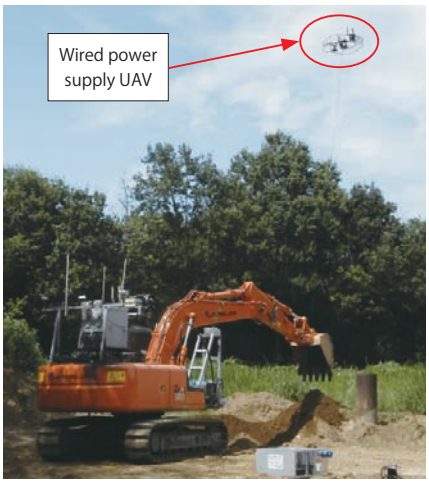
Joint Research and Partnership with Other Organizations

Joint Research

Joint research is a system that PWRI concludes the joint research agreement with private companies and/or research institutes such as universities to conduct researches in collaboration.
For example, the Advanced Technology Research Team concluded the agreement on joint research of research about unmanned-remote-power-shovels controlled by UAVs (Unmanned aerial vehicles) with Tohoku University. Under the background of the agreement, Ministry of Land, Infrastructure and Transport (MLIT) has been actively promoting utilizing Information and Communication Technology (ICT) on civil engineering technology under the i-construction project. Along with this project, we have worked on R&D for controlling unmanned power shovels by obtaining surrounding data from UAV. This technology is expected to be adapted to the situations such as restoration works with the risks of second disasters.
By taking strong points of PWRI and the partner into account, we believe that joint research lead to creation and promotion of great research result.



Remote control hydraulic power shovel and wired power supply UAV


Image acquired from UAV

Alliance with other organizations

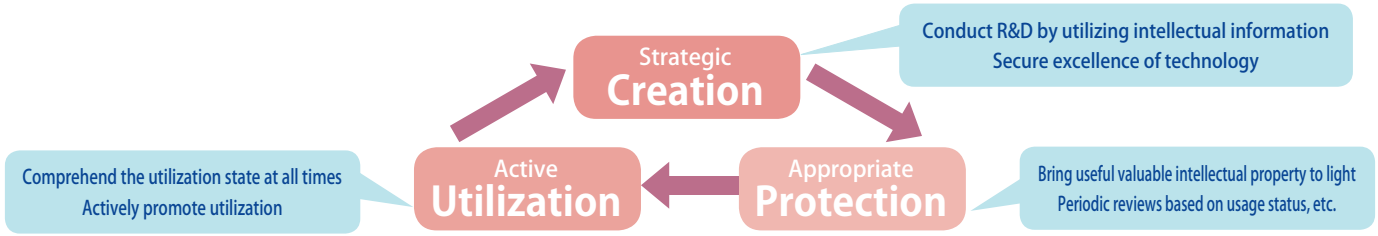
Under the comprehensive cooperation relates to a civil engineering technology, we concluded a cooperative partnership agreement regarding civil engineering technology with research institutions such as universities and local governments aiming to contribute to the efficient development of high-quality public infrastructure and strive to create further research results.
We have the cooperative partnership agreement with foreign and domestic research institutes and the Nation and local governments to exchange variety of information.

Conclusion of agreements on innovative and practical R&D and cooperation in the human resources development and exchange for next-generation with the Graduate and Undergraduate Courses of the Department of Civil Engineering College of Industrial Technology, Nihon University on December 13, 2016 (left) and the Graduate School of Science and Technology and the Faculty of Science and Technology, Tokyo University of Science on March 24, 2017 (right)

Creation / Protection / Utilization of Intellectual Properties

PWRI manages intellectual properties appropriately based on an Intellectual Property Policy to bring the best possible value to society as a whole in a strategic and active manner.

Concepts of the Intellectual Property Policy



For more information about intellectual property rights of Public Works Research Institute, please see below.

Industrial property rights such as patents

Tsukuba Central Research Institute, ICHARM, CAESAR, iMaRRC
http://www.pwri.go.jp/jpn/results/patent/index.html

Civil Engineering Research Institute for Cold Region
http://www.ceri.go.jp/contents/research/research03.html

Program works/Guidelines

Tsukuba Central Research Institute, ICHARM, CAESAR, iMaRRC
http://www.pwri.go.jp/jpn/results/offer/index.html

Civil Engineering Research Institute for Cold Region
http://www.ceri.go.jp/contents/center/center07.html

Corporate works (also posted on page 44 in this handbook) http://www.pwri.go.jp/jpn/about/pr/publication/index.html

We recommend transfer of technology to private companies so that the new technology with a focus on intellectual property rights is widely used.

Practitioner recruitment system for underutilized patent

Public Works Research Institute looks for a partner, such as a private company that is able to carry out development, manufacturing and sales of specific products so that the technologies developed can be utilized on actual site.
"Practitioner recruitment system for underutilized patent" is to present the conditions of technical contents and patents which are implemented and to widely recruit partners who want to participate.

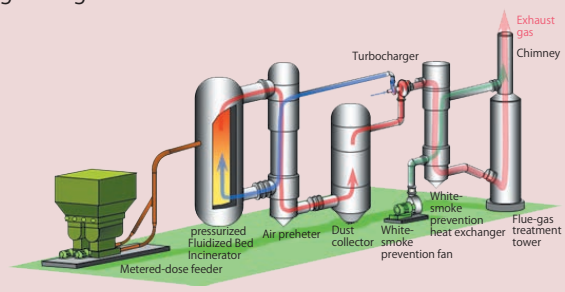
Research Consortium

As a national research and development agency, the Public Works Research Institute is actively involved in the promotion of on-site utilization of their own research results. And we are strongly required to contribute to promotion, utilize new technologies, and improve quality of the public infrastructures and reduce costs. etc.
For this reason, for some of the new technologies that the Public Works Research Institute has developed, active follow-up will be carried out until achieve certain level of to self-reliance, through a new attempt of such research consortium.

Examples of use of industrial property rights

[Invairowan Method]
(Pat. No. 5,534,233, the other 1)
Removing method for protective coating film prior to repainting works by means of environment-friendly coating disbonder

[Fluidized Bed Incineration System with Turbocharger]
(Pat. No. 5,187,732, the other 11)
Energy/space-saving and low environmental load incinerator for sewage sludge



For overview and use of each intellectual property, please contact Tsukuba Central Research Institute, ICHARM, CAESAR, iMaRRC (Construction Technology Research Department), CERI (Cold-Region Technology Promotion Division). We will provide further information.

Introduction of PWRI-Developed Technologies Utilized at Construction Sites

Received the Monozukuri Nippon Grand Award / Infrastructure Technology Development Award

Invairowan Method
(iMaRRC (Advanced materials and improvement))

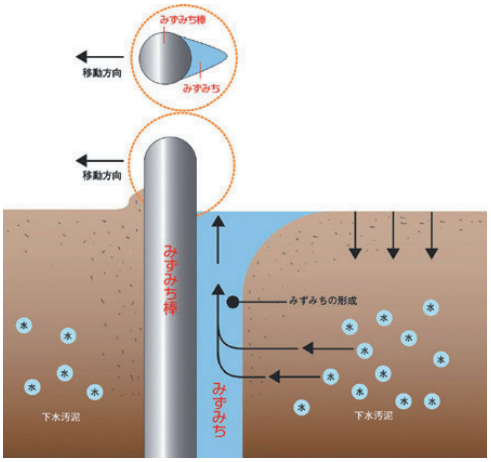
In order to prolong the lifespan of steel structures, it is necessary to peel off conventional coating materials and switch to longer lasting heavy-duty anti-corrosion coating materials. In joint research with a private sector company, PWRI has developed a new removal method that can safely and efficiently remove and collect the old coating film softened in the form of sheet without scattering coating dust in the surrounding area; it is much better than conventional mechanical methods such as blasting, disk sanding, water jetting, etc. This method received the 8th Infrastructure Technology Development Award (MLIT Minister's Award) in 2006 and the 2nd Monodzukuri Nippon Grand Award (Prime Minister's Award) in 2007. So far, it has been applied to a total of 349 bridges and other structures throughout Japan, exceeding 500,000 m^2 in total area, by the national government, local governments, and government-affiliated corporations.

Coating film being peeled off

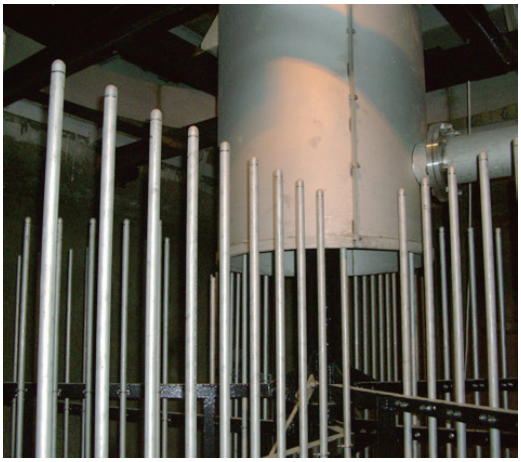
Site application

Gravity thickening technology that uses 'Water Path Forming Poles'
(iMaRRC (Recycling))

In order to efficiently treat sewage sludge, it is necessary to remove as much water as possible from the sludge and thicken it. This technique increases the sedimentation rate of sewage sludge using 'Water Path Forming Poles' (WPFPs). Specifically, by slowly rotating a sludge collector fitted with WPFPs vertically in a gravity thickener, 'water paths' where liquid moves easily form immediately behind the poles. This draws out the water between sludge particles and high density thickened sludge precipitates to the bottom of the thickener. This technique received the 7th Infrastructure Technology Development Award (MLIT Minister's Award) and the 1st Monodzukuri Nippon Grand Award (Prime Minister's Award) in 2005. This technique has been introduced at wastewater treatment plants in 13 municipalities including Tomakomai, Kumamoto, and Imabari, resulting in higher-density thickened sludge at all of the plants.



