

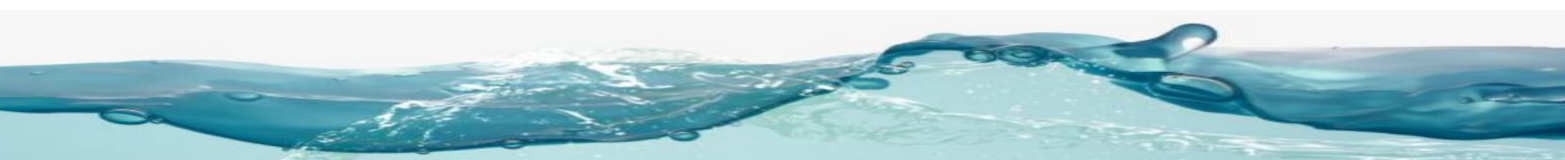
MUMBAI PORT, MAHARASHTRA

Background

Mumbai Port, one of the oldest British era ports of India, is situated in Thane creek on the west coast of India, on leese of Salsette/Mumbai island. This is an all weather natural port and well protected from the fury of sea waves. The port has access to the Arabian sea through a navigational channel wherein tidal phenomenon is dominant with macro type of semi-diurnal tides having range of 5 m. The various marine facilities in the form of docks, jetties and oil terminals were built during pre-independence era. Since opening of Suez Canal in 1869, Mumbai Port had become the Principal Gateway to India and has played pivotal role in the development of the country's trade & commerce. The main docks viz. Indira, Princess and Victoria in use for berthing and ships, were plying towards deep waters of the Arabian sea by taking advantage of tidal window. After independence, various marine facilities like Oil berths at Jawahar Dweep, Chemical & POL berths near Pirpau, finalisation of alignment of main navigational channel with its deepening/widening etc. were planned under master plan development. The various techniques such as field data measurements, physical tidal model (scale: 1/400 H, 1/80 V) and mathematical modeling, desk studies etc. were used to finalise the layouts/alignments of waterfronts, estimation of siltation at berths/channel, identification of dumping grounds for disposal of dredged materials. The port, however, has severe restriction in ship draft due to heavy siltation of the old Docks.



View of Mumbai Port





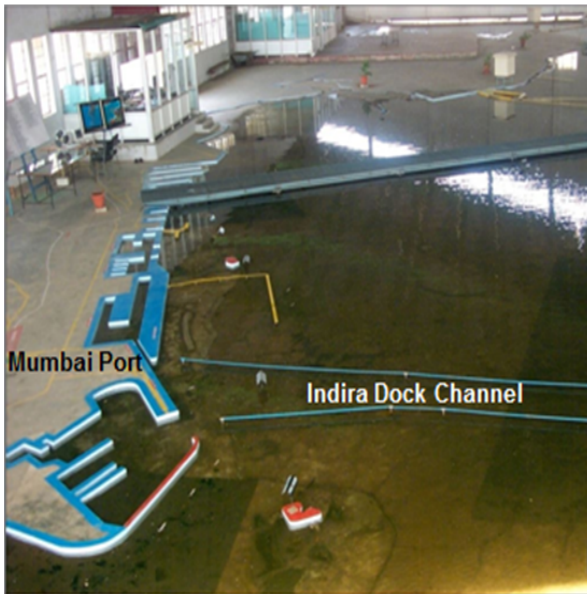
Physical Model of Mumbai Port at CWPRS (1953-1985)

Studies Conducted

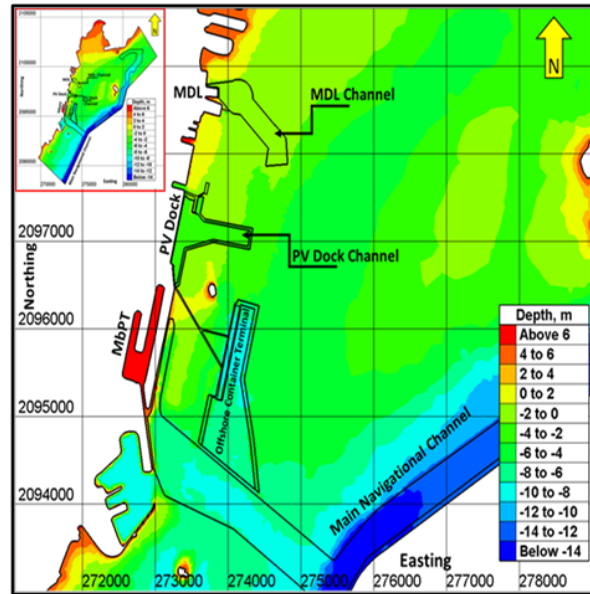
More than 150 studies were carried out since 1950s for the development of various marine infrastructures in Mumbai harbour using Physical and Mathematical modelling techniques.

- Field investigations for various oceanographic parameters were carried out to provide input data for simulation of prevailing flow phenomena in the models.
- Finalisation of alignment of main navigational channel, berths/jetties and effect of reclamations on nearby waterfront facilities.
- Estimation of maintenance dredging quantity in navigational channel and at various waterfronts.
- Identification of dumping grounds for the safe disposal of dredged material.
- Both physical & mathematical (tidal/wave) models are being used as a hybrid modeling technique to finalise alignments of berths, navigational channel etc. in complex hydrodynamic regions.





View of Mumbai Port area on Physical Model(1985- till date)



Mathematical model showing Mumbai Port area

Outcome and Benefits

- The finalisation of optimal alignment of navigational channel facilitated smooth movement of ships to and fro between port and the Arabian Sea along with significant reduction in siltation and thus appreciable decrease in maintenance dredging quantity.
- The appropriate alignment of marine facilities based on tidal/wave hydro dynamics, has simplified the herculean task of berthing/de-berthing of deep draft vessels at oil terminals near Jawahar Dweep as well as other ships at the port.
- In addition, predictions of reliable siltation in harbour by mathematical model studies provide guidance to the port authorities in planning and timely execution of maintenance dredging to enhance the operability of ships at berths.
- The shape of reclamations for various marine facilities like oil terminals, bunders etc. evolved through model studies does not have adverse impact on nearby waterfront facilities as well as on the marine environment.
- The suitable locations of disposal sites for dredged material resulted from capital/maintenance dredging are identified based on dispersion studies carried out using mathematical model studies. The material dumped at dumping/disposal site do not re-enter in to harbour area and in navigational channel.
- The comprehensive studies carried out provide the port authority a guidance to plan the future developments in the harbour area.

