



US Army Corps
of Engineers®

Engineer Research and
Development Center

Navigation Systems Research Program

Vessel/Barge Impact-Flexible Walls

Problem

The forces and locations of inland barge train impacts currently dictate Corps' design specifications for lock walls. This has resulted in a significant increase in the final construction costs of these walls. Thus, the loads from barge impacts on lock approach walls become an important evaluation and/or design factor when working toward reducing construction costs.

Research Approach

Using numerical models combined with full-scale field impact test data, new engineering methodologies for predicting vessel/barge impacts with rigid and with flexible walls are being developed.



Labs/others involved

ERDC Information Technology and Costal and Hydraulics Laboratories, Product Delivery Team (PDT) of District Engineers from across the country, all members of the CASE subtask group on Barge/Vessel Impacts with Lock Approach Walls.

Final Products

Impacts with Rigid Walls: The new engineering methodology for glancing blow impacts centers on the use of a bilinear relationship. The "Empirical Correlation" relates the maximum impact force normal to the wall and the linear momentum prior to impact by the barge train. The Empirical Correlation characterizes the impact force when there is no damage to the barge train, and was developed from instrumented barge impact experiments. A limiting impact force "capping" the empirical correlation forces results either from failure of the lashings that tie the barge train together or the buckling of hull plates and internal structure of the corner barge that impacts the approach wall. Results are being published in Corps guidance documents i.e. ETL 1110-2-563, Barge Impact Analysis for Rigid Walls.

Impacts with Flexible Walls: Two types of engineering formulations are being developed; one is based on a balance of energy approach for impacts with flexible walls and the second is based on the dynamic response of a flexible wall to an impact "pulse" load of relatively short duration. Full-scale field impact testing is part of the data base to be used in this development process. Results will be published in new ETL's.

Point of Contact

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