



combination of I-wall foundations giving way due to weak soils in the areas and I-walls deflecting under the pressure of water, allowing a gap to form on the water side of the floodwalls.

T-walls performed well during Katrina, and overtopping of T-walls did not lead to extensive scour and damage.

Lessons Learned

- Floodwall design criteria should consider a broad range of potential causes of failure.



- I-walls should be designed to withstand gaps opening in the ground on the water side of the wall.
- Design methods should be updated periodically to include review of recent research and experience.
- Armoring and other approaches that provide resilience would significantly reduce the probability of breaching when overtopping occurs.

For more information on this topic, please refer to Volume V of the IPET Report.



IPET Report Summaries

The Performance — Levees and Floodwalls

The U.S. Army Corps of Engineers established the Interagency Performance Evaluation Task Force (IPET) in fall 2005. The IPET's purpose was to provide scientific and engineering answers to questions about the performance of the New Orleans and Southeast Louisiana



The Performance — Levees and Floodwalls

Hurricane Protection System during Hurricane Katrina. Volume V of the IPET's nine-volume Draft Final Report seeks to examine the behavior of individual, damaged structures and to evaluate undamaged sections of the system. Such an analysis was integral to repairs accomplished before June 1, 2006, and will assist future design and planning efforts.

Findings

The performance of levees and floodwalls varied significantly throughout the New Orleans area. In some places, the levees performed well in spite of being overtopped. In other places, overtopped levees were breached and completely washed away.



Katrina caused 50 major breaches in the hurricane protection system; 46 were due to overtopping and erosion. Four breaches occurred before water levels reached the top of the floodwalls and have been attributed to foundation failure.

The types of construction materials used appeared to be a significant factor in levee performance. Clay levees seemed best able to withstand the storm. After erosion began, levees with embankment material high in silt and sand and embankments with sand zones scoured worst, in some cases completely washing away.

In general, levees that were overtopped but experienced little wave action survived better than levees that suffered both overtopping and significant wave action.

Overtopping and erosion led to failure of I-walls when water, cascading over their tops, washed away soil on the walls' protected side. Eventually, the soil supporting them eroded away and the walls became unstable.

In four locations I-walls failed before overtopping. These failures were caused by a

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