

Reclamation of Jurong Island Phase 3B, Singapore



ADAPTING TO A NEW BUSINESS ENVIRONMENT

During fiscal 1999, Penta-Ocean continued to consolidate its organization in order to strengthen its group structure, improve efficiency and enhance its position in the construction industry in Japan and abroad. Owing to these efforts, the Group moved steadily in a positive direction as conflicting reports on the state of the economy continued to raise and then dampen hopes for a recovery throughout the year. Against this backdrop, Penta-Ocean endeavored to increase profit margins on domestic construction projects by making full use of its Value Engineering Method. It also strove to enhance performance through reductions in personnel costs and other general administrative expenses in overseas large-scale land fill projects by utilizing the Queen of Penta-Ocean, a self-propelling trailing suction-hopper dredger. The vessel was delivered to the Company during the previous term, and was used for the first time in reclamation work in Singapore, during the term under review. In only one year the Queen of Penta-Ocean has demonstra-

ted superior performance and significant cost saving on this very-large-scale project. The vessel was instrumental in the completion of the Jurong Island Landfill Phase II and Tuas Landfill projects for Jurong Town Corporation. These two works are part of a series of large-scale island formation projects that will link seven naturally existing islands by landfill. The newly created Jurong island encompasses 3,000 hectares and will be used for Singapore's extensive petrochemical operations. Phase II of the Jurong and Tuas landfill projects were completed during the term under review, with Phase III reclamation work currently under way.

The Group's reputation for excellence in the execution of both civil and architectural engineering projects has gained it recognition worldwide and contributed substantially to a steady increase in sales and new orders.

In Singapore, the Post Centre complex reached completion during the term under review. This ultramodern facility houses a theater and various commercial establishments, in addition to being the district's main postal hub. The complex has already

Singapore Post Centre, Singapore

contributed to accelerated development of the surrounding area and is expected to be a center for further transportation infrastructure development in the future.

Construction work on the Esplanade Theatre on the Bay at Marina Square progressed smoothly during the term with completion expected in the current term. This breathtaking structure will house a 2,000 seat theater, a concert hall and various commercial establishments.

EXTENDING OUR GLOBAL REACH

In fiscal 1999, Penta-Ocean continued work on various social infrastructure projects around the world, including the design and construction of sewerage tunnels for Singapore's Deep Tunnel Sewerage System, Contract No. T-02. The order amounted to ¥6,000 million (US\$56 million) and will encompass both design and con-



Isuzu Motors production facility, Poland

Hong Kong University of Science & Technology, Hong Kong



struction phases of the project for Singapore's Ministry of the Environment. The portion of the system that Penta-Ocean will complete measures 7.7 km long and 35 to 40 meters deep, with an inside diameter of six meters. The Company's sealed tunnel excavating machine will be used to complete the project.

In June 2000, a Japan-Europe joint-venture consortium headed by Penta-Ocean succeeded in receiving an order for the world's largest landfill project from the Government of Singapore. This extremely large-scale project will encompass 1,464 hectares of reclamation work equivalent to approximately 2.2% of Singapore's entire land mass, at a cost of ¥220,000 million (US\$2,072 million). This project is widely viewed as the first mega-project of the 21st century.

Hong Kong is also a market exhibiting enormous growth potential for the Group. Penta-Ocean has a firmly established rep-

utation as a world-class comprehensive construction company with an outstanding list of accomplishments in Hong Kong. Some of these include the Central Wan Chai reclamation project, Hong Kong's new Chek Lap Kok Airport, the beautiful Gateway and Titus Square office buildings, the Ever Gain Plaza, and the spectacular Sai Wong Hoo residential high-rise building. Penta-Ocean also offers a wide range of services supporting its civil and architectural engineering projects.

