US Army Corps of Engineers
Mississippi Valley Division

Corps Hurricane Response

Task Force Hope Status Report Newsletter *November 1, 2010*

Corps applies due diligence using new technologies

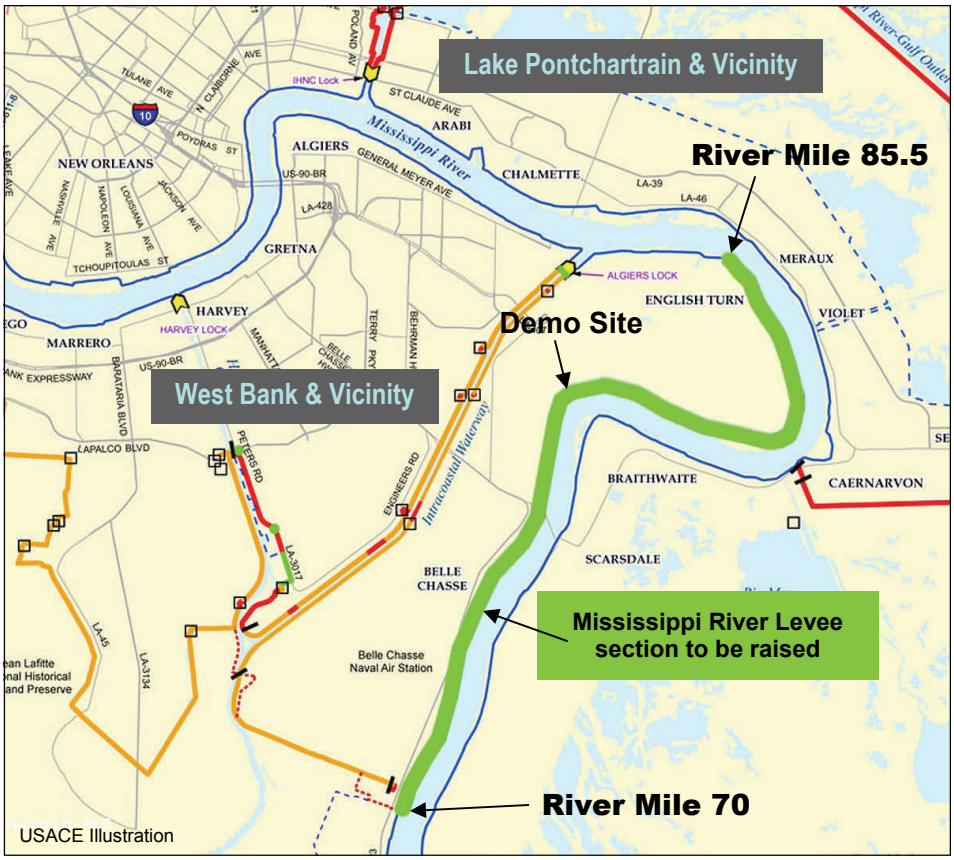
Section of Miss. River Levee to be raised

15.5 miles of Mississippi River Levee will be raised to meet HSDRRS criteria

By Susan Spaht

The Greater New Orleans area is nearing the end of another hurricane season, and the Corps of Engineers continues to work at a rapid pace. Using adaptive engineering measures, building on lessons learned, and applying new techniques, the Corps is driving to complete the Hurricane and Storm Damage Risk Reduction System (HSDRRS).

"We are constantly looking for better ways to improve risk reduction by incorporating the latest technical advances in science and engineering," said Karen Durham-Aguilera, Director of Task Force Hope. "We realized we had a gap in knowledge regarding the Mississippi River flows and storm surge interaction which presented us with the challenge of providing expanded risk reduction for the people of the Greater New Orleans area. The Corps applied due diligence using new technologies to determine how to close the gap."



HSDRRS + MRL

During the initial HSDRRS analysis (2005-2007), new design criteria were developed for the system using state-of-the-art hydraulic storm surge modeling. The focus of this initial analysis was the **perimeter system** within the Lake Pontchartrain & Vicinity (LPV) and the West Bank & Vicinity (WBV) project areas. The purpose of the analysis was to determine design elevations for a 100-

