



**US Army Corps
of Engineers®**

Engineer Research and
Development Center

Vessel/Barge Impact

Description 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.

Issue The Corps is developing an engineering procedure to perform cost-effective evaluations and/or designs of lock approach walls at navigation projects using realistic barge impact forces, especially for deformable approach walls.

Users Corps' District engineers will use this new engineering methodology and software in the evaluation/design of a variety of stiff-to-flexible approach walls at Corp's navigation structures.

Products 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. It was developed from instrumented barge impact experiments. The limiting impact force 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. The formulation of engineering methodologies for various types of deformable approach walls is underway.

Benefits The benefits from this work unit will be derived in potential cost savings by determining realistic values for impact loads which would permit the utilization of innovative lock wall structures that have the potential to be more cost effective.

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