



Civil Engineering and Development Department
The Government of the Hong Kong
Special Administrative Region



Port and Marine Services



Sharp Island Pier at Sai Kung



New Blake Pier at Stanley



Sai Kung Public Pier



CONSTRUCTION OF MARINE WORKS

We design and construct various types of marine works, including public piers, waterfront promenades and projects under the Pier Improvement Programme. We are proceeding with the investigation and design for reconstruction of the Cheung Chau Ferry Pier.

We also carry out improvement works to some existing public piers and landing facilities.

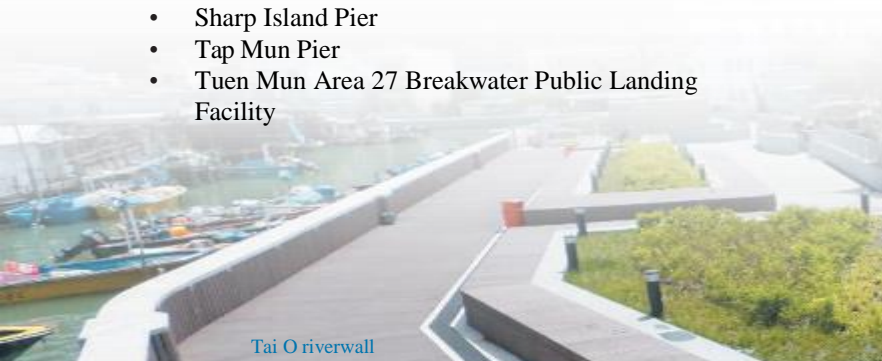
In the past few years, we completed the construction or reconstruction of the following piers:

- New Wan Chai Ferry Pier
- Sai Kung Public Pier
- Sharp Island Pier
- Tap Mun Pier
- Tuen Mun Area 27 Breakwater Public Landing Facility

Under the Pier Improvement Programme, we continued the reconstruction of Pak Kok Pier on Lamma Island in 2021, with a view to completing the works for improving the berthing condition of the pier by end 2022. Reconstruction of Kau Sai Village Pier and Lai Chi Chong Pier was ongoing and we also commenced reconstruction works of Leung Shuen Wan Pier, Sham Chung Pier, Sam Mun Tsai Village Pier, Yi O Pier and Ma Wan Chung Pier in August 2022.

Other projects completed in the past few years include the construction of a riverwall at Yat Chung in Tai O and the widening of Tung Wan Tau Road along Silver Mine Bay Beach in Mui Wo.

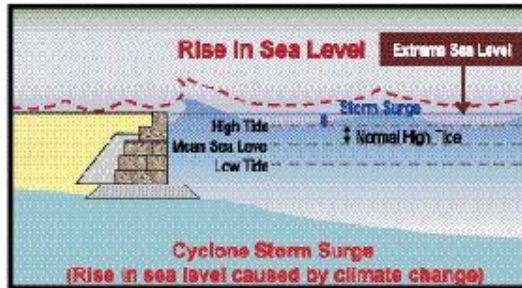
Reconstruction of Sharp Island Pier



Tai O riverwall

CLIMATE CHANGE AND ITS IMPLICATIONS ON COASTAL STRUCTURES

The emission of greenhouse gases lead to rise in global temperature and mean sea level.



Rise in sea level due to climate change in addition to cyclone storm surge may cause flooding in the coastal area

Impact by storm surges and waves on coastal areas

With reference to the Fifth Assessment Report published by the Intergovernmental Panel on Climate Change (IPCC AR5) in 2014 and taking into consideration of the Paris Agreement signed in 2016, we have updated the Port Works Design Manual in early 2018 incorporating the increase in mean sea level rise up to end of the century. With the progressive release of the Sixth Assessment Report by the IPCC since August 2021, we will take into account the relevant assessment reports to review and update the Port Works Design Manual for marine infrastructure in a timely manner as and when necessary.

We have commissioned a strategic study to identify the scope of enhancement works necessary for strengthening the resilience of existing government critical infrastructure, covering coastal structures, government buildings, drainage, water supply and sewerage facilities, etc. Taking into account the recommendations in the study, the relevant departments are formulating required enhancement measures for their critical infrastructure.

We have been collaborating with the Hong Kong Observatory to carry out the following climate-change related studies:

(i) Frequency analysis of extreme sea levels to review the extreme sea levels taking into consideration the extreme storm surge brought by historic storm surge events before 1954 and typhoon events in 2018. The study will be completed in 2022. We will base on the study findings of extreme sea levels to update the relevant design standards against extreme weather in a timely manner as and when necessary;

(ii) Projection of typhoon induced extreme winds in Hong Kong under climate change in the 21st century is underway. The result will be considered in a sensitivity check study of Hong Kong under the direct hit by a super typhoon. The study findings would provide reference for development of emergency preparedness measures for coastal critical infrastructures.