Orders received during the term in Hong Kong included the construction of the Tsuen Wan Station and approach tunnel sections of the West Rail Phase II Project of the Kowloon-Canton Railway Corporation (KCRC). This order amounted to HK\$1,778 million or ¥26,000 million (US\$244 million) and at 30.5 km in length, constitutes one of the largest railway projects Penta-Ocean has undertaken. The Tsuen Wan Station is also the largest facility on this line, and involves the construction of a 300-meter tunnel at each



Hong Kong Academy of Medicine headquarters, Hong Kong

Meteorological
Education Center of
Tokyo University,
Tokyo

end of the station. Due to the station's proximity to the ocean, Penta-Ocean will draw upon its construction expertise and technological prowess in the areas of marine construction and reclamation technology in order to complete the project.

In February 2000, The Group received an order for the construction of a new intensive care unit at Caritas Medical Centre, from the Hospital Authority of Hong Kong's special administrative government. The ward will expand the Centre's emergency treatment facilities and will consist of a 14-story building with a total floor area of 30,940 m², 679 beds, 21 clinic rooms, 7 operating rooms, a CT scanner and other diagnostic facilities.

**ENHANCING OUR REPUTATION AS
A COMPREHENSIVE CONSTRUCTION COMPANY IN JAPAN**

In recent years, Penta-Ocean has enhanced its overseas reputation as a leading marine constructor by building an equal reputation in Japan as a leading architectural engineering firm and developer of cutting-edge construction related technology. During the term under review, the Group comple-

ted construction of piers for a new runway at Iwakuni Airport for the Hiroshima Regional Defense Facilities Administration Bureau, and the Shokawa Interchange on the Tokai Hokuriku Highway for the Japan Highway Public Corporation. It also completed work on the Form Senri Chuo condominium for Recruit Cosmos Co., Ltd., and construction of the Musashino Research and Development Center for Nippon Telegraph and Telephone Co., Ltd.

The Form Senri Chuo Condominium Project is unique in that it represents the first time in Japan that an obsolete housing complex has been completely replaced and then sold back to the original owners at a fixed rate. All of the 150 owners agreed to the project, which included the construction of three, 14-story buildings, each with a basement level. Penta-Ocean employed a highly efficient construction method and was able to complete the project ahead of schedule.

During the term, the Group received orders for the construction of school buildings, including the Meteorological Education Center, located in Mitaka, Tokyo. The Center is a branch of Tokyo University's

Tsurumi Girls High
School attached to
Hosei University,
Yokohama



Kansai International
Airport reclamation
work Phase II, Osaka



Department of Science. The 3-dimensional curves of this uniquely designed building were employed to create the artistic effect of a flying saucer rising out of a forest.

Other orders received included the construction of 4-story reinforced concrete buildings for Tsurumi Girls High School in Yokohama, which is part of Hosei University, and facilities for a junior high school in Minato, Tokyo. The school is attached to Keio University. Penta-Ocean also received an order for construction of an annex building for the Hong Kong Science and Technology College in Hong Kong.

In June, 2000, the Group received an order for a high-rise building construction project in Hiroshima. The 43-story structure will stand at the center of the downtown area and will be the tallest building in western Japan. The intelligent building will

Shokawa Interchange
of Tokai Hokuriku
Expressway, Gifu



be equipped with a full range of high technology features, including optical fiber networks on every floor, and see-through elevators on the outside of this landmark tower. Construction has already begun, with completion expected in 2003.

Penta-Ocean completed a number of civil engineering projects during the term, including the Shokawa Interchange on the 185 km long Tokai Hokuriku Highway connecting the Meishin and Hokuriku highways. The Shokawa Interchange is located at Shokawa, and was designed especially to blend in with the rich natural landscape of Gifu prefecture.

In August, 2000, Phase II of the Kansai International Airport Project began with the building of a second runway. Preparations for construction of the 4,000-meter runway include the reclamation of 42 hectares of new land to enlarge the artificial island. Penta-Ocean will be responsible for pier construction at the south westernmost edge of the island and this will entail the implant-

ing of 130,000 side drain tubes and the piling of approximately 8,000,000 m³ of landfill sand and about 1,000,000 m³ of base gravel. The Group is also involved in large-scale airport construction projects in Iwakuni, Osaka and Oshima and all of these are expected to reach completion during the current term.