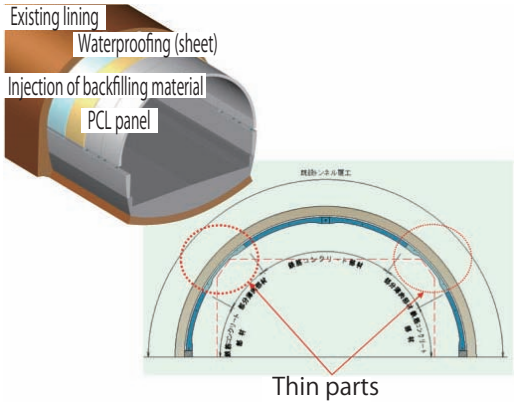
Water path Forming poles



WPFPs installed at the Engaru Wastewater Treatment Plant

PCL construction method using a partially- thinned reinforcing plate
(Tunnel Research Team)

PCL construction method is a technology to reinforce an aged tunnel with inner reinforcing precast concrete. There was a problem when lining concrete of a tunnel in service is deformed by external force, etc., the cross section is too small to provide inner reinforcement and the clearance limit is not secured. Therefore, this team has developed a reinforcing slab with a partially-thinned shoulder in which the clearance limit is hard to be secured and a PCL construction method using it. The team won the 16th Infrastructure Technology Development Award 2014 (podium) for this technology. This method has been adopted to Naruko Tunnel on Route 47 and Tashiro Tunnel on Niigata prefectural road.



ALiCC (Arch Action Low Improvement Ratio Cement Column) Method
(Construction Technology Research Team)

Reducing the improvement ratio of ground improvement is an extremely efficient way to reduce the construction cost and construction period of mitigation measures for soft ground. The Arch Action Low Improvement Ratio Cement Column (ALiCC Method) is one method for this, and it is being increasingly applied to sites. This method enables us to rationally evaluate the embankment loads that are acting on cement improved soil columns and unimproved ground, by considering the arch action generated in the embankments and from there thusly allocate improved soil columns in spans of a greater distance than those needed for conventional methods. As a result, it serves to reduce construction costs and the construction period, while also minimizing the settling of the embankment and differential settlement, by placing numerous improved soil columns in the ground immediately beneath the embankment at equidistant intervals.


Soil improvement work at Maibara Bypass


Soft ground countermeasure work at the Maruyama River

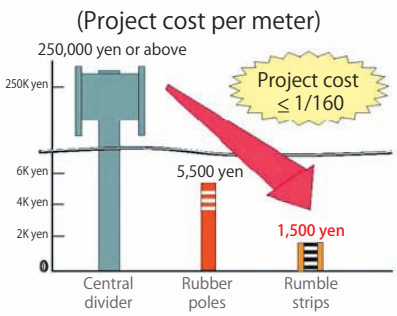
This method was awarded the 15th Infrastructure Technology Development Award in 2013. It has been adopted in constructions of Maibara Bypass and Maruyama River by the Kinki Regional Development Bureau and a road-widening work on Route 57 in Moriyama region by the Kyushu Regional Development Bureau. As of December 2015, the number of constructions is 118 and the constructed volume is more than 730,000 m^3.

Technique Selected as an effective and Serviceable method on the NETIS

Rumble Strips
(Traffic Engineering Research Team)

The installation of rumble strips is a technique to prevent vehicle-departure head-on collisions by excavating and recessing the centerline pavement surface. This recessed centerline generates sound and vibrations to awaken/remind the driver when a running vehicle passes over the centerline. It is highly effective in preventing lane-departure. This technology was used over 1,655 km as of the end of 2009 and has been selected to NETIS recommended technology in FY2009. On 43 routes in Hokkaido which accounted for a total length of 641 km and were improved with rumble strips from FY2002 to 2007, the fatalities from head-on collisions for two years after installment are compared with that for two years before installment; the fatalities from head-on collisions decreased from 59 to 19, or, in other words, by 68%. This technique is highly economical and easy to construct, and can reduce the cost per meter significantly compared to the center divider. This technique is used for 2,100 km as of the end of FY2014.


Rumble strips



Cost reduction effects of rumble strips
(Comparison of actual costs in Yakumo in 2002)

PWRI's Focused Dissemination Technologies/Techniques (FY2017) (Example)

Fluidized Bed Incineration System with Turbocharger
(iMaRRC (Recycling))

This system improves incineration efficiency by incinerating the composite of sewage sludge and other biomass at approximately 0.15 MPa, and allows utilization of compressed air generated by operating a turbocharger with exhaust gas. It can reduce power consumption by 40%, fuel by 10% and CO_2 by 40%. It can also reduce a great amount of N_2O, which has more of a greenhouse effect than CO_2 when the combustion temperature is adjusted to the high-temperature zone. Based on good results in an experimental plant located in Oshamanbe, Hokkaido, this system has been adopted at 9 wastewater treatment plants in Tokyo and other places. This technology received the 17th Infrastructure Technology Development Award (MLIT Minister's Award) and the 41st Excellent Environmental Equipment Award (METI Minister's Award).

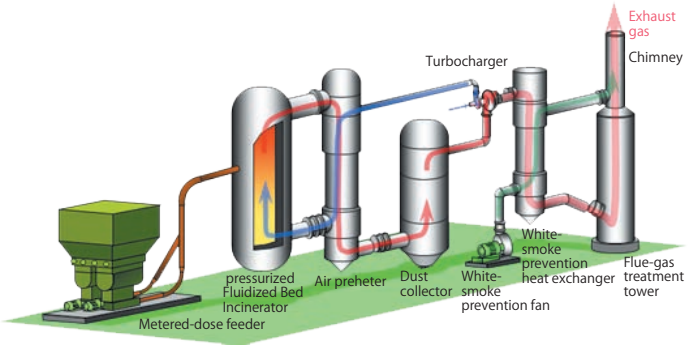
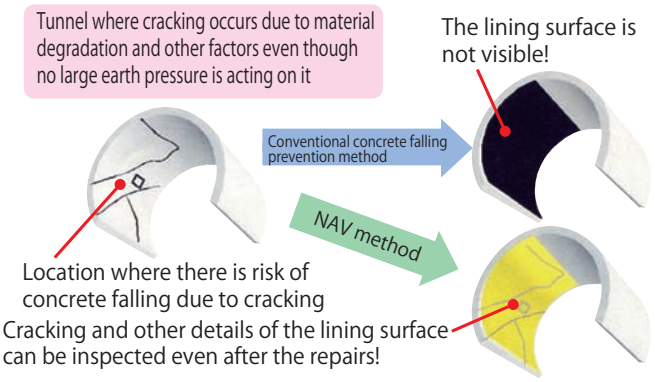


Image diagram of this technology

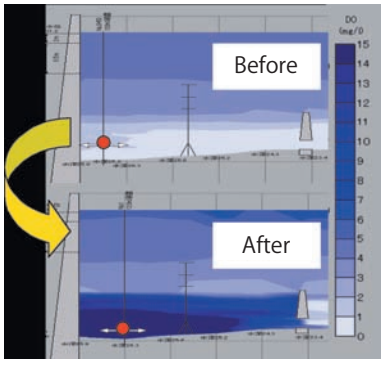
Tunnel repair technologies (NAV method)
(Tunnel Research Team)

NAV method is a repair technology which attaches a newly-developed transparent sheet with cohesive resin to the cracked surface of lining concrete in order to prevent the concrete from spalling. It forms a high degree of transparent FRP (fiber reinforced plastic) by coating and impregnating an adhesive acrylic resin to nylon cloth and the progress of the cracks can still be seen after the sheet is installed, therefore it is possible to check the effects of the repair and the need for additional measures.
This technology is an effective means of preventing damage to users caused by delamination or separation of lining concrete. Further, by using a glass fiber repair sheet, it also proposes further NAV-G method with improved fire resistance. As of March 2016, it has been used for approximately 43,000m^2 of road, railway, subway tunnels and others.



Gas-liquid dissolving apparatus (Technology for improving bottom water quality by supplying water with supersaturated dissolved oxygen)
(Water Quality Research Team)

The release of nutrients and metals from sediments as a result of oxygen-poor condition in the bottom layer caused by thermodine sometimes significantly compromises water quality in closed water body such as reservoirs. Therefore, PWRI developed a novel gas-liquid dissolving system: creating pure oxygen gas to supply water with supersaturated dissolved oxygen to the bottom layer at any depth and increasing DO in order to improve water quality. Because the technology can supply DO across a broad spectrum without destruction of the thermodine, unlike conventional aeration systems, water quality can be restored efficiently and effectively. To date, this technology has been adopted by the Chugoku and Shikoku Regional Development Bureaus for domestic dams and other areas, as well as dams in Jiangsu Province, China.

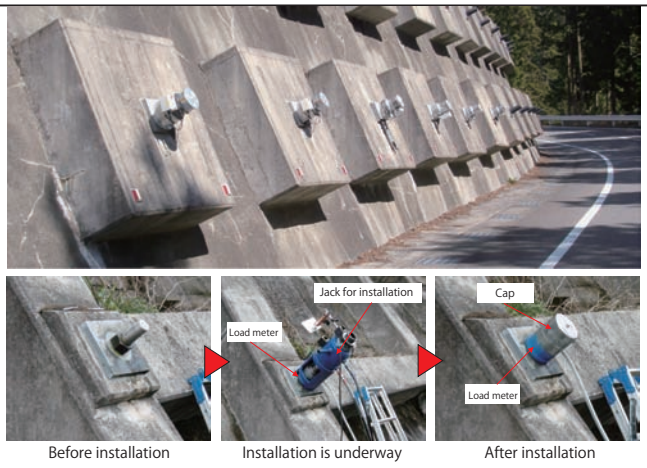


Experimental result at the Haizuka Dam (The darker the color, the higher the concentration of dissolved oxygen.)

Gas-liquid dissolving apparatus (Made of SUS)

Installed anchor tensile monitoring system (Aki-Mos)
(Landslide Research Team)

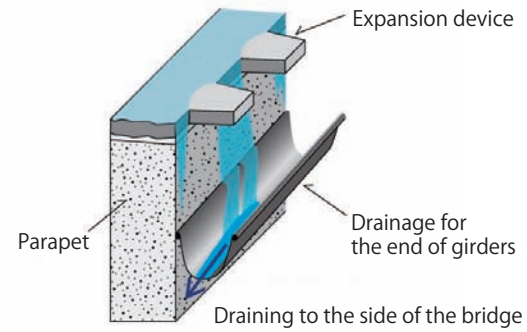
Ground anchor for slope stability should be maintained property. Especially, it is important to know any changes of the tensile stress in order to maintain ground anchor. However, the tensile stresses are not measured in many cases. We therefore developed continuous monitoring techniques of load for installed anchors. These techniques have enabled us to get the load data remotely by radio. By these techniques, it is possible to monitor the load, which it could hardly be done in the past. 202 systems have been adopted by Regional Development Bureaus and NEXCO at 43 construction sites including dams and roads.