We have completed a territory-wide coastal hazards study in end 2021 to comprehensively review the situation of the coastal low-lying or windy locations in Hong Kong, and to investigate storm surges and waves in order to assess the impacts of extreme weather and climate change on these locations. The Government plans to take forward various improvement works and implements the relevant management measures in an orderly manner, and will conduct timely consultation with the stakeholders so as to meet the locals' needs and expectations.

ADVISORY SERVICES

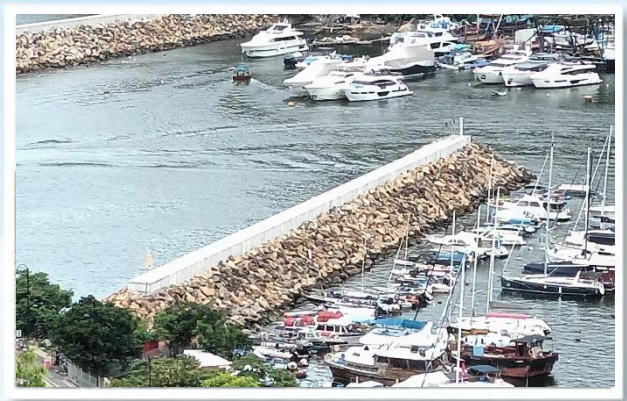
We provide technical advice related to marine works including the examination of public and private development submissions and land use proposals which may affect marine facilities. We also operate hydraulic models of the Hong Kong Harbour and undertake regular reviews of the Port Works Design Manual.

MAINTENANCE OF MARINE FACILITIES

We maintain 110 beacons, over 130 km of seawalls and breakwaters, and over 320 piers and landings (including public piers, as well as franchised and licensed ferry piers).

We carry out routine inspections of marine facilities to ensure that they are safe for public use.

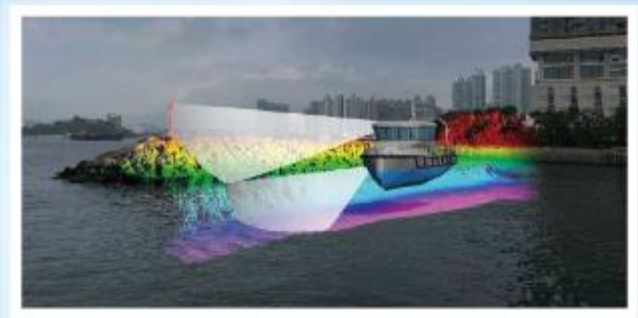
To fulfill the increasing demand for inspections of marine structures, we have introduced new advanced surveying technology including Imaging Sonar, Integrated Multibeam Echo Sounder and Laser Scanner System, Unmanned Aerial Vehicle to assess the conditions of marine structures more effectively.



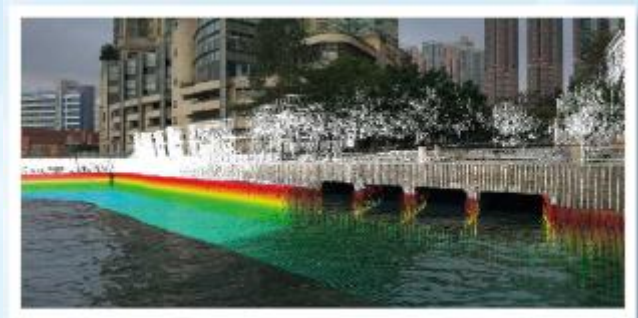
Completion Photo of Wave Walls on Aberdeen Breakwater



Patch repair at suspended deck of pier



Integrated Multibeam Echo Sounder and Laser Scanner System



Inspection of Seawall at Tai Kok Tsui by Integrated Multibeam Echo Sounder and Laser Scanner System

If the facilities are found in need of repair, we will arrange maintenance works, including concrete repair, fender repair and upgrading, and protective coating works to the marine facilities. To minimise disruption to ferry services and inconvenience to the public, we provide temporary berths or carry out the maintenance works after peak hours to maintain their operation.



Upgrading of hardwood timber fenders to plastic or rubber fenders for marine facilities is in progress. This initiative not only enhances the durability of the fenders, but is also more environmentally friendly.



Fender repair works at the pier

The Port Maintenance Information System (PMIS) has been implemented to cope with the growing demand for storage and prompt retrieval of information on the increasing number of marine structures we maintained. The PMIS is a computerised database with all the essential history and records of individual marine structures. It enables us to respond to enquiries quickly and facilitates our planning, prioritisation and scheduling of maintenance works. The inspection and maintenance process is also streamlined by the use of equipment compatible with the PMIS, which allows our staff to efficiently carry out regular inspections and immediately prepare works orders for the necessary maintenance works in the field.

Recently, the PMIS was revamped to develop a BIM-compatible asset management system for marine facilities with a view to organising the maintenance inspections and associated repair records more systematically and enhancing our maintenance strategy for marine facilities through analysing massive data collected.