UTILIZING ADVANCED TECHNOLOGY TO MEET NEW CHALLENGES

Presently, the spread of cities and the growth of regional towns and transportation hubs is accelerating at a rapid pace. Due to the fact that most urban areas are located in Japan's lower lying coastal areas, flooding, water supply and sewage control are important issues being dealt with by municipal authorities and the construction industry as a whole. Owing to its formidable expertise in marine construction and development of construction materials, methods and systems for

Control tower of
Osaka Airport,
Osaka





▶ Hitachi recycling and disposal center, Ibaraki



▶ Shin-Sakuraen nursing home, Kitakyushu



dealing with the problems related to marine environments, Penta-Ocean continues to receive many orders for construction and development projects in these types of areas.

One such project is the Eitai Trunk Line in Tokyo's Koto Ward, presently nearing completion: Tokyo's Water Bureau has designated this project as a model for reducing construction costs. The "tenoned" RC segment method adopted in this project was first introduced to Japan from Europe. Tunnel pipeline segments are equally divided into six tenons and are embedded to accommodate future robotization and automation of the system. This project gave Penta-Ocean an excellent opportunity to gain valuable technological experience in this area.

The Metropolitan External Floodway Discharge Tube Project will involve the construction of a 6.3 km underground river channel to divert flood waters away from populated areas. The Naka and Ayase rivers are representative of urban rivers flowing from the northern Kanto district into Tokyo Bay. As Tokyo's boundaries have expanded, these flood plain areas have been covered with streets and build-

ings and residential districts and the new system is expected to improve ground water conditions in these areas. Penta-Ocean is employing a special method utilizing RC box culverts to complete this very-large scale project.

TECHNOLOGY DEVELOPMENT

Penta-Ocean maintains one of the world's largest and most advanced privately funded technology development centers among construction companies. For over a century, it has led the industry in the development of innovative solutions to the myriad of problems confronting civil and architectural engineering projects around the world. During the term under review, the Group allotted ¥2,334 million (US\$21.9 million) for research and development programs in order to develop new construction materials, methods and systems that meet increasingly complex requirements in various construction environments. These advances are also making it possible to shorten construction time and increase profitability.

Penta-Ocean also participates in joint

research schemes with public sector organizations, universities and private companies to develop environmentally sound construction and recycling systems. Drawing on its extensive experience in marine construction, the Group has developed a method for creating artificial shorelines and transplanting eel grass and other local vegetation to these areas to protect fishing grounds from disturbance by land filling and other types of development. It has also developed systems for purifying streams and rivers.

Penta-Ocean has always supported efforts to protect and rebuild the natural environment and has developed a method to reestablish tidal pools along coastlines: It has set up "bi-top" experimental fields at the Institute of Technological Development, in Nasu. As a proponent of guided resource allocation and conservation, Penta-Ocean continues to promote the development of wind-power generation facilities

in coastal and mountainous areas. The Group continues to become increasingly involved in construction projects related to the development and management of both established and alternative forms of energy.

In the term under review, Penta-Ocean became more involved in the development of co-generation systems, through its subsidiary network. Co-generation systems are used in factories, hospitals, shopping centers, and many other kinds of facilities to increase efficiency and thus, lessen the burden on the environment. The Group began marketing a new heart-type ventilation system, which is designed to create a more healthful interior environment, and a new type of eco-friendly wallpaper. The ventilation-circulation system operates 24-hours a day to eliminate formaldehyde and other harmful substances produced by

construction materials, especially paints. Penta-Ocean adopted this new system for the first time in a condominium currently under construction. Eco-friendly wallpaper, which has proven to be very effective in adsorbing organic chemical substances such as formaldehyde from the air, is also being used in the project. This innovative paper product consists of Japanese paper pulp and natural diatomite, which is easily and safely recycled.

The Penta-Ocean Group will continue to pursue research and development programs that focus on improving construction efficiency, enhancing profitability and reducing the impact of construction materials and methods on the environment.



▶ Nishinomiya-Kita Country Club, Hyogo

▶ Work on Oedo Subway Line, Tokyo



▶ Form Senri-Chuo Condominium, Osaka