Installation of the technology

Drainage system for the end of concrete bridge girders
(CAESAR)

A rubber or polyethylene gutter-shaped drainage available to insert into the expansion gap from the side of existing concrete bridges allows preventing salt damage of girders and substructures due to leakage water contaminated by deicing salt from expansion joints. This drainage can be easily installed from under the bridges without affecting to traffic flow. The drainage system has been applied to a highway bridge in Akita Prefecture.

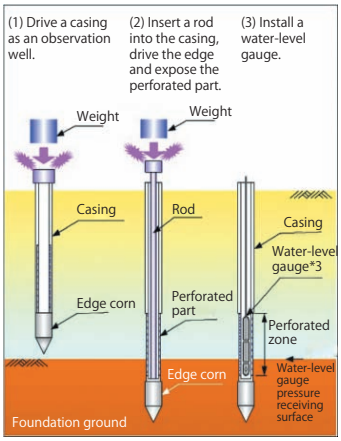


Schematic diagram of the drainage

Driving type water level observation device
(Soil Mechanics and Dynamics Research Team)

An observation well is conventionally excavated by boring to observe underground water levels. This is a simple observation device that can be driven and installed using a simple penetration machine. Because a simple temporary scaffold is used to install the device, it can be easily installed in a short period of time at low cost, thereby enhancing work safety. Specifically, the device is used for verifying the effectiveness of river levee flood countermeasures and earthquake countermeasures, assessing the stability of road embankments, and measuring declining water levels around underground excavation sites.
This device has been installed in more than 65 places of 16 sites including Yonesiro River and Tokushima Expressway.

Device



Setting image of the device

Photo of the device being installed

Wire Rope Guardrail System
(Traffic Engineering Research Team)

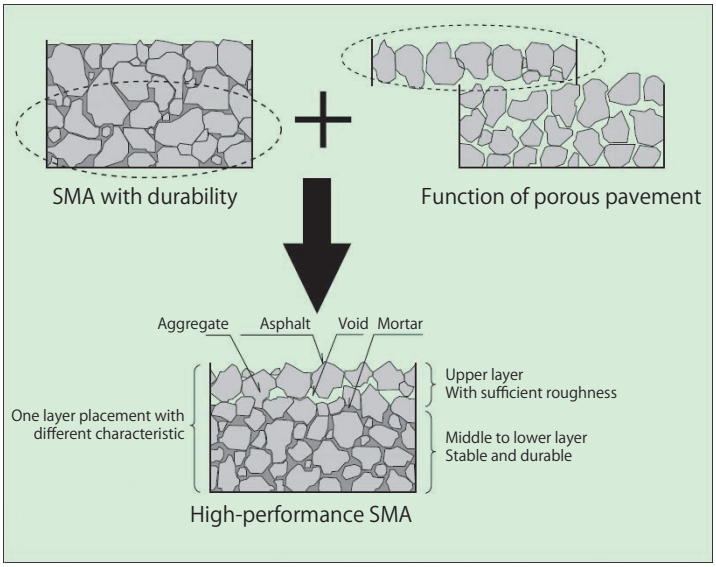
The wire rope guardrail system consists of high toughness wire ropes and thin posts that break when they are hit by a car. By absorbing shocks of vehicle collision mainly with deflection of wire rope, it is expected to drastically reduce fatal accidents. There is no difference between shapes of both sides of the system, thus the width required for installation is narrow and the installation cost can be reduced. Since this guardrail system can be installed and removed by humans, it is possible to partially make opening sections in an emergency to allow car drivers to drive in the opposite lane and complete repair work in a short time. Temporary-two-lane expressways without median strips have higher risks of fatal collision accidents than four-lane sections. Therefore, as an emergency measurement to prevent these accidents, this system has been installed in over-100km temporary-two-lane areas from the 2017 spring for its feasibility assessment.

The wire rope-type protective fence

Collision experiment with the large-size car

High-performance SMA (Pavement including both durability of SMA and permeable function)
(Road Maintenance Research Team)

High-performance SMA is a new asphalt mixture that has both a porous pavement texture and stone mastic asphalt (SMA) superior in durability. Generally, pavement surface layer is designed, produced and placed so that the physical and mechanical quality is even in the vertical direction. On the other hand, in high-performance SMA, the layer near the surface is porous, the middle and lower layers are dense. Therefore, as a surface layer of pavement, it has sufficient durability (plastic flow resistance, wear resistance, aggregate scattering resistance, etc.), safety (drainage function, skid resistance, glare-proof, etc.), environmental preservation (low noise, etc.) and comfort (smoothness, etc.) in a balanced manner. This has been used more than 1,000,000m^2, for slopes, urban intersections and pavement repair in tunnels.



Attachment-type road sweeping device for rotary snowplow
(Machinery Technology Research Team)

Road maintenance- and snow removal-dedicated cars are operated for only half a year in the snowy and cold regions. We developed an attachment-type road sweeping device focusing on the fact that rotary snowplows can be utilized throughout the year.

Existing rotary snowplows with attachment-type road sweeping device allow you to utilize rotary snowplows throughout the year. It contributes cost reduction compared to conventional machinery.

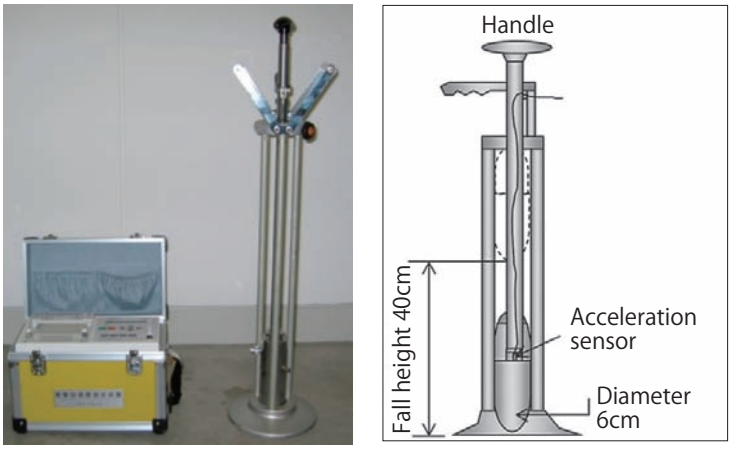
Road surface cleaning by attachment-type road sweeping device for rotary snowplow

Snow removal by the rotary snowplow

Each of this device has been introduced into the Sapporo Development and Construction Department (Takikawa Road Office: FY2012), the Asahikawa Development and Construction Department (Asahikawa Road Office: FY2013), and the Hakodate Development and Construction Department (Hakodate Road Office: FY2015) of the Hokkaido Regional Development Bureau, the Ministry of Land, Infrastructure, Transport and Tourism and they are used for road maintenance works.

Quality control of embankment with Impact Acceleration measuring Device
(Geotechnical Research Team)

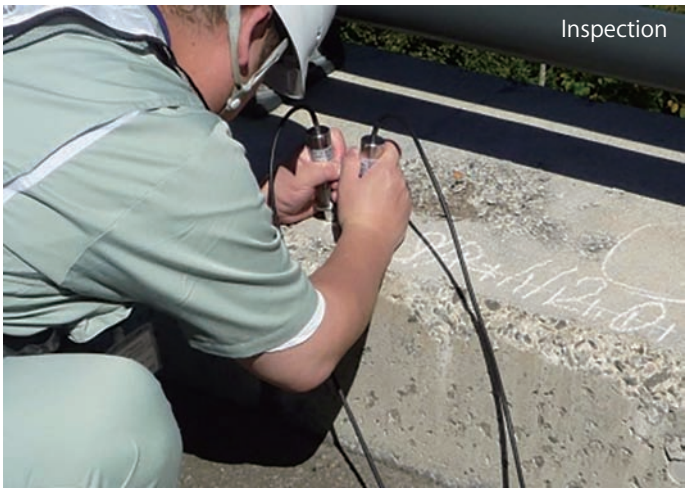
This Impact Acceleration measuring Device can control quality of embankments that serve as the base for roads in a simple, prompt and inexpensive manner. The existing quality control method for embankments (sand replacement method/RI method) requires at least one whole day until the results are available and sometimes affects the progress of work. This Impact Acceleration measuring Device is easy to use and generates results immediately on-site to ensure quality control of embankments in a short time.
This has been applied to the quality control of "Common Specifications on Road/River Construction Work" issued by the Hokkaido Regional Development Bureau, the Ministry of Land, Infrastructure, Transport and Tourism.



Impact Acceleration Taster can control quality

Frost damage deterioration inspection technology for concrete by ultrasound (surface scanning method)
(Materials Research Team)

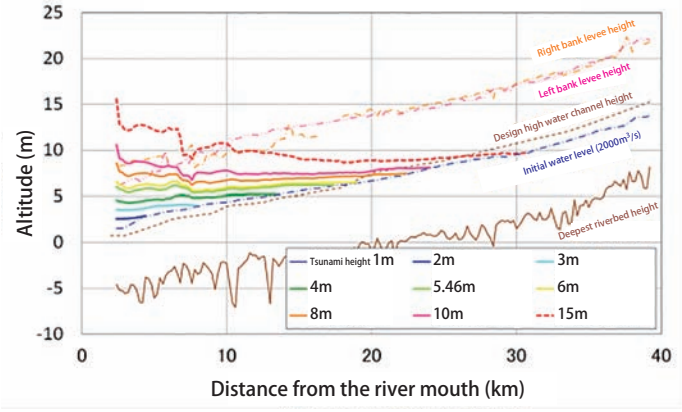
The extent/degree of frost damage in cold climates is generally evaluated by collection and analysis of core. However, the structure is damaged by the collection and the significant cost, time, efforts are required in the wide range of investigation. In this technology, the time spent for inspection can be saved and the number of core collection and the amount of repair can be reduced which leads to saving costs and minimizing damage to the structure.