APPLICATION OF BUILDING INFORMATION MODELLING (BIM) IN ASSET MANAGEMENT

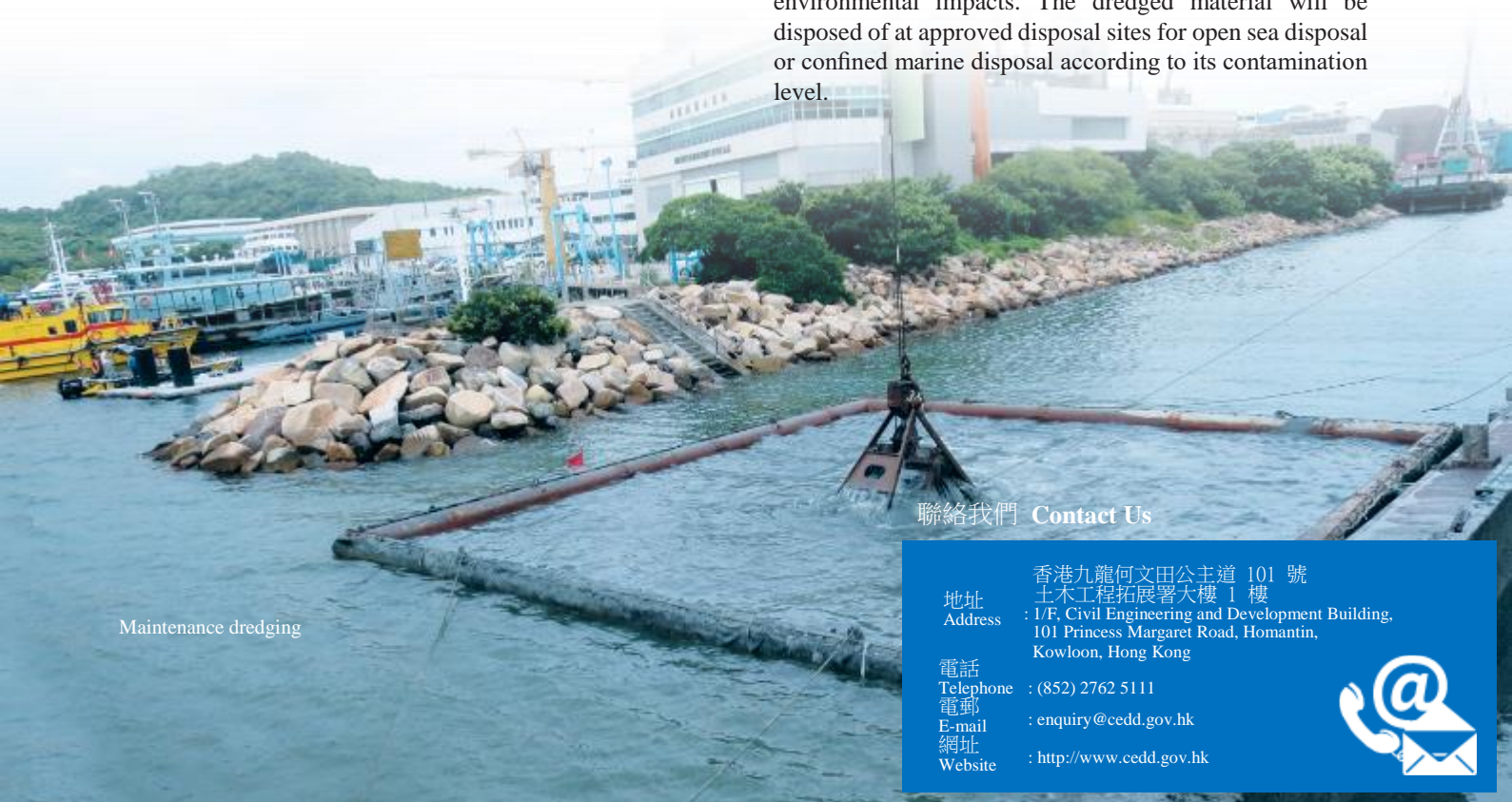
We commenced a pilot scheme to convert 60 nos. of selected existing marine structures into BIM models for asset management. In particular, some piers were constructed long time ago without proper as-built drawings. To create BIM model for these piers, a trial of using point-cloud technology is in progress to convert point-cloud images into BIM models. The BIM application enables us to obtain information and maintenance data of specific component easily and efficiently, e.g. maintenance frequency, prices, quantities, etc., which is useful for data analysis and improving maintenance strategy.

MAINTENANCE DREDGING

We carry out regular maintenance dredging of fairways, anchorage areas, typhoon shelters, public cargo working areas and major river outlets to ensure navigation safety. Major maintenance dredging works have been carried out in Tai O Approach Channel, Western Dangerous Goods Anchorage, Tuen Mun Public Cargo Working Areas, Tuen Mun Typhoon Shelter, Tsui Ping Nullah, Shing Mun River, Tuen Mun River and Tai Po River in recent years.

During our dredging works, we work closely with the Marine Department and the Environmental Protection Department to mitigate the marine traffic and environmental impacts. The dredged material will be disposed of at approved disposal sites for open sea disposal or confined marine disposal according to its contamination level.

Maintenance dredging



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