# Fact Sheet

US Army Corps of Engineers
U.S. Army Engineer Research and Development Center January 2004

Public Affairs Office ▯ 3909 Halls Ferry Road ▯ Vicksburg, MS 39180-6199 ▯ (601) 634-2504 ▯ http://www.wes.army.mil

## Lock Walls for Barge Impact Loads

**Purpose:** To develop safer and more economical lock approach walls by developing new, accurate barge train-to-lock approach wall design impact force computational procedures.

**Background:** Approach walls at locks are subjected to daily impacts ranging from low to moderate loads for the typical loadings to extreme loads where barge train control is lost. The forces and locations of barge impacts currently dictate Corps' design specifications for lock approach walls. This has resulted in a significant increase in the final construction costs of these walls. With the trend towards designing thinner and more efficient lock wall section, the loads from barge impacts on the lock approach walls becomes an important design factor. The current analytical model does not account for the flexibility from the lashings on the barge and the energy absorption from barge/wall deformation. The development of proper analytical models for barge impact for use in the design of innovative lock structures (guide/guard/lock walls) is critical in evaluating both the feasibility and cost of such structures. These new impact models will permit a reasonable impact force to be applied to the structure and an overall reduction in the cost for innovative wall designs.

**Facts:** In FY98 the Engineering and Research Development Center (ERDC) began a research program to improve engineering design methodologies through a series of field measurements of full-scale, controlled barge impact experiments with lock walls. Subsequent reduction of this data resulted in a new, easy to use engineering relationship to compute the design force for use by lock wall designers for usual and some unusual loadings. This relationship has been published in a recent Corps guidance document. ERDC has also embarked on a path of developing new, improved engineering procedures for predicting limiting design impact forces so that engineers will be able to predict design forces for barge-to-lock (approach, guard, and guide) wall impacts under unusual and extreme design events when damage occurs. These extreme design events correspond to failure of the lashings within a barge train or to buckling of the head beam and internal trusses, deck and side plates of the corner barge, in the barge train, that impacts the lock approach wall.

**Point of Contact:** For additional information, please contact Dr. Robert M. Ebeling at 601-634-3458 (ebelinr@wes.army.mil)