

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)

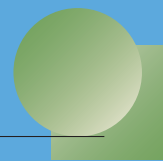
The CENTRAL JAPAN INTERNATIONAL AIRPORT is a full-fledged offshore airport with a 3,500m runway. Since it began its services from February 17, 2005, the airport has been operating 24 hours a day, and special consideration has been given to its facilities, systems and operations.

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. 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.

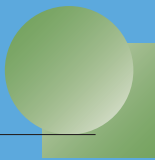
The project included the embankment construction with 7km in circumference, land formation for facility administration offices, construction of an ash-unloading jetty, and construction of the administration building. This involved 20 million m³ of reclamation work, 6 million m³ of dredging, 2 million m³ of stone riprap work and jetty extension of 580m. As a mitigation of land development, we have been engaged in mangrove plantation projects including the one with the area of 13 hectares in Singapore. This was carried out from sowing seeds to final planting of mangrove between 1996 and 1997.



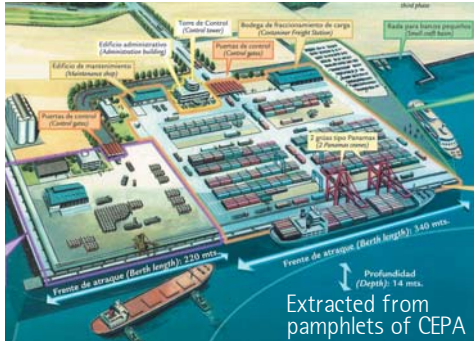
Map Ta Phut Power Plant in Thailand



A coal unloading jetty has been completed by TOA Corporation for the 1,400MW Map Ta Phut Power Plant in Thailand in September 2005 while the entire project itself is scheduled to be completed in 2006.



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.



Newly Completed Projects

Marina Coastal Drive in Singapore

The Marina South Pier, which is also known as New Clifford Pier, was completed in November 2005. The district is also planning to construct financial center, marina barrage, integrated resort facilities, a waterfront park and a Ferris wheel. Located in the Marina South District at the southern tip of Singapore, the project works included the construction of a two storey ferry terminal with rooftop garden, road works, two floating jetties, ten landing steps and a breakwater.



Yumeshima Tunnel in Osaka Harbor

The Yumeshima submerged tunnel is constructed between Yumeshima and Sakishima districts; the key places for the Technoport Osaka Project that consolidates a new metropolitan area for the 21st century. The tunnel, which completed in November 2005, extends 2,100 meters long with roads and rails. The submerged portion of the tunnel was constructed by the submerged tunnel method with caissons, while the on-land approach portion was constructed by excavating land. Toa Corporation was engaged in the construction of the on-land approach portion and placing of caissons.