Method of estimating the run-up distance and run-up height by the river tsunami
(River Engineering Research Team)

The technology is used to estimate the run-up distance and the run-up height of the river tsunami and provide government workers in charge with the tsunami information for making decision of disaster prevention and mitigation. Specifically, the following need to be done in advance: 1) performing run-up calculations of the river tsunami under different conditions of tsunami height and river discharge with a small calculation load by one-dimensional computational model, and 2) creating the longitudinal diagram for river tsunami prediction that summarizes the result of the calculations.
In case of an earthquake and a possibility of river tsunami, the government workers can instantly obtain the predictive value of the run-up distance and the run-up height from the diagram that shows the calculation result under the closest condition of expected tsunami height and the river discharge at the moment.

Longitudinal diagram for river tsunami predictions (river discharge 2000m^3/s)



Technical Support

Technical support at the time of disasters

Our nation suffers from a lot of natural disasters such human/material damages due to earthquake, heavy rain, landslides, and snow. Public Works Research Institute carries out a emergency response in the event of a disaster in order to provide technical advice regarding survey of damages immediately after the disasters, the method to restore civil engineering structures that were damaged and technical support for lifesaving at the time of landslides.

The Kumamoto earthquakes that occurred on April 14, 2016 caused a lot of damages and collapse of buildings, serious destruction of the Kumamoto castle, the damage of the major road and the collapse of the roads by landslides. Damage of river facilities, damage of road facilities and occurrence of landslide were caused by heavy rain on August.20,2016 and typhoon No.10 in 2016 in various parts of Japan.

Receiving request from the national and local governments, we dispatched experts to the site and gave a technical advice regarding damage survey prevention from a secondary disaster and restoration of damaged facilities.

Kumamoto Earthquake: Inspection of damages at the crossover in the City Road Chuo Line (17 Apr.)

Typhoon No.10 etc.: Field survey of the collapsed bridge in Hidaka Town (1 Sep.)

Kumamoto Earthquake: Field survey of the collapsed Aso-Ohashi Bridge and the landslide on the national highway No.57 (17 Apr.)

Typhoon No.10 etc.: Investigation of the overflow and the collapse of embankment in Kitami City (21 Aug.)

Kumamoto Earthquake: Research status of the landslide facing the Tateno River (19 Apr.)

Typhoon No.10 etc.: Research status of the landslide in Rausu Town (10 Sep.)

Technical support relating to civil engineering technology in general

We provide technical support by the request from the national and local public organizations even at the time of the non-disaster for the purpose of supporting solution related to agriculture, fisheries and harbors and providing civil engineering technology in cold regions. We also participate in the technical committee, such as the government and relevant societies to provide technical support. Public Works Research Institute has accumulated knowledge and research results that are reflected in the formulation and revision of various technical standards.

Technical support for shrinkage of the security area due to lowering the eruption alert level in Hakone volcano

Technical support on the maintenance and management of the snowbreak woods in Hokkaido

Dispatch of lecturers

We offer the trainings to engineers of College of Land, Infrastructure, Transport and Tourism, Regional Development Bureau, Hokkaido Regional Development Bureau, local governments, and universities. We also organize lectures for the general public including elementary, junior high, and high schools as well as dispatch a lecturer to institutions by request to give guidance and promote civil engineering technology.

Tsukuba Science Academy (SAT) Technology Showcase Symposium 2016

Training sessions for civil engineers

Dissemination of Research Findings

Publications of the Public Works Research Institute

Research results of PWRI are published and/or posted on the internet as: Reports of PWRI, PWRI Materials, Joint Research Reports, Monthly Reports of the Civil Engineering Research Institute for Cold Region, etc.

Publications by PWRI

PWRI has published the below books under copyright. These books are available at bookstores.

Book title	Publisher
Eco-cement Concrete Utilization Technology Manual	Gihodo Shuppan
Manual for Inspecting Soundness Level of Concrete Structures Using Nondestructive Tests	Gihodo Shuppan
Collection of Physical and Chemical Information Regarding Human Use Pharmaceuticals	Gihodo Shuppan
Manual of Countermeasures for Ground Contamination in Construction Works (Revised edition)	Kajima Publishing
Guideline for Recycling Waste Wood (Draft)	Taisei Shuppan
Manual of Application Technology of Other Industries Recycled Material in Construction Works	Taisei Shuppan
Manual of Simple Measurement Methods for Dioxins in Soil	Kajima Publishing
Manual for Utilization of Liquefied Stabilized Soil (2nd edition, 2007)	Gihodo Shuppan
Inspection and Maintenance Manual for Ground Anchors	Kajima Publishing
Manual for Recycling Construction Generated Sludge	Taisei Shuppan
Soil Pavement Handbook (for Pedestrial Pavement)	Taisei Shuppan
Manual for Landslide Measurements with Insertion Borehole Inclinometer	Rikohtosho
Manual for Inspection of Concrete Structures by Nondestructive/Micro-destructive Tests	Taisei Shuppan
Manual of Countermeasures for Dioxin-Contaminated Soil in Construction Works (provisional edition)	Kajima Publishing
Integrated geophysical exploration of levee systems – A Guideline for the application to the safety assessment -	Aichi Shuppan
Shape estimation method of landslides line	Kajima Publishing
Manual for Utilization of Soils from Construction (4th Edition)	Public Works Research Center
Practical Guide to Water Drainage Boring for Preventing Landslides	Kajima Publishing
Handbookfor Handling Rocks and Soils Containing Naturally-occurring Heavy Metals at construction works	Taisei Shuppan

Application in Standards

Research findings are reflected in new and revised standards for infrastructure.

■River Bureau, Ministry of Land, Infrastructure, Transport and Tourism
- *Preliminary Technical Guidelines for Landslide Investigation and Its Remedies for Reservoirs*
- *Guidelines for Seismic Safety Evaluation of Dams for Large Earthquakes (Draft)*

■Road Bureau, Ministry of Land, Infrastructure, Transport and Tourism
- *Highway Bridge Specifications and Instruction Manual*

■Ministry of the Environment
- *Guidelines for Applying for Offshore Disposal of Waste*
- *Guidelines for Topographical Changes to Final Disposal Sites*

■Related Organizations
- *Standard Specifications for Concrete Structures etc. Japan Society of Civil Engineers*
- *Engineering Bedrock Classification Method, etc. Japanese Geotechnical Society*
- *Guidelines and Commentary on Earthquake Proofing Sewage Treatment Facilities, etc. Japan Sewage Works Association*
- *River Earthwork Manual etc. Japan Institute of Construction Engineering*
- *Manual of Design and Construction of Reinforced Earth Using Geotextiles, etc. Public Works Research Center*
- *Manual of Design and Construction of High-Standard Embankments Foundation for Riverfront Improvement and Restoration*
- *Electronic Delivery Methods for Geological and Soil Research Findings Japan Construction Information Center*

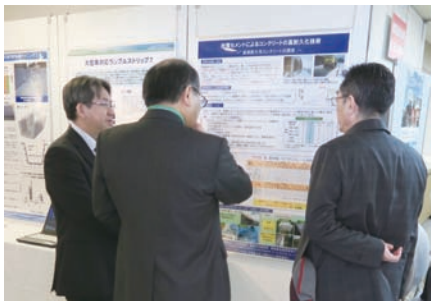
Presentation of Papers

PWRI publishes approximately 1,500 papers each year, including the presentation of papers at international conferences and academic meetings, and the submission of papers for publication in collections of papers and specialist journals. We aim to present high-quality findings, with more than 300 of these papers undergoing peer review before publication.

PWRI New Technology Showcase

The "PWRI New Technology showcase" is a seminar event to explain our new technologies. The panels and models are also exhibited at the events. The researchers provide consultation to introduce our new technologies into actual sites. The Showcases are held every year in Tokyo, Sapporo, and a few other cities. In FY2016, 1550 participants attended the Showcase in the five cities, Tokyo, Sapporo, Osaka, Niigata, and Takamatsu.

Seminar in New Technology Showcase (Tokyo, Niigata)



Exhibition/Technical consultation corner (Sapporo)

PWRI New Technology Seminar / On-site Tour

The PWRI New Technology Seminar gives lectures about selected PWRI technologies for cost reduction, time shortening or other effect, so as to address current detailed technical trends in the respective areas as may be required for application at sites, etc. The seminar is held every year in Tokyo.
The On-site Tour is held on as many occasions as practical in the field where PWRI developed technology is being actually applied to ensure that the participants can actually see with their eyes, understand application methods and benefits.

New Technology Seminar

Scene of on-site tour

Developmental Technology Seminar

PWRI holds briefing sessions on development technologies regarding subjects which are of interest to engineers in snowy cold regions on related institutions in order to promote the utilization of new technologies researched and developed in snowy cold regions on sites of public works.

Morioka

Yamagata

On-site Seminar

On-site seminars are cosponsored in various areas of Hokkaido by the Civil Engineering Research Institute for Cold Region and the Hokkaido Regional Development Bureau so that survey methods and countermeasures in snowy cold regions can be effectively utilized at sites and such seminars contribute to the promotion of development in Hokkaido.

