

Creation of a Rich Environment

Basic Environmental Guidelines

1. We shall contribute to a recycling-oriented society and preserve the natural environment by taking measures to reduce global warming.
2. We shall prevent environmental accidents.
3. We shall enhance mutual communication with local communities and conduct eco-friendly planning and construction, while developing technologies to preserve and restore the environment.
4. We shall communicate with all our stakeholders to enhance their awareness of the importance of environmental preservation.

Environmental Initiatives

Our company is working on technology that enhances biodiversity (diversity of ecosystems, diversity of species, and diversity of genes) in order to help preserve a rich global environment. To create a future in which people and nature coexist, we are conducting research and development based on the technology and experience we have acquired through various construction projects.

Construction of Roads, Including the Tonomachi-Haneda Airport Route, an Urban Planning Road, in Kawasaki City

In this project, the Tokyo Metropolitan Government, Kawasaki City, and the Ministry of Land, Infrastructure, Transport and Tourism have joined hands to design and construct a new bridge over the Tama River to connect the vacant district of Haneda Airport and the Tonomachi district in Kawasaki City as infrastructure to support the establishment of footholds for the growth strategy centered around Haneda Airport.



Architectural rendering

<Outline of the project>

Project title	: Construction of roads, including the Tonomachi-Haneda Airport Route, an urban planning road, in Kawasaki City
Construction site	: Tono-machi, 3-chome, Kawasaki-ku, Kawasaki-shi and Hanedakuko 2-chome, Ota-ku, Tokyo
Construction period	: Jun. 23, 2017 to Mar. 31, 2021
Client	: Kawasaki City
Contractor	: Joint Venture of Penta-Ocean Construction, Hitachi Zosen Corporation, Fudo Tetra Corporation, Yokogawa Bridge Corporation, Honma Corporation, and Takadakiko
Details of the construction work	: Bridge length: 674 m Width: 17.3 m to 21.3 m Detailed design: 1 set Lower part construction •Abutment: 1 unit •Pier: 4 units Upper part construction •Two-span continuous bridge: L = 72.00 m •Three-span continuous bridge: L = 602.55 m Retaining wall construction: 1 set Dredging construction: 1 set

Care for the river-mouth tidal flat

- In this project, we will minimize the impact of construction work, such as the placement of piers, on the tidal flat, and restore the tidal flat after the dredging. Our company takes the initiative in regularly holding sessions involving experts, the client, and contractors, and implements measures for conserving the tidal flat according to the progress of the project.
- Following advice from experts, we design plans for conserving and recovering the tidal flat of the Tama River and for monitoring the environment, and we regularly survey the environment, including birds, benthic organisms, fish, water quality, and topography in the area surrounding the construction site.
- Environmental staff members lead environmental surveys and monitor the environment appropriately while considering the progress of the project and the site condition.
- In this project, we set up the “public relations hall” for local residents, showing the details of the construction work and environmental care.



Exhibitions at the public relations hall

Restoration Work After the Disaster Around the Coast of the Nakajima District in Miyagi Prefecture (Part 2)

At the time of the Great East Japan Earthquake, a tsunami with a height of over 20 m hit the Nakajima district in Motoyoshi-cho, Kesenuma-shi, Miyagi Prefecture, and went upstream on the Tsuya River about 4 km, inundating the upstream urban area. The shoreline receded 200 m, the ground was scoured away to a depth of 5 m, and five detached breakwaters were washed away. Through this work, we will dismantle the existing coastal levees, and then construct new ones (height + 14.7 m) around the mouth of the Tsuya River in the Nakajima district.



