

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

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

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. At present, work is being carried out on

MC-3, with plans calling for work to continue on MC-4.



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Sakhalin II LNG Project in the Russian Far East

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 Sakhalin Energy

Saigon Premier Container Terminal

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.

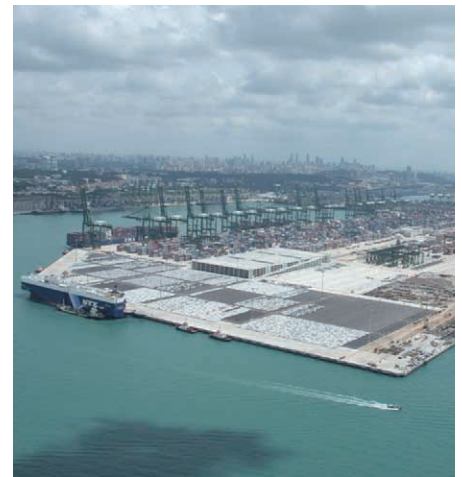
The construction of such port and harbor facilities is seen as being a part of the port and harbor development projects promoted by the government of Vietnam. It is anticipated that this facility will make it possible to increase the volume of containers handled in the southern part of Vietnam.



Pasir Panjang Container Terminal in 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.



Seisho Bypass Seisho Parking Area Embankment Permanent Restoration Work (Kanagawa Prefecture)

The “Seisho Parking Area Embankment Permanent Restoration Work” for the Seisho Bypass, which extends from Oiso-machi, Naka-gun in Kanagawa Prefecture to Odawara City, has been completed. As the sand under the embankment near the Seisho Parking Area had been washed away by the high waves caused by a typhoon, this project called for carrying out restoration work on the embankment by stacking wave dissipating blocks. At the request of the fishery cooperative, a portion of the wave dissipating blocks used in this construction project will be repurposed as a fish reef.

■ Client

Central Nippon Expressway Company Limited

■ Construction period

February 2013 to October 2014

■ Project outline

This construction work involved the permanent restoration of a collapsed portion of a stair-formed embankment at the Seisho Parking Area.



■ Construction details

- (1) Wave dissipation : Production and installation of wave dissipating blocks / 40-ton type; 485 blocks
- (2) Work on temporary pier : (H400 L=13m to 16m) 239 piles / 1,042 tons of steel material for structural support
- (3) Steel sheet pile work : Vibro-pile driver using water jet cutter for steel sheet pile (diameter of 900mm) / 87 piles (L =13m) (45 piles for precedent excavation)
- (4) Concrete work : 1,243m³ (concrete for shelter, cover, protection)
- (5) Road diversion work : 1set

■ Site of construction

Odawara City, Kanagawa Prefecture

Construction Work on the Jebel Ali Container Terminal(Design and Construction) (United Arab Emirates)

A new container terminal has been completed in the United Arab Emirates city of Dubai. 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.



■ Client

DP World

■ Construction period

June 2012 to March 2015

■ Project outline

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 will be 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 MEP works.

■ Main scope of works

Dredging	approx.2,400,000m ³
Quay wall	1,860m
Diaphragm wall	1,900m
RMG crane rail	17,500m
Pavement	715,000m ²
MEP	1 LS
Building (total floor area)	8,700m ²

■ Project site

Dubai in the United Arab Emirates