



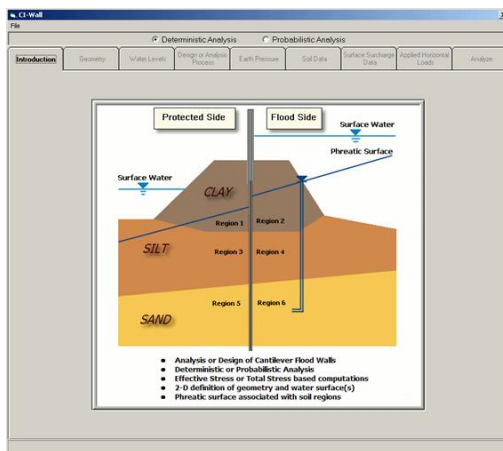
US Army Corps
of Engineers®

Water Resources Infrastructure R&D Program

I-Wall Investigation Detailed Evaluation Guidance

Description

Investigations of the hurricane protection systems in Louisiana identified possible deficiencies in the guidance used to design I-Walls. The U.S. Army Corps of Engineers (USACE) issued directed guidance regarding these deficiencies in a memorandum to MSC's. The compilation of data and site inspections, pursuant to this memorandum, is considered Phase I of a three-phase approach to evaluating existing I-walls. Phase II Interim Guidance was prepared and deployed to help districts identify projects that may be at risk of poor performance until the Phase III Detailed Evaluation Guidance is completed. In order to provide a more definitive guidance on dealing with I-wall performance across the nation, further research is required. The combination of work that proved to be extremely valuable in understanding the behavior of the I-walls in New Orleans was numerical and physical modeling of the system (I-wall and foundation). It is proposed that this same combination be used to investigate the performance of other I-walls in the COE inventory.



The approach would be to identify a set of I-wall/foundation systems representative of all those that exist across the nation. This would certainly include variations in foundation material, I-wall material, and construction. These identified I-wall/foundation systems

would be modeled numerically (finite element/finite difference) and physically (scaled centrifuge models) to explore the formation of a gap/crack and the resulting effects on the foundation materials and ultimate stability of the wall or wall/levee composite system. Additionally, information will be obtained related to the stability of the flood barrier when unsupported heights of I-wall are loaded in the absence of a gap/crack formation. In addition to the numerical and physical models, information from existing full scale load tests on I-walls will also be evaluated. These load tests include the recent London Canal load test in New Orleans, and load test performed in Tell City, Indiana in the 1940s. This effort will also include the development of reliability models and analysis tools that can be used to evaluate the COE inventory of I-walls.

Benefits The results of the research will be definitive guidance on analyzing and evaluating the overall stability for various foundation and loading conditions (height of water on unsupported I-wall) using common design tools/software. The developed software will be a state-of-the-art reliability computer program that can be used by Districts to analyze both existing and future designs of COE I-walls.

Status A detailed project management plan has been completed. Selection of six representative field sites has been completed in addition to determination of required data properties. Numerical and physical modeling efforts for the sites are underway and scheduled to be fully complete by the end of second quarter FY10. The guidance development team has been formed and actively engaged.

Distribution Source(s) Results of this research will be distributed through ERDC technical reports and the final guidance released by USACE-HQ. Developed software will be distributed through the CASE web site, via the RADS portal, and will also be located on a Corps server.

Available Documentation Interim I-Wall Guidance has been released by USACE-HQ and will remain in effect until final guidance is issued pending results of this research effort.

Available Training Training will be made available through RADS training classes for the National Teams or Prospect Courses as needed.

Available Support Application support can be obtained by contacting Dr. Robert Ebeling at ERDC-ITL.

Application The Dam Safety Methodology Team as well as all District engineers will be able to use the developed guidance and software to evaluate the overall stability of levees with I-walls.

Point of Contact Dr. Robert Ebeling, Information Technology Laboratory, US Army Engineer Research and Development Center, 3909 Halls Ferry Road, Vicksburg, MS 39180 E-mail: Robert.M.Ebeling@usace.army.mil

Partners Mr. Don Yule, Mr. Ron Wahl, Mr. Noah Vroman, and Dr. Johannes Wibowo of ERDC-GSL; Dr. Kevin Abraham and Mr. Mike Pace of ERDC-ITL; Mr. Kent Hokens and Mr. Neil Schwantz of USACE-MVP; Mr. John Clarkson of USACE-LRH; Ms. Anjana Chudgar and Mr. Don Dressler of USACE-HQ