

CENTRAL WATER AND POWER RESEARCH STATION

PHYSICAL MODEL STUDIES FOR STUDYING WAVE TRANQUILLITY ASPECTS INSIDE HARBOUR BASIN FOR DEVELOPMENT OF EASTERN BREAKWATER AND JETTY AT PORBANDAR, GUJARAT

STUDY OVERVIEW

Porbandar port situated on the west coast of India in the state of Gujarat has direct berthing facilities which can accommodate ships up to 50,000 DWT. At present, the port is protected by a 2650 meter long existing Western breakwater. Director General of Naval Projects (DGNP), Indian Navy intends to develop an exclusive berthing facility for their naval ships by constructing eastern breakwater of 2040 m in length on eastern side of the existing western breakwater. The Indian Navy through M/s RITES Ltd has entrusted CWPRS to carryout physical wave model studies as a part of DPR.

APPROACH

- Physical wave model studies were conducted on rigid bed model of scale 1:120 (Geometrically Similar) with appropriate model bed roughness. The Random Sea Wave Generation (RSWG) facility alongwith multi-channel Data Acquisition System under SCADA control in a 75 m x 60 m Multi-Purpose Wave Basin Hangar were used for studies.
- Mechanical wave board unit (14 m long) was used to generate incident Random wave from the SW (Hs 3.5 m, Tp 10 sec), while 21 m long wave board was used to generate waves from WSW (Hs 4.0 m, Tp 10 sec) directions. The wave board simulates 1.7 km and 2.52 km of wave front respectively in the model for waves from SW & WSW. The wave height measurement were made with capacitance type wave sensors
- The studies were carried out for different scenarios with 200 m, 250 m & 350 m long new spur alongwith 100 m & 200 m extension to eastern breakwater.

KEY FINDINGS

Various configurations of extension in proposed eastern breakwater with or without spur are studied to achieve the prescribed wave tranquility limit of 0.80 m along 600 m long proposed jetty. The wave tranquillity consideration necessitates construction of a 350 m long spur normal to eastern breakwater at a distance of 150 m from seaward tip of the jetty. Moreover, the proposal of 350 m spur would create additional berthing face on its lee-side for any possible future utility. Also, with the introduction of the spur, length of eastern breakwater could be optimized by removing 350 m portion beyond the spur. The provision of 350 m spur is not expected to cause any adverse effect on ship maneuverability and any additional financial burden, as overall construction cost of eastern breakwater would be reduced.



IMPACT

A 350 m long spur normal to eastern breakwater at a distance of 150 m from seaward tip of the jetty provides desired tranquility to achieve safe berthing. Moreover, the proposal of 350 m spur would create additional berthing face on its lee-side for any possible future utility. Also, with the introduction of the spur, length of eastern breakwater could be optimized by removing 350 m portion beyond the spur. The provision of 350 m spur is not expected to cause any adverse effect on ship maneuverability and any additional financial burden as overall construction cost of eastern breakwater would be reduced.

