

RESEARCH & DEVELOPMENT

From Yokohama Tsurumi to everywhere in Japan, to all the world, and to the future



Developing “Technologies with a Vision for the Future”

We believe that the mission of TOA CORPORATION is to respond to the needs of society, which change with the times, and contribute continuously and appropriately to society as a construction company. In order to promote contributions to society, TOA Research and Development Center truly shoulders the responsibility of being “the foundation of TOA’s technology.”

The demands made of a construction company will change due to dramatic shifts in the consciousness of the people and in society.

“Protect people’s livelihoods from natural disasters”
 “Reduce the burden on the environment, and live in harmony with nature”
 “Maintain and renew the facilities in service and utilize them for a

long time”
 To create a sustainable society, it is essential to respond to a wide variety of needs, including coexisting in harmony with nature, and prevention and reduction of damage from natural disasters, as well as safety and security. We are fully prepared to respond to those needs.

We will effectively activate the research and development capabilities, know-how, and skills we have accumulated from the past to today, and thoroughly grasp the ever-changing needs to determine the direction our research and development will take.

Going forward, in order to perfect “technologies with a vision for the future,” TOA Research and Development Center will continue its efforts in research and development of the technologies that will form the fundamentals of its those technologies.

Large-Scale Wave Flume, Small-Scale Wave Flume

The large-scale wave flume, equipped with a wave generator and current generator, is capable of generating various types of waves and flows. Furthermore, various types of tsunami having the desired wave profiles can be generated by using either the wave generator, the current generator, or a tsunami generator independently, as well as by coordinating the various systems together. This large-scale wave flume makes it possible to carry out large-scale experiments in about 1/20 scale. It

can be used in the development of technologies for port and harbor structures, marine and coastal structures, floating structures, ships, coastal erosion, tsunami disaster prevention works, and other structures. The small-scale wave flume, which is set up at the same premises, is used to conduct basic experiments and preliminary experiments in about 1/100 scale. The system is very easy to use, making it possible to conduct experiments speedily.



Tsunami generator

Deep Water Basin

This is a huge water basin, which is installed in the basement, with the capability of reproducing on a large scale various working conditions that are encountered underwater. In this water basin, it is possible to conduct various types of construction experiments underwater, and carry out work experiments using underwater construction robots or other equipment. Together we can observe the condition of the experiment from the 1st floor, and also from underwater through an observation window provided in the basement.



Large-Scale Soil Container

The large soil container makes it possible to conduct large-scale experiments similar to in-situ tests, controlling the experimental condition on model ground accurately. We can apply a pile load test to observe bearing capacity and pile friction. In addition, we can conduct pilot tests on soil improvement work by chemical grouting and cement mixing, etc.



Large-Scale Loading Test Equipment

This is the equipment for performing loading tests of full-scale structural members such as columns, slabs, beams, as well as the joints of beam-columns, etc. By utilizing a vertical jack in combination with a horizontal jack and/or a reaction frame, biaxial loading tests in the vertical and the horizontal directions can be performed.



Severe Environment Reproducing Chamber

This is the chamber for reproducing various environments with extremely high or low temperatures, extremely high or low humidity. It is possible to mix concrete and conduct various quality of tests of concrete, as well as to produce test specimens in the reproduced harsh environments, because of the spacious work area in the chamber. In addition, the durability test can be performed by exposing test specimens in harsh environments for an extended period. Therefore it is possible to conduct advanced researches and developments of materials and construction methods taking into consideration the local and harsh environment of the construction site such as freezing warehouses or foreign countries’ climate.



One-Dimensional Shaking Table Test Equipment

With this equipment, it is possible to conduct basic experiments in a gravitational field (1G gravitational field) related to liquefaction and deformation of foundation material and soil structure caused by seismic vibration. This equipment can be applied to the development of ground improvement methods and foundation materials. The specifications of this equipment give it the capability to reproduce the maximum acceleration (approx. 1.8G) similar to the acceleration in the harbor area during the 2011 off the Pacific coast of Tohoku Earthquake. One to its small size, a large number of experiments can be conducted in a short period of time.



Fatigue Testing Machine

This testing machine is equipped with vertically-oriented high-speed actuators. This is the machine for performing bending test and fatigue test of structural members under static or dynamic load condition. By setting a hydraulic jack separately in the horizontal direction, biaxial loading can be performed.



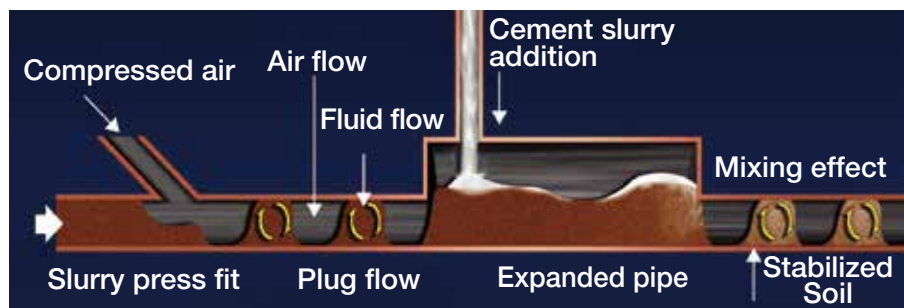
RESEARCH & DEVELOPMENT

TOA's Proprietary Technologies

Plug Magic Method

Since recently a securing disposal space for dredged soil becomes difficult in Japan, in order to utilize the soft dredged soils as a filling material for a reclamation project, TOA developed an advanced soil improvement method such as PLUG MAGIC Method, which is a type of the Pneumatic Flow Mixing Method classified in admixture stabilization techniques. Dredged soft clayey soil is mixed with injected cement slurry in the pneumatic pipeline by means of turbulent effect due to plug flow generated by compressed air during the transportation to the reclamation site without using mixer. This method has the advantages such as recycle of dredged soils and gain of relatively large strength in a short period without additional ground improvement work. Also this has the advantage over the conventional

method in large-scale and rapid construction so that the operating cost could be economical. The produced stabilized soil is used for not only filling material for land reclamation but also backfilling material behind of sea revetment for the purpose of reduction of earth pressure to attempt to minimize marine structures and countermeasures against liquefaction.



Decom

DECOM (Deep Cement Continuous Cement Deep Mixing System) is a one of cement deep mixing method, in which soft soil ground is stabilized in situ condition with binder. While cement type of binder premixed with water is injected to the ground, mixing blades of working vessel are rotated to mix the ground soil with the slurry to create stabilized soil column with required strength. DECOM has advantages such as availability of shortening construction period as a result of gain of the large strength in a short period for the improved ground admixed with binder, ensuring required strength of stabilized soil by means of binder type and its

amount depending on soil properties, and practically negligible compression and deformation of the stabilized body. DECOM has been applied to foundation ground of breakwater, sea revetment, pier and so on in order to prevent from slip failure, reduce settlement, and improve bearing capacity, while it has been applied for countermeasures against liquefaction. In addition, it is applied for environmental countermeasures such as treatment of contaminated ground and seepage shutoff for prevention against outflow of hazardous material.