Asahikawa

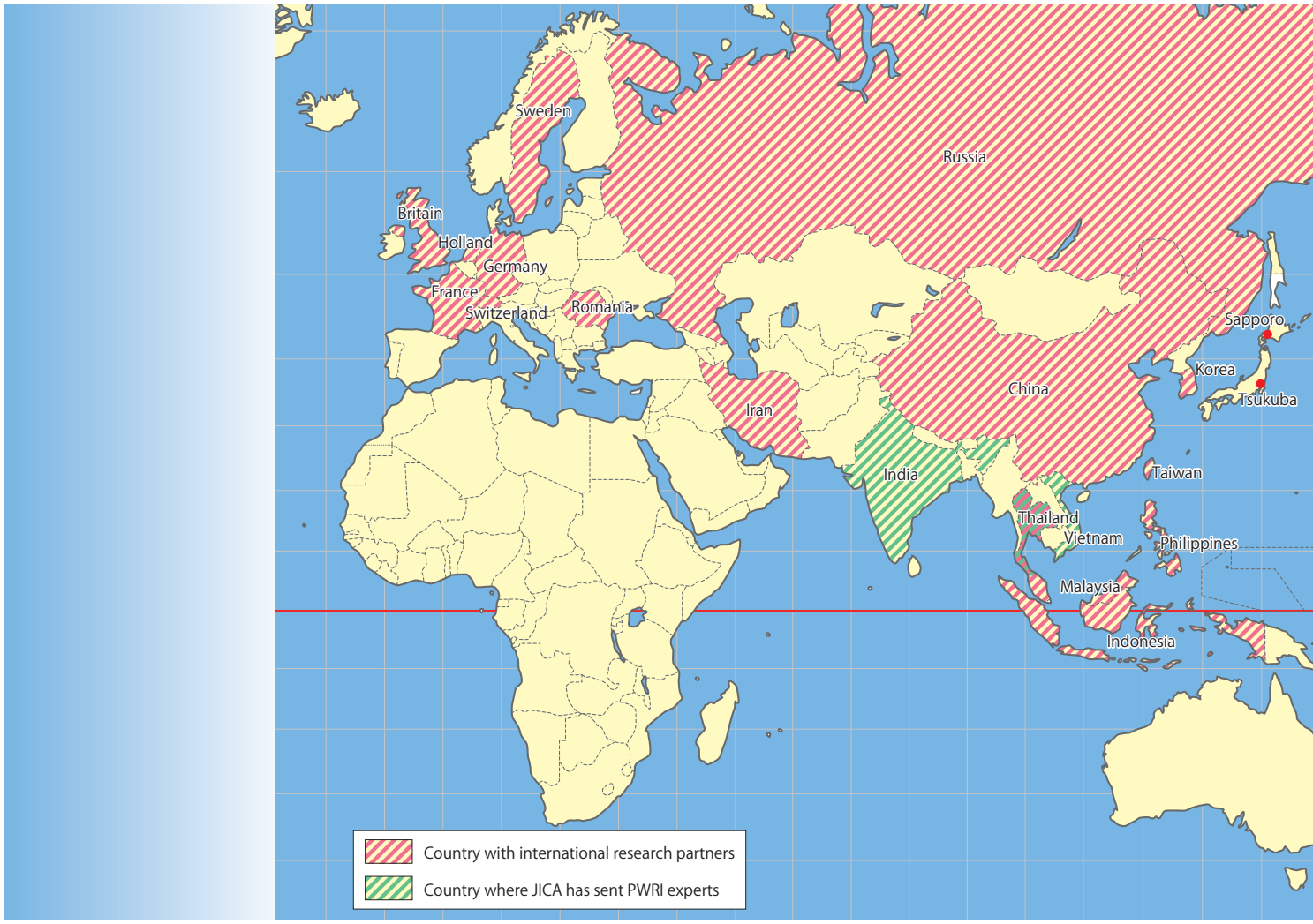
Muroran

International Contribution

The Public Works Research Institute (PWRI) has been active in conducting research and on-site activities in collaboration with international organizations and research institutes in Asian and other regions.
One example is an international project, "Transformation of Urban Management (TA8456 MYA)," in which the International Centre for Water Hazard and Risk Management (ICHARM) has been involved since July 2014. The project is led by the Asian Development Bank and specifically developed for Myanmar. Assigned to strengthen the nation's urban flood management capacity, ICHARM has provided local government personnel with training and technical assistance needed to perform flood and storm-surge risk assessment and hazard mapping. ICHARM is also involved in a UNESCO-funded project, "Strategic Strengthening of Flood Warning and Management Capacity of Pakistan Phase II." Furthermore, it has been the secretariat of the International Flood Initiative (IFI), a global framework to promote collaboration on flood management with major international organizations such as UNESCO, the World Meteorological Organization (WMO), and the United Nations University. PWRI will continue to plan and implement a wide range of activities in partnership with donor organizations such as the Japan International Cooperation Agency (JICA) and the World Bank.

Workshop for Improvement of Flood Management Capacity in Myanmar (TA84656MYA)

International Flood Initiative (IFI) Workshop (Jan. 2017)



Human Resource Development

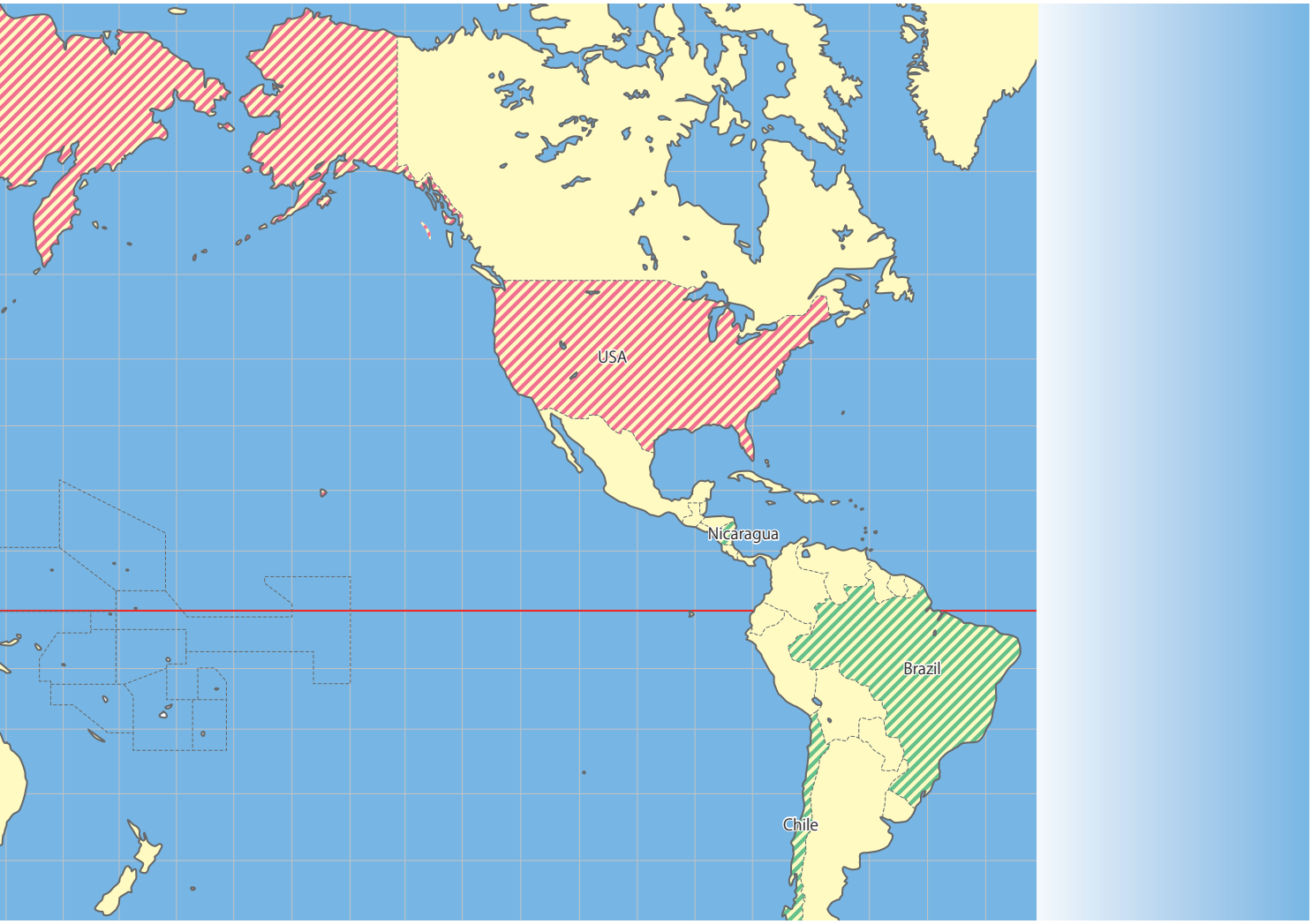
The Public Works Research Institute accepts trainees of civil engineering technology field of more than 300 people every year from Africa, Asia, and Central and South America. We also dispatch a large number of instructors in specialized training of civil engineering that JICA organized to work on human resource development.
In particular, the three parties, ICHARM, the National Graduate Institute for Policy Studies (GRIPS) and JICA jointly launched a one-year Master's course "Disaster Management Policy Program and water disaster risk management course". ICHARM also launched a three-years Ph.D. program "disaster prevention science program" with GRIPS..

