

Marine Civil Engineering

TOA was established at the beginning of 20th century and has been engaged in the development of coastal industrial zones, starting from Tokyo Bay Area. TOA has been contributing to the formation of infrastructure, consolidation of industrial foundation and many project completions for our rich, daily life in various local areas.

Among our completed results, it includes the land development for industrial zones, construction of advanced harbor related facilities such as piers, sea berth, container terminals and warehouses, and colossal building facilities that took long-term construction period. We also provided high level of technology for the construction of airports, artificial islands, bridges and facilities including coastal plants, marina and offshore amusement spots. In the background of these completion of large but quality based marine civil engineering projects, there is the requirement for "modernization" in Japan, and we are confident that we have our specific mission and technology to realize these social needs.

In every project, we always think of the importance of harmony between man and nature. Therefore, we initially investigate and study the topography, soil conditions, water and marine sources of the site thoroughly. We then consider the human factors including culture and industries before we engage in our projects. This results in solid reputation not only in the local societies and industries, but from local inhabitants too.

Future projects for marine civil engineering forecast that they require higher level of technology, more remarkable equipments, richer experience and environmental friendly human nature.

Completion of the Central Japan International Airport (centrair)

The CENTRAL JAPAN INTERNATIONAL AIRPORT is a full-fledged offshore airport with a 3,500m runway. Since it began its services from February 17, 2005, the airport has been operating 24 hours a day, and special consideration has been given to its facilities, systems and operations.

A 470-hectare airport site was reclaimed using 56,000,000m³ of earth and sand, of which 8,630,000m³ of those soil were provided by effectively utilized recycled materials dredged in the Nagoya Port executed by TOA. Our dredging technologies were applied to the reclamation works that contributed to shorten the construction period. The remaining 4,500,000m³ soils came from mountains, and were transported to the site from other areas.

The revetment with a circumference of 12km surrounds the area. The minimum distance between the revetment and the opposite shore is at least 1.1km, and the island was curbed to prevent eddy currents. These measures will help to ensure that any potential impact on the tidal stream from this project is minimized.



TOA's dredging method "Plug Magic" (see page 12 for detail) was adopted in order to maximize the recycle of dredged soft soil.



Kansai International Airport 2nd Stage



(Photo : KALD)



In this project, a new 545-hectare airport island is being built 200m off the existing island to construct a second 4,000m runway, apron and taxiway. The island needs 250,000,000m³ of earth and sand as it is deep as 19.5m on average at site. The revetment work that began in July 1999 was completed in November 2001, and the reclamation work is now proceeding. When preparing the ground for an airport, it is important to build a firm foundation free from any ground subsidence. In order to ensure the construction of a firm foundation, TOA is utilizing various technologies and techniques for this reclamation work. One of the good examples is the use of GPS to ensure the accurate positioning and the height of reclaimed land.

Completion of Container Terminal in Osaka Bay

The YUMESHIMA CONTAINER TERMINAL was planned to upgrade the container berth consisting three submerged type berths of -15m in order to accommodate post panamax and those increasing container transportation that plays a major role in international logistics. The 350m long wharf consists of steel pipe pile foundations driven into the front area of the caisson revetments and the jetty superstructure.

We conducted extensive studies of concrete cold joints and methods to control cracking after pouring concrete over a large area for the superstructure of wharf and achieved greater results than expected in quality assurance and safety control. Learning

from the destruction hit on port facilities in the Great Hanshin Earthquake, we designed the wharf to be available for emergency purposes, giving it a -15m and providing it with functions for an earthquake proof structure. As a sole contractor for this project, we were able to make extensive use of our marine engineering technologies and experiences.

The Yumeshima and Maishima linking bridge for floating portion (878m and 410m long, respectively) has attracted the attention for becoming the world's first floating type bridge. When post panamax is navigating, the floating portion of this bridge revolves with a pivot placed adjacent to Maishima.

Construction works of a submerged tunnel for roads and rails, which connects the Yumeshima Island and downtown Osaka to ensure smooth transportation of goods, have been completed. Other than offshore civil works, we have completed the administration building, maintenance shop building for the repair of various port facilities and support of container handlings, and the gatehouse building used for entry and exit of trailers. These facilities are the core of this Yumeshima Container Terminal C-11, which is one of the largest physical distribution site at Osaka Port.



