

Constructioneer

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Corps Studies Temporary Dam Systems

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Lined, steel-frame system does well in Army lab and field tests, also selected by N.J., Pa. contractors.

Contractors that work on the water's edge on even small jobs can learn a lot from the Army Corps of Engineers. That's why flood fighting research is especially relevant to progressive contractors looking to get the edge.

Some of the latest news comes out of a 2004 congressional directive called the federal Energy and Water Development Bill. It directed the Corps of Engineers to act immediately to devise real-world testing procedures for flood-fighting technologies. In an effort to replace the age-old technique of stacking sandbags, the Corps is conducting a side-by-side comparison of three flood fighting systems, including laboratory testing and actual tests in the field.

"We can send men to the moon and do micro surgery, but we're still throwing sandbags at floods," says Joan Pope, U.S. Army Corps of Engineers Engineering Research and Development Center program director for Civil Works, based in Vicksburg, Miss.

Preliminary results were presented last August at the Tri-Service Infrastructure Systems Conference held August 3, 2005. Hydraulic Engineer Fred Pinkard of the ERDC Coastal and Hydraulics Lab made the presentation titled "Flood Fighting Structures: Demonstration And Evaluation Program."

Three relatively newer systems are compared to sandbags. A steel frame structure that supports a fabric liner was supplied by Williamstown, N.J.-based Portadam. An interlocking, plastic grid structure filled with sand or earth called



the Rapid Deployment Flood Wall was supplied by San Francisco-based Geocell Systems. A wire-based structure that can be joined together to form a continuous structure called Concertainer from Hammond, La.-based Hesco Bastion USA is also being tested.

No system is perfect, according to the Corps' results. Portadam weaknesses included puncturing during debris impact tests, and inability to be raised in typical applications. Hesco experienced minor sand steeling and washout, and the wire bent during debris impact tests. Geocell experienced minor settling, significant washout among the edges and toe, toe damage during large waves or overtopping, and 10 percent of the structure was broken. Sandbags experienced repeated damage by waves, and failed during overtopping.

The first round of field testing was also done in the Vicksburg harbor area of Mississippi. On field testing of seepage, Portadam stayed below 1,000 gallons per

hour going from zero to almost 700 wetted square feet, Hesco rose to almost 7,000 gallons per hour going from zero to under 450 square feet, Geocell rose to about 1,500 gallons per hour going from zero to 500 square feet, and sandbags stayed at almost zero gallons per hour from zero to about 350 square feet, then rose to over 4,500 gallons per hour at 350 to nearly 700 square feet.

Portadam achieved the highest ratings in setup and removal time and cost. While Portadam's combined setup and removal time was 28.8 hours, Hesco's time was 34.2 hours, Geocell's was 74.8 hours, and sandbags totaled 214.1 hours.

In summary, Portadam strengths included ease of construction and removal, low seepage rates, no fill required, and least Right Of Way required.

Hesco strengths were ease of construction and removal, low cost, and a high degree of usability and raisability. Weaknesses were a significant Right of Way required



due to granular fill, and the highest seepage rates.

Geocell's strengths were ease of construction, low seepage rates, high degree of usability, raisability, and the most height flexibility. Weaknesses were a high Right Of Way because of granular fill, a high cost, and difficulty of removal.

Sandbag strengths were low cost (installed with volunteer/prison labor), conforming well to terrain, low seepage rates and raisability, while weaknesses were extreme labor intensiveness and non-reusability.

Looking forward, the Corps will be posting this data on a public webpage. It will also report on pilot tests using approximately 1,670 feet of each system installed on the Susquehanna River in Wilkes-Barre as well as the Omaha, Neb., district on the Missouri River, and in Sacramento, Calif. The report will also include data on an installation used in Iron County, Utah, last year during an actual flood. The Corps is required to issue a final report to Congress in 2006, with recommendations on flood fighting structures.

Recent Pa. and N.J. projects

While Hesco's system was used with success during Hurricane Katrina, according to Portadam Sales Manager Gerry Mann, his system was used last September for about six weeks in Martin's Creek, Pa. Utility Pennsylvania Power & Light dumped quantities of fly ash in the Delaware River.

After being contacted by Shaw Environmental, "we had a guy on-site within 24 hours to do an in-water survey to explore the viability of using our system," adds Mann. Within 48 hours Mann's crew was on-site installing dam.

The initial upstream return leg, which basically runs perpendicular to shoreline, is the most relatively difficult when

installed in moving water. The flow is 2 to 3 feet per second. "But once the team got the return leg installed, it acted as sort of a protective barrier to get the rest of the dam installed [like a breakwater]," adds Mann.

With one area dewatered, Shaw removed contaminated material, which included contaminated rocks and boulders in addition to the contaminated soil.

The dam was also used last summer on a Warren County, N.J., stone bridge restoration project. H.C. Constructors, led by Harry Chowansky, performed the work. One reason H.C. chose the system was the difficulty of using sheet piling to try to channel water under one of the arches.

As an aside, H.C. Constructors of Whitehouse Station, New Jersey, was inducted into the UTCA/OSHA Partnership earlier this month. The firm became a part of the Partnership after participating in several UTCA meetings that prepared firms for the program. Representatives of H.C. Constructors also met with OSHA officials on several occasions to discuss the firm's commitment to worker safety. The Utility and Transportation Contractors Associations (UTCA) launched the UTCA/OSHA Partnership just over a year ago, and since then several firms have met the requirement for participation.

Sheet piling, dirt pushing and Portadam According to Portadam's Mann and Gatta, numerous misconceptions block some contractors from choosing alternatives to sheet-piling cofferdam structures.

"In most cases we [cost] substantially less, contingent on labor," says Mann. Other drawbacks to pile driving include the possibility of leaking hydraulic oil into the surrounding water body, and having to send a diver to cut sheet piling once the project is complete.

"With ours, nothing is left behind. Also, since it sits on the surface, nothing is built into the stream bed," he adds. In addition, because the rental-only Portadam is installed and removed by the company's divers, the price includes the entire job.

Another misconception is that temporary systems are not appropriate in situations where there is flowing water, says Gatta.

"Some people know a little about temporary cofferdam structures, such as the inflatable dam, and [mistakenly] lump us in the same category. Our frames transfer the load vertically, and the head pressure of the water anchors the system. But a water-filled product can become buoyant."

Mann adds: "We will trench the leading edge of the liner into a riverbed, then top it with single-row sandbags as an added protection. But the actual design of the system is what anchors it. The weight of the water holds it down."

Another misconception is that product is expensive, because it is compared to an age-old practice that's quickly becoming extinct.

"10 years ago, a contractor would just push dirt out into a river. Laws have changed drastically in the past 10 years," says Gatta. "The environmental agencies, such as the Corps of Engineers, plus state and local agencies that issue permits in most states no longer allow you to dump dirt into a river."

And finally, the misconception that a puncture can be problematic is overblown, says Mann. While the nylon-backed PVC liners from Portadam can puncture, "we fix it in place," says Gatta. "Sometimes we fix it within the hour, and sometimes we can walk a contractor through fixing it himself."