Hydrological exercises for trainees

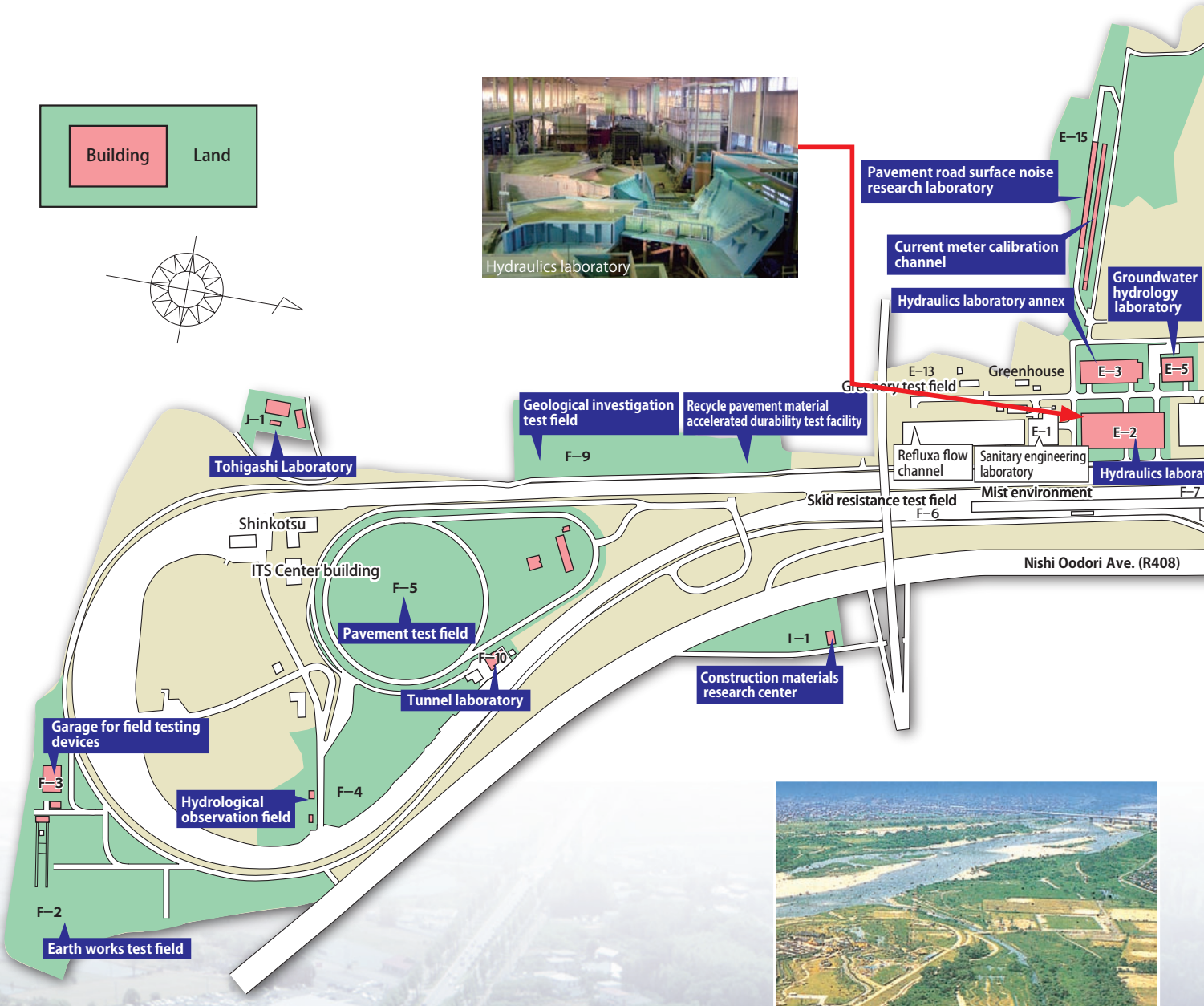
Overseas Technical Support

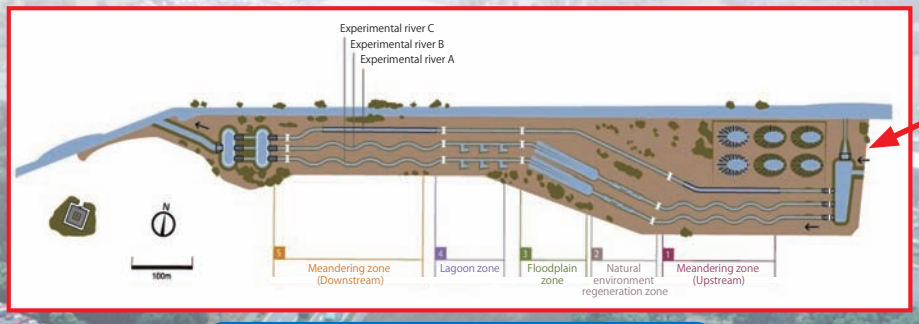
As a reply for requests made by JICA, foreign governments, and foreign research institutes, PWRI dispatches engineers to foreign countries, and disseminates technical knowledge and research outcomes of PWRI, depending on the need.
We, as a member of the investigation team, helped the restoration and reconstruction of the damage from the Nepal earthquake in April and May 2015. We also performed technical activities for earthquake reconstruction planning for the Nepal government and made a risk assessment for the sediment disasters such as landslides, as well as gave a technical advice to the Sindhupalchowk District.

Report and proposals to the Nepal National Planning Council Vice-Chair (far right)

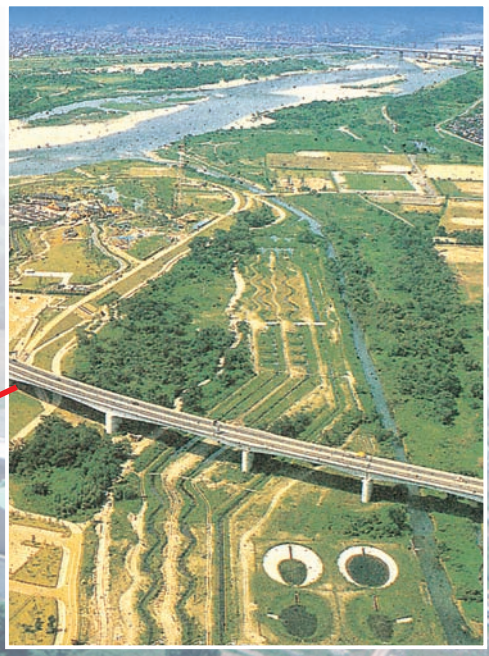


Tsukuba Central Research Institute
International Centre for Water Hazard and Risk Management
Center for Advanced Engineering Structural Assessment and Research
Innovative Materials Resources Research Center



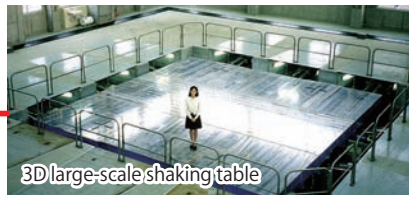


Aqua Restoration Research Center (Gifu)




Tunnel lining loading test


30 MN large-scale universal test machine

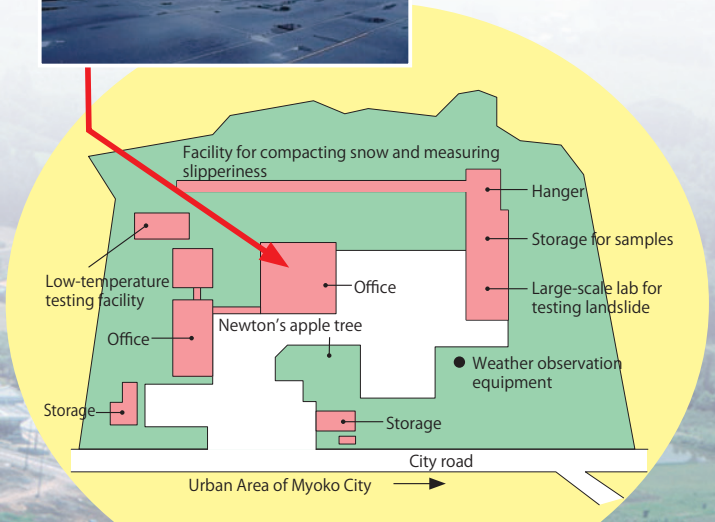

3D large-scale shaking table


Wheel running machine

E–9 River model test yard
PA building Observatory
Wave channels
E–14
Torrent channel mode test field E–10
E–6
E–12
River environment laboratory
G–5 Archive
E–4 River hydraulics laboratory
E–7 Coastal hydraulics laboratory
D–1
F–1 Test track
Full-scale test tunnel
F–8
Sanitary engineering and hydrology laboratory
Hydraulics laboratory
G–1
A–5
A–2–1
A–2–2
A–3
Wastewater treatment plant
Micropollutant analysis laboratory
Material and structural engineering laboratory complex
Structural dynamics laboratory
Storage for removed materials for clinical research
Construction material laboratory
Vibration laboratory
Earthquake engineering laboratory
D–3
D–6
D–8
D–2
D–5
D–4
D–7
Atmospheric diffusion laboratory
Structural aerodynamics laboratory
Structural engineering laboratory
Traffic sign laboratory
C–4 Traffic collision test field
C– Noise control laboratory
Construction machine test field
C–3 Strong motion earthquake observation station
Main research building
International Centre for Water Hazard and Risk Management
Mechanized construction laboratory
Foundation engineering laboratory
Earth structure laboratory
A–1
A–0
A–4
B–2
B–4
B–6
G–3
Dynamic geotechnical centrifuge laboratory
B–1
B–3
B–9
B–5
B–7
B–8
B–10
Annex (7F/8F)
Security gate
Front gate
Center for Advanced Engineering Structural Assessment and Research • Innovative Materials and Resources Research Center
Seepage laboratory
Landslide model test laboratory
Earth works laboratory
Geological engineering laboratory
Underwater environmental test pit
Construction environment laboratory

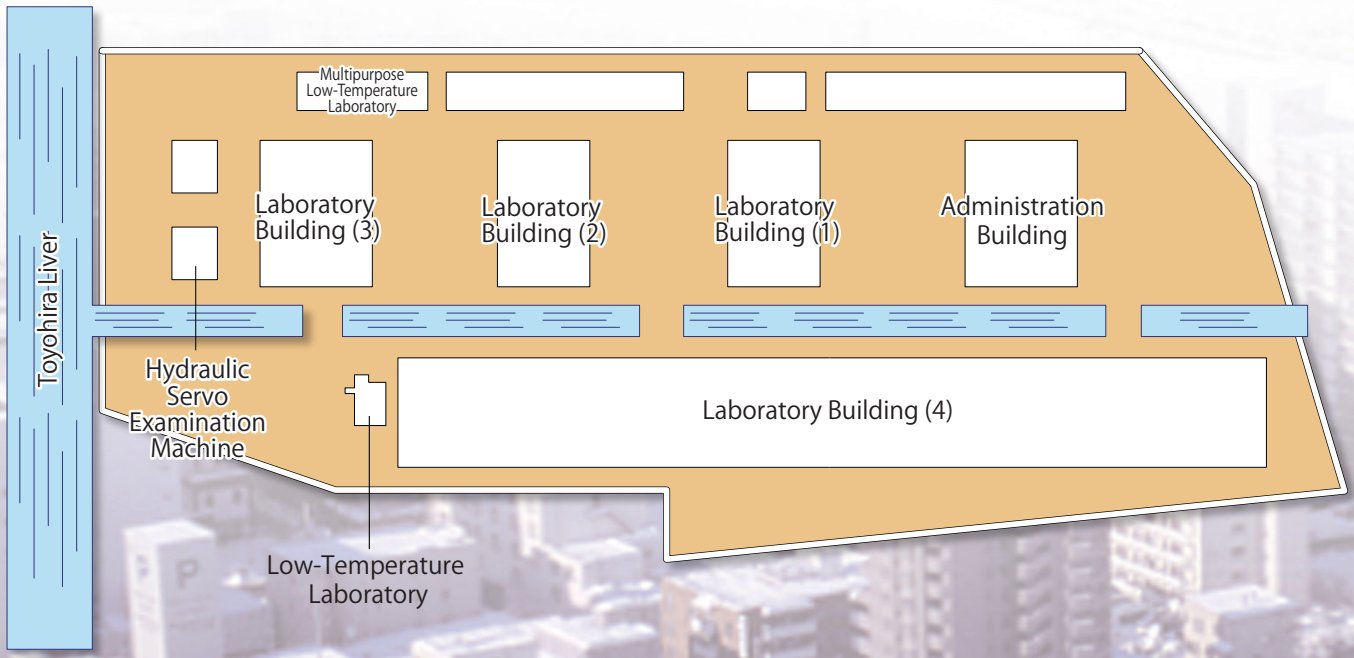

Earth structure laboratory


Large-scale Geotechnical Dynamic Centrifuge



Snow Avalanche and Landslide Research Center (Niigata)

