Fact Sheet

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Design for Wave Protection at Chicago Harbor, Illinois

Purpose: To study wave conditions for the existing harbor and the impacts of various breakwater breaches on wave conditions in the harbor, and to determine optimum improvements that will provide acceptable wave conditions within the harbor during periods of storm wave activity.

Background: Chicago Harbor is located on the southwestern shoreline of Lake Michigan at the mouth of the Chicago River. Construction was initiated in 1833 with dredging of a channel and the construction of piers extending into the lake on the north and south sides of the river. The modern-day inner breakwaters were built south of the Chicago River mouth between 1874 and 1880 and the outer breakwaters were constructed between 1889 and 1923. Improvements, repairs, and general maintenance of the structures have continued until present day. The Chicago Harbor Breakwater system is a combination of several types of structures combined to provide protection to the Chicago Harbor infrastructure. The outer breakwaters have deteriorated over the years. Significant overtopping of the structures occurs during storms resulting in unacceptable wave heights in the harbor. Marinas protected by the inner breakwaters also experience damage to their facilities and small craft due to excessive wave action during storms.

Facts: At the request of the U.S. Army Engineer District, Chicago, a 1:120-scale physical hydraulic model was designed and constructed at the U.S. Army Engineer Research and Development Center by the Coastal and Hydraulics Laboratory to study wave conditions for existing conditions and proposed harbor modifications. The model reproduces approximately 18,000 ft of the Illinois shoreline, the entire Chicago Harbor complex, and offshore bathymetry in Lake Michigan to depths of 30 ft or greater. A 160-ft-long unidirectional, spectral wave generator, an automated data acquisition and control system, and capacitance-type wave gauges are being used in model operation. Modifications are being made to the breakwaters that will alleviate undesirable wave conditions in the harbor and provide acceptable conditions. The impacts of various hypothetical breakwater breaches on wave conditions in the harbor are also being studied.

Points of Contact: For additional information, please contact
Mr. Robert Bottin at 601-634-3827 (ray.r.bottin@erdc.usace.army.mil), or
Mr. Dennis Markle at 601-634-3460 (dennis.g.markle@erdc.usace.army.mil).