Construction of Infrastructure in Cebu City, Philippines



The Company has been engaged in integrated waterfront development in many Asian countries and gained itself an utmost reputation. TOA is currently consolidating various infrastructures in the re-climatized land of Cebu City. The city has faced urgent construction projects of roads, urban infrastructural facilities to supply gas, electricity and water, and treatment facilities of sewage and waste. The Company completed and delivered newly constructed road and sewage treatment facilities during the year under review. This was a project to construct the road on the sea of the south bay in Cebu City. The road, extending 4,300m on the sea, was constructed by embanking the sea that required improvement of the foundation. The project was completed by TOA's advanced technology of marine civil engineering such as Paper Drain. The project also included the construction of the road extending 800m on the land.



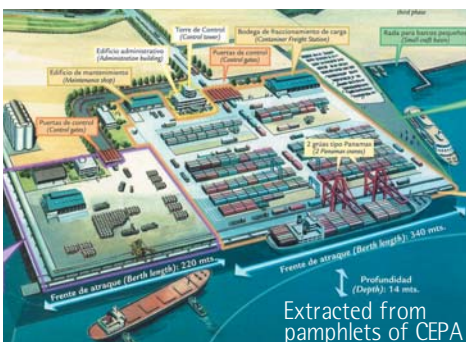
Semakau Island Offshore Landfill Project, Singapore

TOA completed and delivered the Semakau Island offshore landfill project to the Ministry of Environment in Singapore. Located between Semakau Island and Sekang Island, some 10km south of Singapore Mainland, this large sized waste-receiving island constituted a major construction project.

The project included the embankment construction with 7km in circumference, land formation for facility administration offices, construction of an ash-unloading jetty, and construction of the administration building. This involved 20 million m³ of reclamation work, 6 million m³ of dredging, 2 million m³ of stone riprap work and jetty extension of 580m.



New Order Received from El Salvador



Ever since our first project in Argentina in 1989, we have been continuously working in the American regions, including the countries of the Caribbean islands. Based on Japan's official development assistance program, we have mainly been involved in the development of fishery relating facilities and have made great contribution to the local residents.

In the year 2005, TOA was awarded the contract for the construction of a new multi-purpose terminal in La Union, El Salvador. Local labor and organizations have been utilized to great effect on the project and will enhance the local community by bringing them directly into the project from its inception through to completion. This contract has become the largest project

funded in this region by the Japanese Government and has also become a great challenge for us.



New Clifford Pier and Ferry Terminal to be Completed in Singapore

Singapore is a highly advanced nation contributing to the world industry, and the Singapore government has strengthened to consolidate various infrastructures. With a well-planned strategy, TOA Corporation has received and completed many projects including the construction of offshore facilities, roads and land through dredging and reclamation, and both public and private buildings. From Housing Development Board of Singapore, the Company received the proposal of new erection of 2-storey ferry terminal with roof garden at Marina Coastal Drive on Lot 14 (Part), Ts 30 in April 2004. The project scheduled to be completed in November 2005 includes the construction of ferry terminal, two piers, breakwater and road consolidation. These harbor facilities will contribute to the expansion of multiple industries in Singapore.



Newly Completed Projects

Naha Submerged Tunnel

Okinawa Prefecture is located in the southern part of Japan. It is the gate to East Asia including Mainland China where its economy is extremely expanding recently. Thus, Okinawa is rapidly increasing its economical aspect and has consolidated its infrastructure. In connection with this, the Naha Submerged Tunnel is constructed as one of the integrated road consolidation project between Naha Airport and Naha Harbor.

The tunnel is constructed with eight hybrid caissons of full-sandwiched structure that is independently constructed on-land and conjugated under the sea. This submerged tunnel construction method has reduced the operation cost compared to the conventional methods including the shield tunnel construction method. The most important procedure in this method is to drive a specific concrete stably to the submerged caisson. To achieve this goal, TOA has developed its own quality control system called ORCA. NET.



Hibikinada Container Terminal

TOA has been engaged in marine construction for many years and have gained high reputation amongst both domestic and global clients. Other than offshore civil works, we have completed various types of harbor related facilities as an integrated part of the construction.

The Hibikinada Container Terminal Project in Kitakyushu City, Japan commenced in February 2004 for the construction of container facilities including building construction works of the control building, maintenance building, gate house, marine house, and other relating facilities. After its completion in February 2005, it became Japan's first container terminal operated by a private company.