Civil Engineering Research Institute for Cold Region



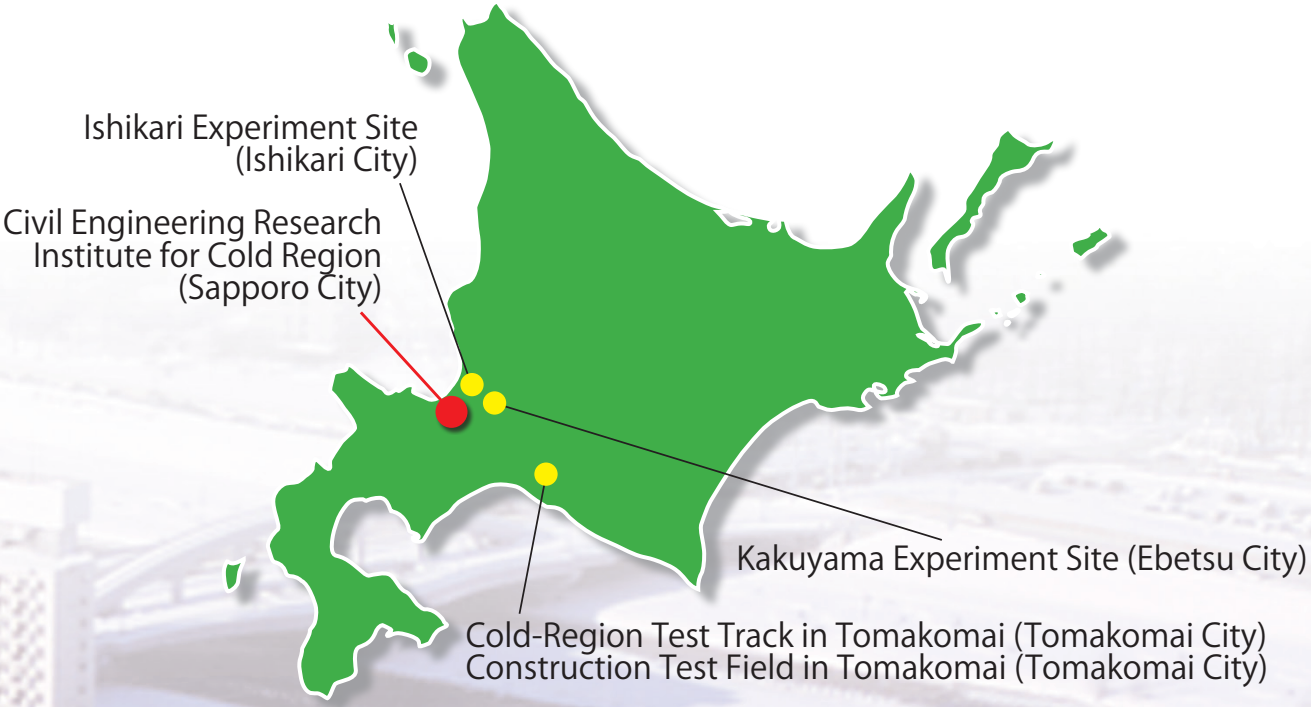
High-speed hydraulic channel

Irregular oscillatory water tunnel

Off-Site Facilities



Ishikari Experiment Site




Kakuyama Experiment Site


Cold-Region Test Track in Tomakomai


Construction Test Field in Tomakomai

Lease System of Facilities

PWRI leases test facilities and equipment in its possession to national institutions, local governments, universities, public-interest corporations and private research organizations as a rule. There are special civil engineering test machines that are expensive or difficult to maintain properly. Some of the lease-signers are from fields other than civil engineering.

Examples of lease

Civil engineering-related experimental research


Experiment using a wheel running machine


Channel to generate waves and reproduce the phenomena in 2D

Other experiments


Experiment using a 3D large-scale shaking table


Cold-Region Test Track in Tomakomai

Other facilities for lease

Tsukuba
30 MN large-scale universal testing machine
Earthquake engineering laboratory
Current meter calibration channel
Earth Structure Laboratory
Differential settlement
Earthwork experimental laboratory
Large-scale Geotechnical Dynamic Centrifuge
Dam hydraulics laboratory
Pavement test field
Large-scale box shear test apparatus

Civil Engineering Research Institute for Cold Region
Impact acceleration tester
Wind tunnel experimental apparatus
Ishikari hydraulic experimental station
Wheel tracking test machine
Ishikari blowing snow test field
Freeze-thaw testing machine
Raveling testing machine
Centrifuge

Other civil engineering facilities

■ Please check our homepage for application procedures, forms and regulations.

Check our homepage → Application → Receipt → Approval → Agreement → **Lease**

Open House

We organize open house for the general public to get to know more about our research. Research institutions, corporate officials, university students and vocational school students as well as the residents of the region who have no contact to our research visit our facilities so they can observe part of our activities. We also accept the facility tour if it is pre-registered.

Public Works Research Institute

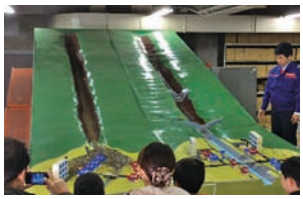
The research facilities of Tsukuba, Ibaraki Prefecture, has an open house during "Science and Technology Week (April)" and on the "Civil Engineering Day" (November) in collaboration with the National Institute for Land and Infrastructure Management.
We introduce civil engineering in recent years and the mechanism of disasters through hands-on events and demonstration/experiment.
We also introduce special vehicles used in the field in cooperation with Ministry of Land, Infrastructure and Transport Kanto Regional Development Bureau.
At open house in November, we hold the bridge making contest for elementally students with support from the city Board of Education cooperation. We display the bridges which elementally students create.


The works of the bridge contest



Exhibition of removed materials of the bridge


Experience of striking sound test of concrete


Introduce damage due to debris flow and its countermeasures

Civil Engineering Research Institute for Cold Region

CERI in Sapporo, Hokkaido has held open house every year in July since 1983 in conjunction with the "Land, Infrastructure, Transport and Tourism Day". The purpose of this event is to provide the general public including children with understanding and outreach of our institution' s role, research result and research themes that we are correctly working on.
Every year each team displays unique exhibition and visitors can enjoy and play with hand-on exhibits. We also have the section dedicated to the professional civil engineers.


Model experiment of snowstorm


Experience section to touch creatures of the sea


Test drive experience of the snow removal vehicles

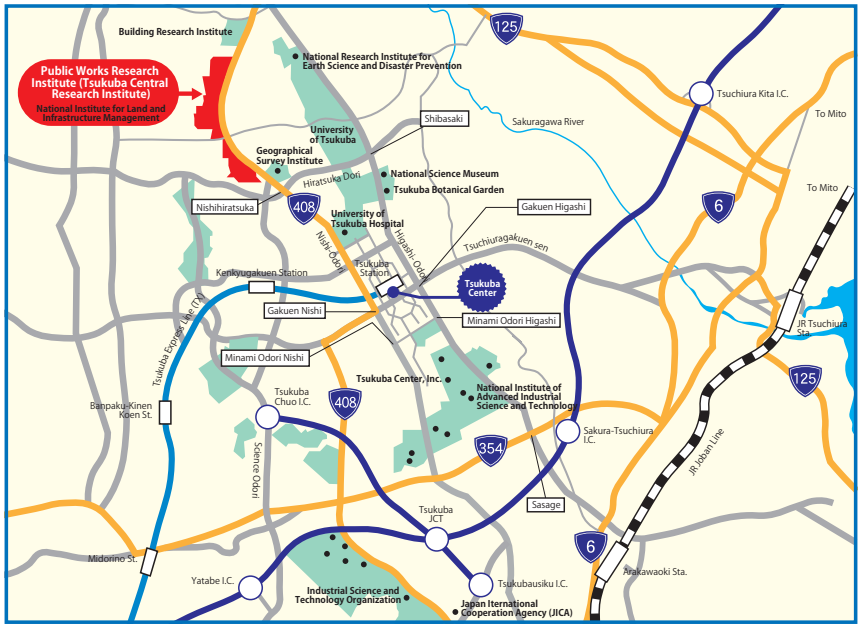

Facility tour quiz rally

Aqua Restoration Research Center

Aqua Restoration Research Center (Gifu Prefecture Kakamigahara) offers “guided tour” (pre-registration is required) in spring and autumn in order to promote research result of the conservation and restoration of the river environment and give technical guidance of river engineering. In this tour, based on the research results of the experiment, you can learn about the practical content related to multi-natural river such as the form of a river, the relationship between the water/sediment flow and living organisms, revetment block with consideration of landscape and the concept of environment and the band of engineering investigated.


