



**US Army Corps
of Engineers®**

Engineer Research and
Development Center

Lock Design

Description

Hydraulic engineers at ERDC's [Coastal and Hydraulics Laboratory](#) (CHL) conduct studies on the planning, design, operation, management, and maintenance of locks along the Nation's waterway systems for USACE Districts, municipalities throughout the country, and other Federal and non-Federal agencies. The research includes studies of the lock chambers, the filling and emptying systems, guard walls, extensions, and other data pertaining to the locks within canals, rivers, or docks. The purpose of the research is for providing safe and efficient marine transport, cost-effective systems, and environmentally acceptable conditions.

Capabilities

CHL's locks experts are research hydraulic engineers and civil engineering technicians who have access to extensive laboratory facilities and the Department of Defense High Performance Computing Center. Studies involving lock design typically include constructing models of the lock and appurtenances (either physical or numerical) obtaining data concerning the hydraulic performance, reduction and analysis of the data, and documentation of the final results in the appropriate media.



**Inner Harbor Navigation Canal Replacement
Lock Model looking downstream**

Supporting Technology

Hydraulic engineers at CHL make use of numerical models, physical models, simulator models, in addition to analytical techniques, field investigations, and consultations among experts in the field.

Benefits

Lock design studies focus on navigation improvements to reduce lockage delays, which would save time and money and help meet future capacity requirements. Without improvements, the potential for significant traffic delays on the Nation's waterways would occur resulting in significant economic losses.

Success Stories

- A model investigation of the J.T. Myers Locks and Dam on the Ohio River was conducted based on lock filling and emptying characteristics including fill and empty

times, hawser forces on a tow in the chamber and upper approach, culvert pressures, and loss coefficients. The lock intakes and outlets were evaluated based on their efficiency and flow conditions as well as impacts to tows. A filling and emptying system was developed that met the filling and emptying performance requirements for the range of hydraulic conditions anticipated. Modifications to the design increased the efficiency of the filling system and resulted in better chamber performance.

- A study to find innovative methods to construction and operation and maintenance costs of navigation structures was conducted at McAlpine Locks and Dam on the Ohio River in which it was agreed that large savings in lock wall construction costs could be realized if the lock filling and emptying culverts were placed inside the lock chamber rather than in the lock walls. The study was conducted to evaluate the hydraulic performance of a new design. The filling time for acceptable chamber performance with the changes was achieved.

Point of Contact

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