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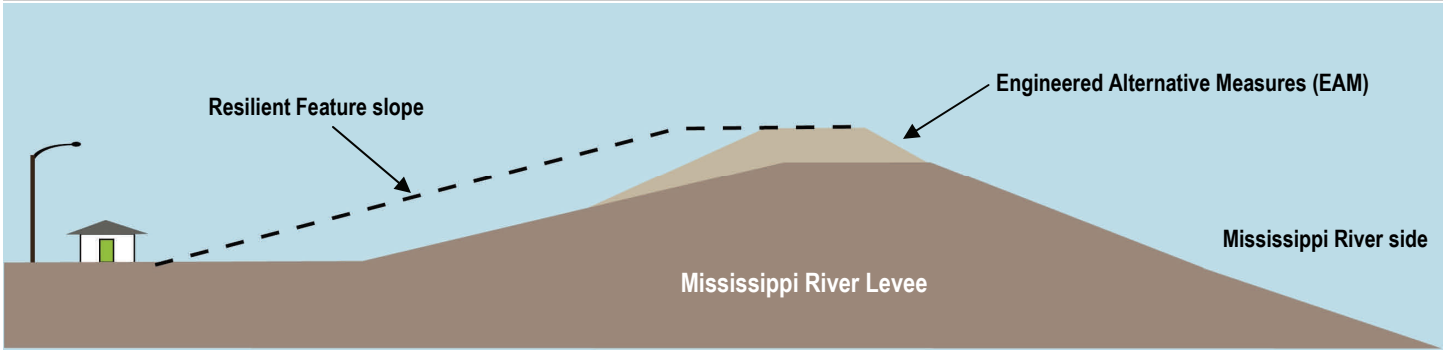
Also in this issue:

Corps to raise 15.5 miles of Mississippi River Levee to meet HSDRRS criteria



After completing detailed storm surge modeling and overtopping analyses, the Corps of Engineers has determined that 15.5 miles of Mississippi River Levee need to be raised from a maximum of 5 to 5.5 feet at River Mile 70 down to no increase after River Mile 85.5 to meet the Hurricane and Storm Damage Risk Reduction System criteria for a 100-year level tropical event. This drawing illustrates how the EAM will raise and cap the levee, and shows the wider footprint (dashed line) needed for the resilient feature. USACE Illustration

Working at the Bonnet Carre Spillway, a churner tractor (right) mixes lime with clay to provide a stabilized soil mixture that will be used at the EAM demonstration site on the Mississippi River Levee. *Inset above:* churner tractor "teeth" mix lime with the special clay.

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year level of risk reduction, including floodwall and levee heights, and to revise Factors of Safety. The new design criteria developed for the system were technically reviewed both internally and externally.

Historically, the Mississippi River Levee (MRL) system was designed to defend against river flood events, not against hurricane or storm surges. The Corps now had to solve the challenge of how Mississippi River flows interact with storm surge.

For the initial HSDRRS modeling, a constant Mississippi River flow, similar to what occurred during Hurricane Katina, was assumed. Upon further analysis, the Corps determined that during Hurricane Katrina, the river flow was abnormally low compared to average river flow during hurricane season (June – November). The Corps realized that a more a complex analysis was required for the Mississippi River and its interaction with the hurricane perimeter system.

As the Corps' technical tools and capabilities continued to improve, a more complex analysis was performed to examine combined river

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Members of the MRL team are, from left, Garnet Hardin, Project Manager; Marlea Haugen and Jennifer Vititoe, Project Engineers; and Julie LeBlanc (seated), Senior Project Manager. USACE Photos

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discharge and storm surge. Using historic river flow records over a 27-year period gave the Corps a more representative reflection of normal river flow conditions during hurricane season. This updated analysis provided new technical information regarding the effect of Mississippi River flows on storm surge in the river.

The new information revealed that certain portions of the Mississippi River Levee (MRL) and the HSDRRS serve a dual purpose of providing risk reduction from both river flooding and hurricane surge flooding.

"This information was unexplored territory for everyone," said Julie LeBlanc, Senior Project Manager for MRLs. "We realized we were breaking new ground here."

Design Summit

In January 2010, the Corps of Engineers sponsored a Design Summit to review the more complex analyses being done, find effective ways to integrate MRL and HSDRRS criteria and methodology, and to resolve implementation concerns. The Summit was attended by more than 100 experts from the Corps; the Army's Engineer Research and Development Center (ERDC); FEMA; the Louisiana Coastal Protection and Restoration Office; as well as industry experts and academia.

In June 2010, after 18 months of study and analysis, the Corps completed detailed storm surge modeling and overtopping analyses and determined that there is a portion of the Mississippi River Levee that meets the river flooding elevation requirements but does not meet the HSDRRS elevation requirements for 100-year level storm surge risk reduction.

That portion is approximately 15.5 miles of river levee in the West Bank & Vicinity from River Mile 70 to River Mile 85.5, an area that borders parts of Plaquemines and Orleans Parishes in the Belle Chasse Polder (see map). In this stretch, the MRL will be raised to meet the 100-year level hurricane risk reduction requirement. It will be raised a maximum of 5 to 5.5 feet at River Mile 70, down to no increase in height after River Mile 85.5. The work for this project is authorized under both the Mississippi River & Tributaries and West Bank & Vicinity authorizations.

The new analysis showed that the river levee across the river along the LPV side needed no elevation increase because predominant hurricane winds come from the east and, therefore, eastward-facing levees (i.e. West Bank levees) experience higher waves and need higher levees. So, the MRL on the LPV side of the river was already sufficient to defend against the effects of a 100-year storm.