Progress of construction work (as of May 2018)

<Outline of the project>

Work title	: Prefectural Bond 311 in 2014; Earthquake Disaster 252-A02 Restoration work after the disaster around the coast of the Nakajima district (Part 2)
Construction site	: Coast in the Nakajima district of the Motoyoshi Coast and Nakajima, Motoyoshi-cho, Kesenuma-shi
Construction period	: Dec. 17, 2014 to Mar. 25, 2019
Client	: Miyagi Prefecture
Contractor	: Special Construction Joint Venture of Penta-Ocean Construction, Mirai Construction, and Tokura Corporation
Details of the construction work	: Length of the restoration site: L=1,351m Sloping dike: L = 800 m Embankment: V = 376,870 m ³ Slope pavement (2t block): A = 51,070 m ² River bank: L = 551 m Embankment: V = 287,200 m ³ Slope pavement (2t block): A = 35,896 m ² Training wall: L = 331 m Ground improvement (deep mixing): N = 7,474 Sluice pipe: N = 3 Bywalk: N = 567 m

We engage in construction work while caring for living organisms inhabiting the Nakajima coast and the Tsuya River.

- Since we will perform a large-scale improvement of the area from the coast to the riverbed, the client and experts discuss this project regularly, and the environmental decisions are reflected in the construction work.
- In the construction area, rare plants have been found, and so we design and implement plans for replanting them, with instructions from the experts. After the replanting, we will monitor their condition continuously.
- We give environmental education and explanatory programs about conservation to site staff and workers, so that every worker will be aware of conservation measures. In addition, we post our construction method and process, etc. for local residents.



Replanting of rare plants

Establishment of Water Purification Facilities and Monitoring Surveys

In Hyogo Prefecture, "water purification facilities" were established in Amagasaki Kitahori Canal in Amagasaki City to promote water purification in a unique way of combining biological purification technologies and citizen activities.

In April 2016, we started the "experiment of the revetments for coexistence with creatures in the canal area" along with the University of Tokushima. We perform monitoring surveys during "Open Canal Day," also providing an opportunity to learn about the environment. We introduced an experiment that demonstrates the effect of installing a fish evacuation place in the canal area, and explained the fact that some marketable species of fish, such as eels and marbled rockfish, live in the canal area. We also explained the importance of installing a place in the surface layer to evacuate from the bottom layer of the canal where there is low oxygen.



Group photograph on "Open Canal Day"

Winning the FY3/18 3Rs (Reduce, Reuse, and Recycle) Promotion Merit Awards

With the theme of "Reduction of the soil generated by land development and excavation work by reusing it for other construction projects," our project for a new Kansai Building of the National Diet Library (tentative name) won the MLIT Minister's Prize in the field of "businesses and local governments" from the 3Rs (Reduce, Reuse, and Recycle) Promotion Council. The office was awarded because it put the 3Rs into practice and made efforts to become a model for other organizations.



Awards ceremony

Recycling Business

Construction Sludge Recycling Business (Sendai Ecoland)

① Overview of the business

This business promptly processes inorganic sludge from construction work and drilling work (certain type of sludge which cannot be reused, such as cement-bentonite mixture, construction sludge having a high moisture ratio, etc.) into construction material (treated sand).

② Characteristics of the business

- Since construction sludge, which is industrial waste, goes through the granulation and solidification process without pretreatment (dewatering, drying, etc.), water pollution, noise, vibration, dust, etc. never occur, preventing any impact on the surrounding environment.
- Construction sludge having a high moisture ratio can be granulated and solidified in just a few minutes.



③ Use of recycled product (reconditioned sand)

Since the treated soil has sufficient strength with properties of high-quality sand and gravel, it can be used as civil engineering material.

Main construction projects that generate sludge

- Shield work, propulsion work • Basic construction work • Dredging work
- SMW, continuous wall construction • Soft ground excavation, etc.



Sludge treatment plant

Miki Composting Center

*This business is conducted by JAIWAT Co., Ltd. (our wholly owned consolidated subsidiary)

Food Waste Recycling Business (Miki Composting Center)

① Overview of the business

This business processes and sells compost materials made from organic waste discharged from food-related companies, etc.

② Characteristics of the business

- With the automatic agitator (scoop-type) and the forced air circulation (aeration), collected food waste is subject to primary fermentation for about 1 month, and then further fermentation and maturation for about 3 months to produce complete compost.
- Since the Miki Composting Center is located near the Hanshin district with concentration of many food-related companies and easily accessible from interchanges of the expressway, it can contribute to the reduction of waste transport costs.

