

MARINE CIVIL ENGINEERING

Operations

Since its foundation in 1908, TOA has engaged in reclamation and marine construction works through various projects all over the world. Among them are reclamation works for industrial areas and offshore airports; port and harbor facilities, such as wharves and breakwaters; transportation facilities, such as coastal roads and bridges; and recreational facilities, such as marinas. In order to complete those projects safely and successfully, TOA has developed various construction methods, working vessels, and equipment to overcome severe natural conditions on and under the sea. In addition, as lifecycle management of infrastructures, environmental sustainability, and protection from natural disasters are becoming of greater concern to society, TOA has developed new technologies for renewal and reinforcement of structures, environmental assessment and pollution control, sub-surface and sub-ground survey, disaster prevention, and so on.

With these work achievements, advanced technologies and accumulated expertise, TOA has earned a reputation for more than a century as a reliable contractor of maritime construction and engineering. TOA will make all possible efforts to improve technologies and cultivate human resources in order to respond to growing engineering requirements and emerging concerns, and strive for the prosperity of society and sustainability of the natural environment.

Chubu Centrair International Airport (Aichi)

Chubu Centrair International Airport, inaugurated on February 7, 2005, is a first class airport with a 3,500m runway. It is designed to be the main international gateway to the Chubu (central) region of Japan. In order to be 24-hour operational, the airport is located in Ise Bay, 1.1km offshore of Tokoname City, Aichi Prefecture, to prevent disturbing local communities with airplane noise.

Throughout the construction of the 470ha artificial island, which commenced in November 2001, "Plug Magic" and "COS-NET," two of TOA's advanced technologies, played

critical roles in building the 12km-long enclosing seawalls and reclaiming 56,000,000m³ of soil and earth in an economical, timely, safe, and environmentally-friendly manner. "Plug Magic" recycled the soft clayey material coming from dredging operations of navigational channels in Ise Bay into construction material suitable for reclamation, and saved 8,630,000m³ of soil from having to be transported from on-land sources in the vicinity. "COS-NET" was adopted by contractors involved in the projects as a common system to monitor and control working vessels, and ensure their smooth and safe navigation around the working area.



TOA's "Plug Magic" dredging method was adopted in order to maximize the recycling of dredged soft materials

Tokyo International Airport (Haneda Airport) (Tokyo)

Haneda Airport started in 1931 as a small nationally run airfield with a single 300-meter runway. Subsequent extensions were continuously carried out to keep pace with the continually increasing demand of the airport. To respond to this growth, Toa Corporation, too, moved forward with its state-of-the-art civil engineering technologies. A new artificial island was completed at the Haneda Airport site and put to use for the 4th runway (2,500 m).

The construction was carried out in cooperation with multiple construction companies under a variety of difficult conditions, including using a hybrid pier/reclamation construction, a structure rarely used anywhere in the world, short construction periods, and quick execution under restrictions by airlines.

Toa Corporation's technologies were applied to nearly every part of the construction of the artificial island, including improving the weak foundation soil and producing landfill material by hardening dredged soil. Furthermore, the

company dedicated itself to ensuring quality by grasping the ever-changing movements of the foundation in real-time through meticulous management of work execution that was reflected in subsequent processes.



Minami-Honmoku Container Terminal (Yokohama)

The Minami-Honmoku Pier is located at the Port of Yokohama, which is one of the ports in Keihin Port, a designated strategic international container port. With the aim of strengthening its international competitiveness, work is currently underway to make improvements to the facilities at the Minami-Honmoku Pier to transform it into an international container terminal capable of enabling large-scale container ships to come alongside the quay. Columns measuring 32 meters high with a diameter of 24.5 meters constructed of steel sheet structure cellular were employed in the work to construct the earthquake-resistant quay's foundation. The quay will, in the future, have a façade that is sunk to a depth of 20 meters. The project

was started in the 2007 fiscal year and is scheduled to be completed in the 2012 fiscal year. Work on MC-3 was completed in the

2015 fiscal year. At present, work is being carried out on MC-4.



MARINE CIVIL ENGINEERING

Operations

Sakhalin II LNG Project (Russia)

The Russian Government invited foreign investments to develop the natural gas and oil fields offshore of Sakhalin Island in the Russian Far East in the Sea of Okhotsk. For the Sakhalin II project, TOA was awarded contracts in 2003 to construct a LNG loading facility for the natural gas processing and liquefying plant, the foundations for the oil export terminal, and to provide ready-mixed concrete for the entire project.

TOA overcame various difficulties that hampered the smooth execution of the construction work, such as the severe weather conditions that prevented offshore work throughout the winter and oftentimes other seasons as well, the strict environmental regulations to protect fish, other marine creatures, and their habitats around the worksite, and completed the project in 2008 on schedule.



