Greater New Orleans Hurricane & Storm Damage Risk Reduction System

SLFPA-East Update

Col. Robert Sinkler, Commander
Hurricane Protection Office

July 15, 2010
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Public Discussion Rules

- Will not publicly discuss speculative subsidence, settlement and sea-level rise projections beyond 50-years (will do it privately)

- Will not publicly discuss speculative performance of a well-maintained system beyond 100-years of age (will do it privately)

- Will not publicly discuss speculative performance of the 100-year HSDRRS at higher surge levels (will do it privately)

- Will not publicly discuss speculative performance of HSDRRS resiliency at higher surge levels than 500-yr (will do it privately)
USACE Accepted Measures to Inhibit Corrosion

- Over-sized cross sections of piles (addition of a corrosion allowance).
- **Coal tar epoxy** or other coating.
- Application of a polyethylene sleeve (on steel pipe piles).
- Zinc Coating.
- Electro-chemical (cathodic) protection.
- Casting in cement, mortar or concrete.

All are being used in the HSDRRS!

*The Current HSDRRS Design Guidelines DO NOT Address All!*
USACE Position on Oversized Steel

- In some cases an oversized sheet pile section may be specified to provide for the anticipated loss of section resulting from corrosion.

- USACE policy on use of an oversized section as an alternative in addressing steel pile corrosion is consistent with other federal and state agencies, as well as private industry design guides.
"5.6.8 Painting

Only coal tar epoxy shall be used. Steel sheet, H and Pipe pilings that will be installed in new fill, disturbed materials or fluctuating water tables shall be painted with a coal tar epoxy system. The H-piles and sheet piling shall be painted 3 inches above the stabilization slab and to a 5 ft. minimum below new fill material, disturbed soil or the lowest elevation of fluctuating water tables. Piles exposed in water (i.e. cutoff pilings in breakwaters) shall be coated the full height exposed to water plus a 5’ embedment length. Use engineering judgment for final painting requirements."

Using accepted methods to address corrosion other than painting with coal tar epoxy is within current HSDRRS Design Guidelines.
St. Bernard H-Pile Dimensions

Oversized Steel = More Strength

(not drawn to scale)

H14X89 (with oversized steel)

Depth: 13.8 in.

Flange Width: 14.7 in.

Flange Thickness: 0.6 in.

Web Width: 11.25 in.

Web Thickness: 0.6 in.

30-50% more cross-sectional area than structurally needed in top 5-7 feet!
St. Bernard H-Pile Cross Section

- Maximum Corrosion Potential
- Maximum Cross-Sectional Area Required
- Top of T-Wall Elevation of 32 feet
- O&M Manual Requires Joint Periodic Inspections of H-Piles

Not to scale
Next Step on Corrosion

- Follow-up meeting at 2pm today to further discuss way ahead (includes SLFPA-E, OCPR and ERDC experts).
Independent External Peer Review (IEPR)

- Recommend that the next (future) version of HSDRRS Design Guidelines specifically address:
  - “Corrosion”
  - “Bending Moment”

- All substantive HSDRRS Design Guideline changes do undergo an IEPR.
Settlement Calculation Factors

- Historical data.
- Soil samples from the foundation tested to determine values for settlement calculations.
- Computer modeling used to predict settlement over time.

Most settlement would occur in the first 15 years after project completion.

Many of the levees in St. Bernard Parish are on ground that has already been consolidated to some degree.
H-Piles

There is No Hydraulic or Soil Induced Load that Will Break These Piles!
There has Never Been a Documented Case of a Pile Supported T-Wall failure.
IHNC Storage Capacity

For a 100-yr Storm Surge:

Closure elevation: +3 feet
Rainfall (10-year, 24 hour event): +0.8 feet
Pumping into the basin: +2 feet
Overtopping: +1.5 feet
Wind setup: +0.5 feet
Water elevation of less than 8 feet

For a 500-yr storm surge, the IHNC Basin will rise to an elevation of less than 10 feet.