Tour of the experimental river intended for engineers

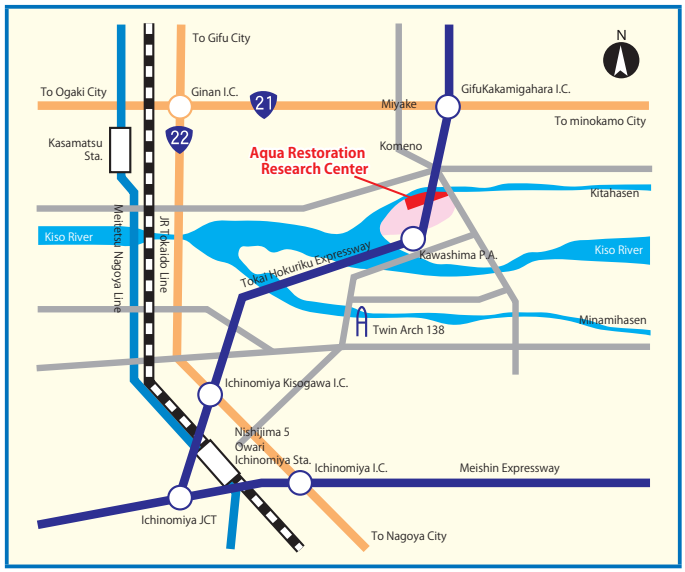
Map and Access to PWRI (Tsukuba) (ICHARM, CAESAR, iMaRRC)



Train	Akihabara Sta.	Tsukuba Express Line (about 50 minutes by semi-rapid)			Kenkyu-Gakuen Sta.	Tsuku-bus bound for Teragu (about 25minutes)
		Tsukuba Express Line (about 45 minutes by rapid) Tsukuba Sta.			Tsukuba Sta. (Tsukuba Center)	Kantetsu Bus, Gate No. 5 bound for Shimotsuma Sta. or Kenchiku Kenkyusho /Building Research Institute (about 25 minutes)
	Ueno Sta.	JR Joban Line (about 60 minutes)	Hitachinoushiku Sta.	Kantetsu Bus bound for University of Tsukuba (about 25 minutes)		
		JR Joban Line (about 60 minutes)	Arakawaoki Sta. (West Exit)	Kantetsu Bus bound for University of Tsukuba (about 25 minutes)		
		JR Joban Line (about 70 minutes)	Tsuchiura Sta. (West Exit Bus Terminal 2)	Kantetsu Bus bound for University of Tsukuba (about 25 minutes)		
Highway Bus	Tokyo Sta.	At Tokyo Station, go to bus gate No. 5 Yaesu South exit. Take Tokkyu (express) Tsukuba-Go bound for Tsukuba Center or University of Tsukuba (about 70 minutes).				Doboku Kenkyusho Mae (PWRI)
Car	Tokyo	Shuto Kosoku (Metropolitan Expressway)	Misato I.C.	Joban Expressway (about 30 minutes)	Yatabe I.C. or Sakura-Tsuchiura I.C.	Suitable route (about 20 minutes)

Public Works Research Institute (Tsukuba Central Research Institute) 1-6 Minamihara, Tsukuba-shi, Ibaraki-ken 305-8516 Phone: +81 29-879-6700

Aqua Restoration Research Center

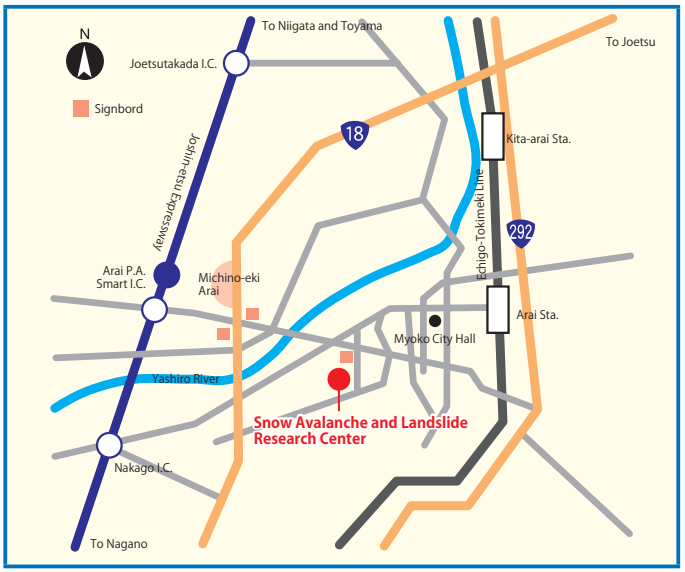


Kan-yuchi-mubanchi Kawashimakasada-machi, Kakamigahara-shi, Gifu-ken 501-6021
Phone: +81 586-89-6036

[Train]
Take the Meitetsu Nagoya Line either from Shin Nagoya Station or Shin Gifu Station. Get off at Kasamatsu Station. From the Kasamatsu Station, 10 minutes taxi ride (taxi is the only means of transportation).

[Car]
The ARRC is 10 minutes drive from Gifu Kakamigahara I.C. on the Tokai Hokuriku Expressway.
Use the west parking area of the Water Eco Park. The ARRC is also within walking distance from the Kawashima P.A. on the Tokai Hokuriku Expressway.

Snow Avalanche and Landslide Research Center

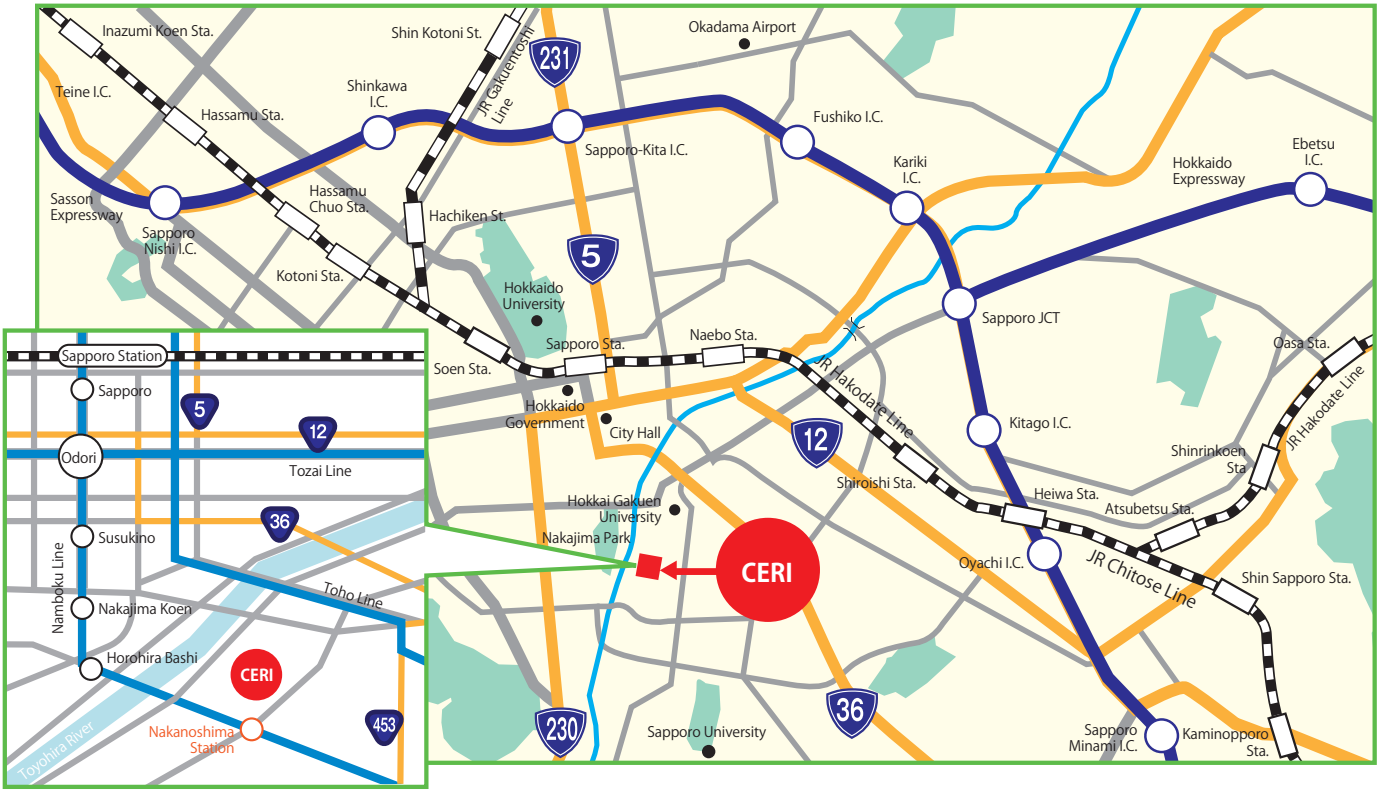


2-6-8 Nishiki-cho, Myoko-shi, Niigata-ken 944-0051
Phone: +81 255-72-4131

[Train]
- Hokuriku Shinkansen (Tokyo-JoetsuMyoko) About 2 hours
  Echigo-Tokimeki Line (JoetsuMyoko-Arai) About 10 minutes
  Total ..... About 2 hours and 10 minutes
- Niigata-Naoetsu-Arai ..... About 2 hours and 30 minutes

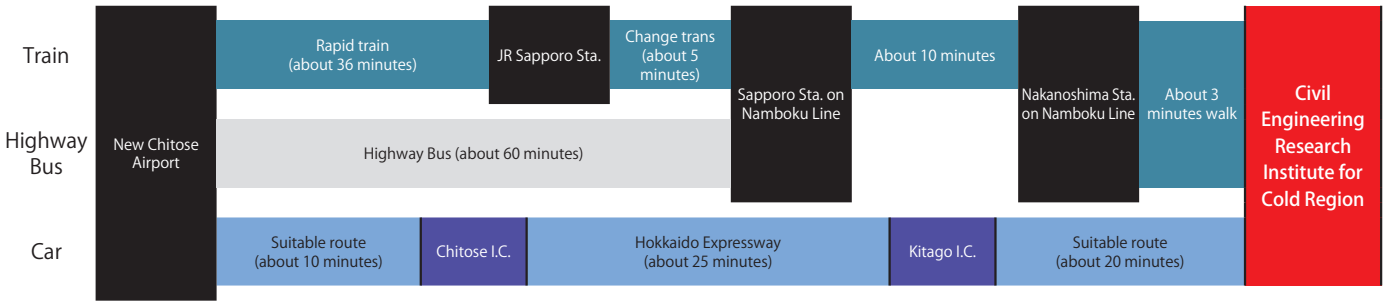
[Car]
- From Arai Smart I.C. on Joshin'etsu Expressway .. About 3 km 5 minutes
  From Nakago I.C. on Joshin'etsu Expressway ..... About 4 km 10 minutes
  From Arai Sta. ..... About 2 km 5 minutes

Access to Civil Engineering Research Institute for Cold Region



Access

CERI is located on the eastern side of the Toyohira River that goes through the center of Sapporo City, in an area called Hiragishi in Toyohira-ku. The institute is about 200 meters north of, or 3 minutes walk from, the Nakanoshima Station on the Namboku Line of the Sapporo City Subway System.



Civil Engineering Research Institute for Cold Region 3-1-34 Hiragishi Ichijo, Toyohira-ku, Sapporo-shi 062-8602 Phone: +81 11-841-1624

Public Works Research Institute

Tsukuba Central Research Institute
International Centre for Water Hazard and Risk Management
Center for Advanced Engineering Structural Assessment and Research
Innovative Material and Resource Research Center

1-6 Minamihara, Tsukuba-shi, Ibaraki-ken 305-8516
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http://www.pwri.go.jp/eindex.html
e-mail：www@pwri.go.jp

Civil Engineering Research Institute for Cold Region

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e-mail：info@ceri.go.jp

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