will surely be useful for policy on road bridge maintenance and management in Japan and for research at NILIM.



International meeting with the Directorate for Roads of Vietnam

Conference for the interaction of urban studies researchers

- Joint research meetings and joint inspection visits are held with the Korea Research Institute for Human Settlements (KRIHS) in accordance with the memorandum of understanding signed on research cooperation.
- In the joint research meeting in FY 2022, participants presented their studies on smart cities and discussed future activity plans.



The seventh joint research meeting with the Korea Research Institute for Human Settlements

International cooperation on landslide disasters

- As a member of the consortium launched in FY 2020, the NILIM is editing technical documents.
- These activities are reflected in understanding movements of other countries in the distribution of advisories to limited members of the private sector and in creating standards for landslide warning information.



Presentation at the landslide early warning consortium workshop

Cooperation with JICA projects and training

- In FY 2022, training was provided in dam safety management, public works estimating capacity building, airport construction, and formulation of operation and maintenance plans.
- The NILIM dispatched lecturers in online training sessions and supported inspection visits during their visit in Japan.



The training on airport construction and the formulation of operation, maintenance, and management plans
Inspecting an aircraft load simulator

Activities related to ISO

Water Quality Control Department, Road Traffic Department, Building Department, and Research Center for Infrastructure Management participated in technical committees (TC) to examine and discuss 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.

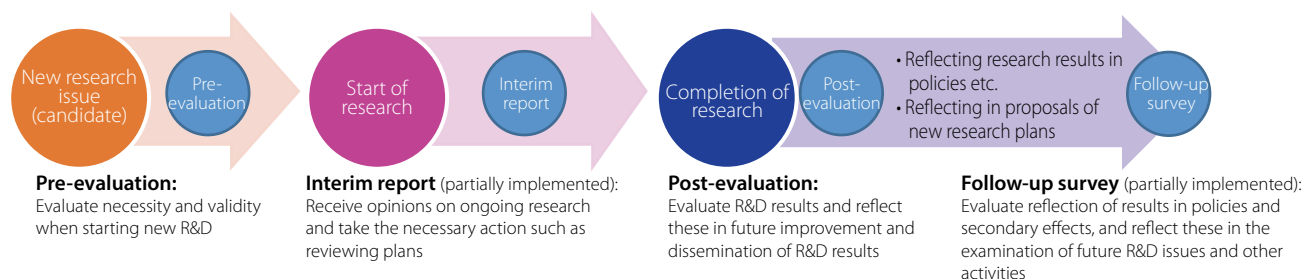
- **Domestic cooperation**
The aim is to develop education and research on the university side and to contribute to the activities of NILIM through coordination and cooperation between universities and NILIM.
University of Tsukuba, Kansai University, Tokyo University of Science, etc.
- **International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

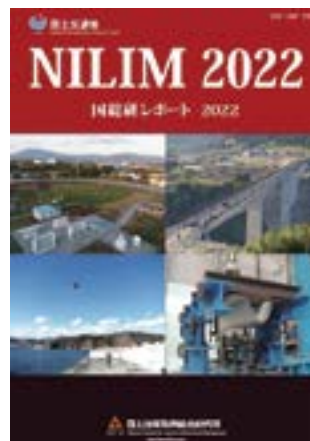
Visit this site to view information about lecture meetings, open houses, open experiments, and other PR information.



URL: <https://www.nilim.go.jp/english/eindex.htm>

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.)



SNS (Twitter and Facebook)

Using the official NILIM social media such as Twitter and Facebook, we are distributing various information such as press releases, website update information, research outcomes, including publication information, and events and lectures.



List of NILIM social media



Official NILIM Twitter

NILIM Reference etc.

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.)



NILIM YouTube channel

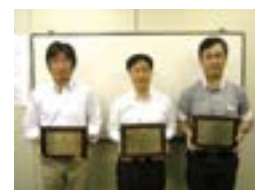
Videos of experiments and lectures in the field of housing and social capital of NILIM are available on YouTube with easy-to-understand explanations.



Presenting papers

The NILIM is publishing approximately 500 papers per year and receiving awards for papers in many fields, both from inside and outside of Japan.

- FY 2021, Information Processing Society of Japan
Won the Achievement Award
(March 2022)



- FY 2021, Japan Society of Civil Engineers
Won the Tanaka Ward
(paper division)

(May 2022)

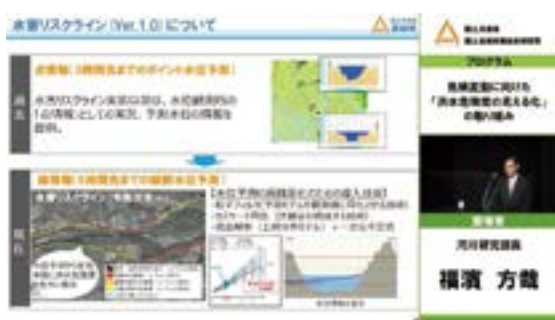
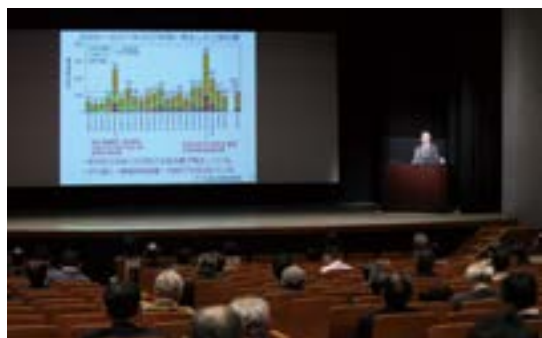
and others



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.