③ Use of recycled product (compost "Minami-No-Hikari")

Made from recycled food waste, not only is this product nature-friendly and safe compost, it also is free from unpleasant odors because it is fermented and matured for a long time. It can be used for a variety of applications including full-scale agriculture, landscape gardening, greening, and private vegetable gardens.



Nagoya
Soil Recycling Center



Inside the facility



Panoramic view of the facility



Product "Minami-No-Hikari"

*This business is conducted by Miki Biotech Co., Ltd. (our wholly owned consolidated subsidiary)

Paper Sludge Incineration Ash Recycling Business (Sodegaura Ecoland)

① Overview of the business

This business manufactures a water-absorbing mud stabilization material "watoru" made from paper sludge incineration ash discharged from papermaking companies, and supplies it for construction.



Panoramic view of the facility

② Characteristics of the business

- The material is harmless and extremely safe, since it undergoes chemical treatment using special chemicals.
- This is a mud improving material with two characteristics: instant improvement effect and gradual strength development property.
- Includes three main components: calcium, silicon, and aluminum.
- Has high water absorbing and deodorizing properties.
- Reformed soil demonstrates eco-friendly, neutral to slightly alkaline pH levels. Unlike the case of cement treatment, it is not solidified.



"Watoru,"
a water-absorbing mud
recycled material

③ Use of recycled product ("Watoru," a mud stabilizing material)

This product is suitable for the treatment of dredged soil in ports, rivers, and lakes, as well as mud and sludge generated in the course of excavation work on land.

Example of using Watoru



Before treatment with Watoru



After treatment with Watoru

*This business is conducted by JAIWAT Co., Ltd. (our wholly owned consolidated subsidiary)

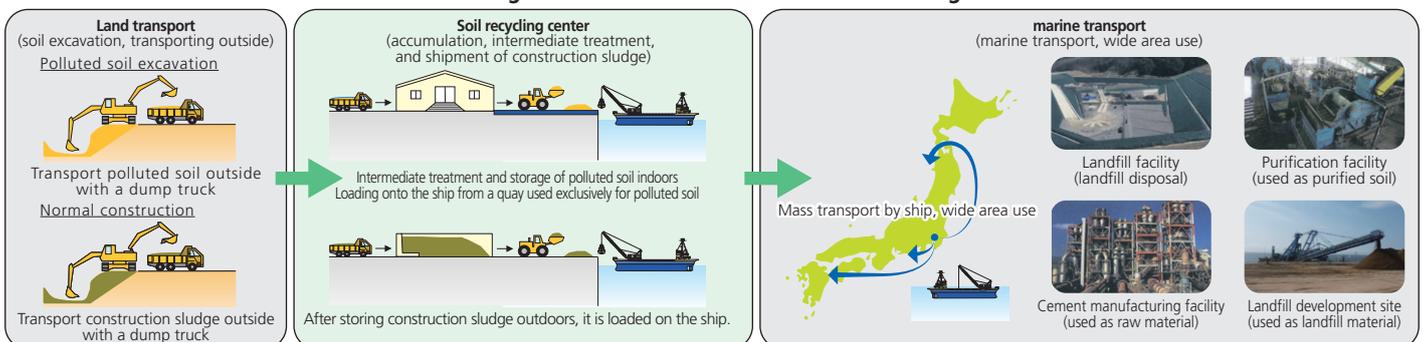
Construction Sludge Business for Wide Area Use

● Ichikawa Soil Recycling Center ● Yokohama Soil Recycling Center ● Nagoya Soil Recycling Center

① Overview of the business

This business operates Soil Recycling Centers (in Ichikawa, Yokohama, and Nagoya) that perform accumulation, intermediate treatment, and shipment of generated sludge to recycle construction sludge and contaminated soil generated in the Kanto and Chubu regions over wide areas.

Image of the wide area use of construction sludge



② Characteristics of the business

- Helps reduce the transport distance of trucks by making the most of our positional superiority in the Kanto and Chubu regions.
- Adopts a 24-hour acceptance system.
- Allows mass transport by a large ship using of the quay which can dock up to a 10,000t class ship.



Ichikawa Soil Recycling Center



Yokohama Soil Recycling Center



Nagoya Soil Recycling Center