

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, Japan)



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, Japan)



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, Japan)



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 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 18 meters. Toa Corporation was involved in the project and successfully completed MC-3 phase and MC-4 phase (2007-2019).

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Manzanillo LNG Receiving Jetty (Mexico)

In June 2011, Toa Corporation completed work (design and execution) on the construction of an LNG Receiving Jetty, which was part of a construction project to build LNG Receiving and Supply Facility in Manzanillo, in the state of Colima, Mexico.

The client that placed the order for the construction was Terminal KMS de GNL, a Special Purpose Company (SPC) that was established for the purpose of

building, owning and operating this LNG project.

It comprises unloading platform of 30 meters in width, 45m in length and 15m in depth, four breasting dolphins and six mooring dolphins.

In addition to executing the work on its part of the project, Toa Corporation was also involved as an Engineering Procurement and Construction (EPC) Contractor of the LNG Receiving Jetty.



Jebel Ali Container Terminal in Design and Construction (United Arab Emirates)

A new container terminal has been completed in Dubai of United Arab Emirates in March 2015. For this construction project, an existing general cargo berth was redesigned and renovated as a state-of-the-art container terminal.

Jebel Ali Port is the largest marine terminal in the Middle East and also has the largest man-made harbor in the world. With the completion of the new container terminal, Port Jebel Ali has become able to handle 19 million TEU containers a year.

This project involves renovating the

existing 1,860-meter berth at the Jebel Ali Free Zone Area (JAFZA), which is located in the United Arab Emirates and operated by DP World. Improvements were made to the existing berth (the quay has a depth of 11 meters) by constructing a container berth (1,860 meters) with a depth of 18 meters.

The work calls for the design and construction of container terminal including a 75-ha container yard behind the berth, building and Mechanical, Electrical and Plumbing (MEP) works.



Construction Work on Phase III of Container Terminal at Pasir Panjang Terminal (Singapore)

Singapore is one of the largest container handlers in the world. And the volume is increasing day by day. In order to alleviate congestion at the terminal in Singapore, and as part of an effort to increase the volume of containers to be handled, fifteen new berths were built at Pasir Panjang Container Terminal,

without disrupting the operation of the terminal. Toa Corporation built 12 of the 15 berths that were built, as well as a container yard having an area of approximately 160 ha. On the west side of this terminal, TOA has also built 14 berths and a container yard covering an area of 140 ha, all of which are currently in operation.



Newly Completed Project

The Port Vila Lapetasi International Multi-Purpose Wharf Development Project

Construction work has been completed on the Port Vila Lapetasi International Multi-Purpose Wharf Development Project on Efate Island, where the capital city of the South Pacific nation of the Republic of Vanuatu is located. This nation is made up of an archipelago of more than 80 islands stretching north to south. Many of the islands are experiencing a growing number of tourists who come to enjoy natural surroundings untouched by humans, which contributes to the nation's economic growth.

In order to handle the recent rapid increase in the volume of cargo that has resulted from this growth, a development project to improve the facility to be an international multi-purpose wharf was carried out. In this project, a new quay, with a length of 200 meters and made to a depth of 12.3 meters below sea level to handle mainly container ships, was



constructed at a location 500 meters east of the current harbor, which had been shared by both cargo ships and cruise ships.

- **Client** Ministry of Infrastructure and Public Utilities, Republic of Vanuatu
- **Construction period** October 2015 to February 2019
- **Project outline** [Civil engineering work] Quay; dredging; reclamation; revetment; paving work [Building construction work] Administration building; electrical and machinery installation work; refrigerated facility; building for unloading cargo
- **Site of construction** Efate Island, Republic of Vanuatu

Project for Upgrade of Wharf for Domestic Transport

Construction work has been completed on the Project for Upgrade of Wharf for Domestic Transport in the Kingdom of Tonga. Nuku'alofa Port, where this project was carried out, had no wharfs dedicated to large domestic inter-island ships, so ships had to share berths with large international cargo ships, causing congested conditions. To resolve this problem, the construction work for this project was carried out through Grant Aid assistance from the Japanese government, with the aim of separating international and domestic cargo by turning a different wharf that had been used for small ships into a dedicated domestic wharf that was capable of also docking large ships, in addition to improving passenger and harbor safety. Furthermore, the new terminal building that was constructed through this project was designed to be environmentally friendly, with electric power being generated by solar panels mounted on the roof, and rain on the roof being collected in underground pits and reused for such purposes as flushing toilets.



Earthquakes frequently occur in the Kingdom of Tonga, and in consideration of tsunamis generated by earthquakes, the terminal building has been equipped to serve as a tsunami countermeasure by functioning as a wave dissipating seawall and an evacuation facility. The new wharf constructed as a part of this project has been named Taufa'ahau Tupou IV Domestic Wharf (after the current King's late father), and has become accepted as a new landmark of the Kingdom of Tonga.

- **Client** Ministry of Infrastructure and Tourism, Kingdom of Tonga
- **Construction period** December 2015 to May 2018
- **Project outline** Civil engineering and construction work on ferry terminal for domestic transport; breakwater; quay; dredging; terminal building; parking lot
- **Site of construction** Tongatapu Island, Kingdom of Tonga