NILIM Lecture (December 2022)

Starting in FY 2022, we started a hybrid format of in-person participation at the venue and live-streaming of the lecture.

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



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.

Please visit our website for the more information.



Open house
(Civil Engineering
Day 2022)



Facility tour



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 2022: 40 lectures)



View of a lecture



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.



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.

1 Tachihara Office

2 Asahi Office

3 Test course

4 Collision test facility

5 Full-scale tunnel experiment facility

6 Sewers experimental facility

7 River model experiment facility

8 Marine and coastal experiment facility

9 Road foundation structure experimental facility

10 Experimental channel with large-scale embankment model and high flow velocity experimental channel

11 Construction DX experimental field (outdoor experimental facility for construction machinery)

Specifications

- Total length: Approx. 6.2 km
- Number of lanes: 3
- Curve section
- North loop design speed: 100 km/h
- South loop design speed: 120 km/h

Videos of various experiments conducted at the NILIM and information videos are available on the NILIM YouTube channel.

Legend

- A block
- B block
- C block
- D block
- E block
- F block
- G block
- H block

* Buildings and lots other than those indicated above are those of the Public Works Research Institute, Building Research Institute, and the Port and Airport Research Institute.

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
 Email address: nil-shisetsu-rental@gxb.mlit.go.jp
 Reference website: <https://www.nilim.go.jp/lab/bbg/rental/rental.html>

Organization, budget, and employees

Special feature

Introduction of research

Support for accident and disaster responses

Support for field technology improvement

Beneficial use of field data

International expansion/
Public information activities

Introduction to facilities

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

The simulator can apply a full-scale load of a main gear of the B747-400. Repeated loading tests are conducted using the simulator on pavements that are the same structures as runways, taxiways, and aprons.



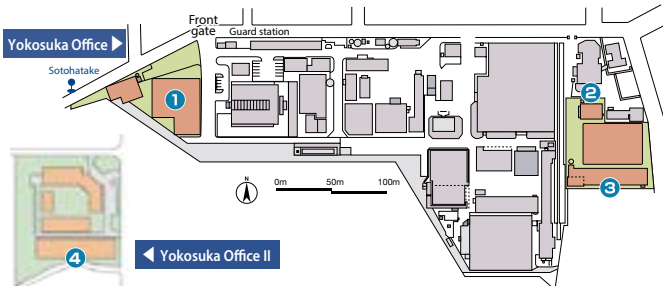
3 Typhoon experiment wind wave channel

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.



4 Airport Pavement Test Field

Test pavements are constructed in an outdoor field to confirm long-term durability, deformation resistance, and other properties of materials used in airport pavement.



6 Sewers experimental facility

This full-scale experimental facility can artificially reproduce various defects such as joint misalignment and cross-sectional cracks, which occur in sewer systems. Under uniform conditions, the performance of inspection equipment can be examined and comparatively evaluated more safely and efficiently than conducting experiments using actual sewer systems.



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 hydraulic model of Arakawa No. 2 and No. 3 Regulating Ponds is a large-scale model that is 180-meter long and 40-meter wide. Using the 1/50 scale reproduction of river topography such as the Iruma River confluence and levee shapes, researchers are checking how river water flows into a regulating pond and how the water spreads after entering the regulating pond by conducting experiments.

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. In recent years, researchers are conducting overflow experiments by creating a levee model with the height of 4 meters to study the structure of persistent river levees that are resistant to collapse even when overtopped by water. Based on findings gained at this experimental channel, we created the Technical Reference for Examining the Structure of Persistent River Levee (draft).

11 Construction DX experimental field



The construction DX experimental field is a research facility aimed at promoting digital transformation (DX) in the infrastructure sector. This facility consists of full-scale complete-shape models to develop technologies for construction management and inspection of structures using technologies, including 3D measurement technology, and an earthwork field to develop technologies for unmanned construction and automatic/autonomous construction using 5G and other tools.



Ministry of Land, Infrastructure, Transport and Tourism 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.

List of NILIM social media

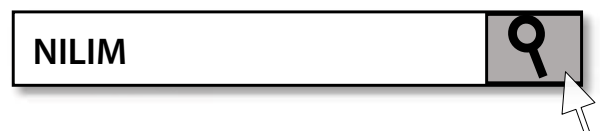


Access



VR NILIM

<https://www.nilim.go.jp/lab/bbg/vrkokusouken/index.html>



Created in April 2023