Provided by SEIC

Saigon Premier Container Terminal (Vietnam)

The Saigon Premier Container Terminal, located in the south part of Ho Chi Minh City, was constructed in the largest port in the city. This facility has a 500-meter wharf and a 23-ha container yard with a storage capacity of 16,000 TEU (20-foot equivalent container units), giving it the capability of handling containers totalling 930,000 TEU a year.

Making use of its many years of experience in construction work in the Mekong Delta region in southern Vietnam, TOA took part in the construction of this facility by undertaking measures to reinforce the soft ground in the delta region. TOA employed the cement deep mixing (CDM) method, a technology for ground improvement developed by TOA, earning high praise from the client.

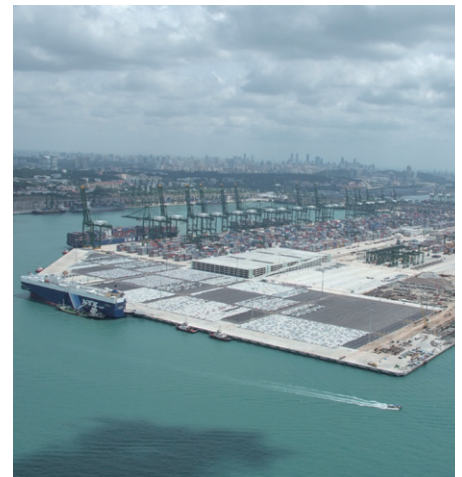
The construction of such port and harbor facilities is seen as being a part of the port and harbor development projects promoted by the government of Vietnam. It is anticipated that this facility will make it possible to increase the volume of containers handled in the southern part of Vietnam.



Pasir Panjang Container Terminal (Singapore)

The Port of Singapore, which is connected to 600 ports in 123 countries, is one of the largest container hub ports in the world. The Pasir Panjang Container Terminal, located in the southwest part of Singapore Island, will have a total of 26 berths at the completion of Phase I and II of the project. All container berths have been designed to have a depth of 15 meters and be equipped with gantry cranes capable of reaching out across 18 rows of containers, making it possible to accommodate Post-Panamax class container ships.

Since 2005, TOA Corporation has been awarded 6 separate contracts to construct 14 container berths with a total quay length of 4,330 meters and a carry ferry terminal. The last 4 berths, with a total quay length of 1,300 meters, were completed in October 2009.



Newly Completed Project

Construction Work to Relocate Tokushima Port Ferry Terminal (Tokushima)

Relocation of the terminal facilities for Ocean Tokyu Ferry, which connects Tokushima with Tokyo and Kita-Kyushu, has been completed on the opposite bank of the Shinmachigawa estuary.

By making it possible for large ships that had been unable to dock at the old terminal to enter the port, and also shortening the distance to the expressway interchange, it is anticipated that the completion of the new terminal will increase the quantity of distribution as well as optimize the transport function.



■ Client

Ocean Trans Co., Ltd.

■ Construction period

December 2014 to November 2015

■ Site of construction

Tokushima City, Tokushima Prefecture

■ Project outline

This project involved the construction of a ferry terminal, side rampway (vehicle ramp), and gangway (footbridge) in preparation for the relocation of the Tokushima Pier of the Ocean Tokyu Ferry.

The newly-built terminal building is a four-story steel-framed structure with a total floor space of 1,162.10m²

Construction and installation of the side rampway (vehicle ramp): steel structure, capable of handling 50t trailers, constructed using pile foundation construction method.

Construction Work on Tarakan Island Shipyard (Indonesia)

Construction work on the Tarakan Island Shipyard on Tarakan Island, North Kalimantan, Indonesia, has been completed. Construction work for this project was undertaken to build a shipyard with two slipways for barges and one slipway for tug boats, and also an unloading jetty and facilities to control the operation of the shipyard, where the maintenance and repair of barges and tug boats operated by local private business operators could be carried out.

TOA CORPORATION undertook all aspects of the project, from end to end, starting with the design of the structures, procurement of equipment and materials, all the way through to the construction of the structures and guidance regarding the operation of the facilities after construction was completed.



■ Client

PT. KAYAN MARINE SHIPYARD and PT. CIPTA UTAMA

■ Construction period

April 2012 to April 2015

■ Site of construction

Tarakan Island, North Kalimantan, Indonesia

■ Project outline

- (1) Slipways: two slipways for barges (DWT 4,000 tons and Weight 2,000 tons) and one slipway for tug boats (DWT 411 tons and Weight 400 tons)
- (2) Unloading jetty; and
- (3) Other facilities to control the operation of the shipyard