"Engineered Alternative Measures (EAMs) will be used to raise and cap this 15.5-mile section of the Mississippi River Levee to meet the Corps' criteria for 100-year level hurricane surge risk reduction," said Ms. LeBlanc. "Our plan is to have the EAMs in place by hurricane season 2011."

EAMs may involve clay or soil stabilized with lime which allows the levee to be raised with steeper slopes while still remaining within the existing levee right-of-way, that is, without widening the footprint of the levee. From River Mile 70 to 78, the Corps will use soil stabilized with lime to raise the levee; and from River Mile 78 to 85.5, compacted clay will be used.

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Section of Miss. River Levee being prepared for EAM

USACE Photos by Tom Durel

Staging area for lime-stabilized soil

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To test this method, a 1,000-foot demonstration section is currently underway where F. Edward Hebert Boulevard meets the Mississippi River levee (see photo this page). The demonstration work is using lime-stabilized soil from the Bonnet Carre borrow area to raise and cap that MRL section.

After completing all environmental requirements, the Corps proposes to come back in the future and construct resilient features for this 15.5-mile section of the MRL. Resilient features involve more gradual levee slopes and possibly armoring to reduce damages to levees from large storm events. Resilient features will ensure that FEMA accreditation can be sustained over multiple years and numerous storm events.

"The refinement of hydraulic modeling methods has been a progressive process," said Ms. LeBlanc. "It has only recently advanced to the level of sophistication necessary to examine the complex wave and surge climate in the lower Mississippi.

"These refinements represent the Corps going beyond the Interagency Performance Evaluation Task Force and the initial HSDRRS analyses to provide a sophisticated examination, analysis and solution. Another good example of adaptive engineering."

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The *Status Report Newsletter* supports the information program for Task Force Hope and its stakeholders. It also serves as the primary tool for accurately transmitting the Corps' hurricane risk reduction efforts to stakeholders.

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Corps to raise MOWL to 8 feet at Outfall Canal walls

Remediation work will help S&WB remove rainfall unimpeded

By Susan Spaht

Working with its local and state partners, the Corps of Engineers conducted a re-analysis of all levees and floodwalls along the three outfall canals using its new and more stringent post-Katrina criteria. The methodology and data in these peer-reviewed reports was used to determine what improvements could be made.

In December, the Corps will begin remediation work on the walls of the three outfall canals: 17th Street, Orleans Ave. and London Ave. The work will address seepage, stability and bending issues in the canal walls to allow for a **Maximum Operating Water Level** (MOWL) of 8 feet in all three canals. An additional benefit of this work is that it will help the Sewerage & Water Board remove rainwater through the outfall canals unimpeded, both now and in the future.

Construction on the planned remediation efforts is expected to be completed in June 2011.

Pumps, Gates and Walls

Previously, the Corps set Safe Water Elevations (SWE) at each canal to ensure stability of the canal walls during high-water events. Currently, the SWEs are: 17th Street Canal, 6 feet; Orleans Ave. Canal, 8 feet; and London Ave. Canal, 5 feet.

The Interim Closure Structures (ICS) have dual purposes:

- When closed for a tropical event, the gates are part of the 100-year perimeter risk reduction system, **blocking surge** from entering the canals.

London Ave. Outfall Canal

- During tropical events with heavy rainfall, the pumps at the ICSs **evacuate rain water** from the canals around the gates into Lake Pontchartrain.

The ICS structures were installed shortly after Hurricane Katrina and provide 100-year level risk reduction. The canal walls have safely handled all Sewerage & Water Board pumping requirements, including the record rains in May 1995 and December 2009.

Experts Agree

The methodology and data collected for the remediation work was reviewed by a committee of experts including Corps personnel from the New Orleans District, the Mississippi Valley Division and Headquarters; the Southeast Louisiana Flood Protection Authority – East; the Sewerage & Water Board; external consultants and academia. Based on the data gathered, the Corps and its partners are in agreement on the remediation work to be performed at each canal as follows:

- **17th Street Canal** – the Corps will use deep soil mixing to strengthen the canal walls, and add embankment at the crown of the levee to reduce floodwall bending.

- **Orleans Avenue** – the Corps will use deep soil mixing and stability berms to strengthen the canal levees, and add embankment at the crown of the levee to reduce floodwall bending.

- **London Avenue** – the Corps will drive sheet pile to prevent seepage and add embankment at the crown of the levee to reduce floodwall bending.

All of the remediation work is described in Individual Environmental Report 27, and a Decision Record was signed by Col. Edward Fleming, Commander of the New Orleans District, on October 6, 2010.

Public Safety

Dan Bradley

"Public safety is our number one priority," said Dan Bradley, Branch Chief for Permanent Pumps. "We are continually analyzing and improving our technologies to provide the best defense from tropical events for the people of Greater New Orleans. Improving the outfall canal walls is one more step in that direction."