The 20th Anniversary since the Relocation to Nasushiobara
Technical Research Institute Generating Safety and Security

Our Technical Research Institute was relocated to Nasushiobara in Tochigi Prefecture in 1994. Since then, we have investigated and researched various challenges regarding civil engineering, building construction, and environmental construction work for over 20 years. Meanwhile, we have developed several technologies which expand our potential as a construction company. We will make further efforts toward the development of construction technologies for a safe and secured society.

Tsunehiro Sekimoto
Director of Technical Research Institute

April of last year marked 20 years since our technical research institute relocated from Higashi–oi in Tokyo to Nasushiobara in Tochigi Prefecture in April 1994. For these 20 years, we have addressed research and development of both construction and engineering technologies to grasp social needs and respond to the expectations of customers. We have developed a wide range of technologies in areas including disaster prevention, environment and recycling, maintenance and updating, and construction. Of these technologies, 44 were employed in actual construction works. Thus, we provide two or more new technologies to actual construction sites every year. We greatly appreciate your continuous understanding, warm support, and cooperation for our research and development activities. While aiming to play a leading role among technology based companies, Technical Research Institute will continue to make active efforts toward the development of technology which can support our life and contribute to our society.

Experiment Facility Introducing Advanced Technologies

Technical Research Institute consists of the research main building, hydraulic experiment building, multipurpose experiment building, and so on. Various research studies are conducted including wave movement, ground deformation, structural earthquake resistance, and environmental conservation. The following are some examples.

Underwater shaking table facility

This facility is available to investigate earthquake-induced damages to the infrastructures and architectural buildings by using experimental models in which various sensors are installed. These models are set on the shaking table provided on the center of the basin.

Completed in 1994, our facility contributed a lot to indentify the causes of port and harbor structures damage which was occurred during Hyogo - ken Nanbu Earthquake 1995.

Plane wave making water tank

This is a device that consists of a water tank with a length of 20 m, a width of 30 m, a height of 1.5, and 39 wave making plates. It produces waves in a water tank that has submarine topographic for observation of the effects on marine geographical features of the ports, beaches, and other places with presence of waves.

Researchers Who are Working Towards the Development of Next–Generation Technologies for Taking Measures Against Disasters or Environmental Conservation

Protecting Infrastructures from earthquake (or earthquake disaster)

Using numerical analysis for research on leading–edge soil improvement methods

Rasouli Rouzbeh
Researcher of Seismic & Structural Engineering Team

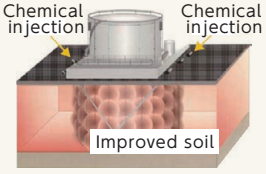
After graduation from Iranian University, I came to Japan as a post–graduate student to research geotechnical engineering.

By joining Penta–Ocean Institute of Technology, my research have been focused on "Permeation Grouting Method" which is an effective countermeasure against liquefaction, numerical analysis for seismic performance of port and harbor structures, and development of these technologies.

Similar to Japan, my hometown in Iran and the shores around the Caspian Sea are also located in earthquake–prone zone. We are going to make more efforts to develop our technologies to contribute in construction of earthquake resistance infrastructures and implementation of anti–liquefaction soil improvement technologies all over the world. Particularly, we address the cost reduction of port and harbor structures and increase of the quality of soil improvement works.

Permeation Grouting Method (PGM)

This technology is one of the countermeasures against liquefaction with grouting permanent chemicals into soils.



Mechanism of Infiltratio Solidification Processing Method

Using PGM, the liquefiable soils beneath the structures such as the gravity type quay walls and petroleum tanks could be improved without suspension of their operation. The PGM has been employed for anti–liquefaction soil improvement works at Tokyo International Airport etc.

Tsunami protection

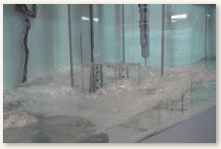
High precision simulations and experiments will lead to solid measures against tsunami

Takeshi Nishihata
Section Chief of Coast and Ocean Team

We study floods caused by tsunami and evacuation simulations with hydraulic model experiments and simulation technologies. We suggest comprehensive disaster prevention plans with both intangible and tangible aspects by predicting evacuation routes for people and cars, as well as designs of factual countermeasure works based on the results of hydraulic model experiments and infrastructure development.

Since the Great East Japan Earthquake, local governments and private companies are taking active initiatives for disaster prevention and reduction. To prevent the tsunami disaster, we would like to utilize study results for designs and construction works in order to contribute to the infrastructure development of a safe and secured society.

Hydraulic Model Experiments



An example case of tsunami hydraulic model experiments (measurement of tsunami wave pressure on buildings)

Tsunami waves are made in an experimental water tank with scale model structures of buildings and pipe lines to measure the wave pressure of tsunami on buildings and high waves which overflows from the openings of pipe lines. These experimental results are effectively utilized for tsunami resistant structural designs and as measures against floods.

Environmental protection

Contributing to a recycling–based society with recycled aggregate concrete

Yuichi Takahashi
Section Chief of Structural Material Team

I am specialized in building materials and in charge of the development of "Recycled aggregate concrete". As natural aggregates, which are elements of concrete, are reducing, we started to develop recycled aggregate concrete from recycled material in 2004, aiming at its practical use. Currently, we have established quality control technologies which can ensure quality equivalent to that of normal concrete and have been practically applied to posts and underground structural skeletons.

I make sure to be present at all of the sites where our concrete is employed and visually evaluate its quality. We will address further cost reduction and expansion of applications to promote its diffusion.

Recycled Aggregate Concrete

Recycled fine aggregates (left) and recycled coarse aggregates (right)

Concrete made of processed and collected rubble from concrete structures (recycled aggregates) instead of natural aggregates. We received general certifications by the Minister of Land, Infrastructure and Transport and Tourism for posts and underground structural skeletons in several plants. We have established stricter quality control methods than ever before, and are working together with a ready–mixed concrete plant and a recycled aggregate plant on quality control. We are focused on developing modestly–priced recycled aggregates so that customers can proactively use them,and achieving a same or lower price level than that of normal concretes.

Exploring biodiversity with a biotope created in the research institute

Noriko Kikuhara
Planning Team Assistant Manager

We conduct investigations and studies with dragonflies about the relationship between a biotope created at Technical Research Institute in 2006 and the surrounding natural environment. Findings obtained from investigations and studies will be utilized for nature restoration associated with construction works and development planning.

I took maternity and childcare leave in 2012. Although there are few female employees in this research institute, I was able to combine working and raising my child.

I started to work on environmental education activities for local children last year in addition to my studies. I would like to contribute to local environmental conservation through these activities.

Biotope

Flora and fauna living in the biotope in Technical Research Institute

A biotope in which various organisms live requires diverse environments such as forests, rice paddies, rivers, and marshes. As the biotope in Technical Research Institute provides a relay point for organisms living in a watery environment, biological information can be obtained.