The IHNC Basin will be able to safely hold water to the top of the wall, which is at elevation +12 feet at its lowest point. (Hurricane Gustav Elevation)
Why is the Work being Expedited?

• “The Corps’ operational goal is to provide [100-yr] level of risk reduction by June 1, 2011.” (24 Feb 09 Congressional Testimony)

• Most HSDRRS work is funded by Congress with Flood Control and Coastal Emergency (FCCE) appropriations. Federal expectation is that work will be expedited as if under emergency conditions.

• A major U.S. Urban Area does not have the Hurricane Storm Surge System its needs.
USACE Authorities and Activities
Public Law 84-99
(Annual Flood Control and Coastal Emergency Appropriations from Congress)

• Disaster Preparation
• Emergency Operations
• Rehabilitation
• Water Assistance
• Advance Measures
• Hazard Mitigation

Post Hurricane Storm Surge Damage Repair

• Repair any active flood control work
• Repair any Federally constructed hurricane or shore protection work
Design Life for St. Bernard Structures

• Hydraulics drive the 50-year design elevations used for the structure elevation.

• Structures will provide one percent storm risk reduction in 2057.

• The 50-year design life is not an indicator of product life span.
  • There is no factor for longevity.
  • The walls and gates will remain structurally sound past the 50-year design life (if properly maintained).

Design Corrosion Rate for Most Steel is 100 Years or Greater
Design Life Case Study: IHNC Lock
(It is Part of the Mississippi River Levee System)

• Built in 1923 by the Port of New Orleans.

• The Lock has exceeded its original “50 Year” design life.

• It’s the evolution of the barge industry and the increased sizes of the barge tows, and not the design life, that has resulted in the authorization to replace the Lock.

Still in Operation
Nearly 90 Years Later!

Built on Timber Piles!
Southeast Louisiana Flood Protection Authority – East
Construction Execution Team

Robert Turner
Regional Director
SLFPA-E

Marcia St. Martin
Executive Director
Sewerage & Water Board

John Ashley
Branch Chief
Pump Station Repairs
Cost: >$70 M
Contracts: Design-Bid Build
Design-Bid-Build: 5
Total: 30

Joe Becker
General Superintendent
Sewerage & Water Board

Dan Bradley
Branch Chief
Permanent Pumps
Cost: >$1 B
Contracts: Design-Bid Build
Design-Bid-Build: 9
Total: 11

Stuart Williamson
Lake Borgne Basin Levee District

St. Charles Parish
Cost: >$150 M
Contracts: Design-Bid-Build
Total: 16

Orleans Metro
Cost: >$100 M
Contracts: Design-Bid-Build
Total: 10

Orleans East
Cost: >$700 M
Contracts: Design-Bid-Build
Total: 12
Early Contractor Involvement
Total: 13

St. Bernard
Cost: >$1 B
Contracts: Design-Bid-Build
Early Contractor Involvement
Total: 6

St. Bernard
Cost: >$1 B
Contracts: Design-Bid-Build
Early Contractor Involvement
Total: 6

IHNC
Cost: >$1.5 B
Contracts: Design-Bid-Build
Design-Bid-Build
Early Contractor Involvement
Total: 9

> $5 BILLION EXECUTED IN < 5 YEARS

INTERNAL WORKING DRAFT AS OF: 13 JUL 2010
St. Bernard T-Wall Decision

Earthen levees considered but ruled out for St. Bernard

New levee heights: 28' (Approx.)

Existing levee heights: 14' - 20'

Levee width necessary to meet new, more stringent post-Katrina design criteria - approx. 900'

Existing width, approx. 300'

USACE illustration, not to scale
Some T-Wall O&M Cost Savings

(Compared to a Levee)

- 75% less mowing
- 75% less settlement-related maintenance (borrow material)
- 2057 elevation without having to address future lifts and future subsidence
- Less flood side and protected side armoring maintenance
Katrina storm surge elevations were much higher elsewhere along the Gulf Coast.

100-YEAR LEVEE ELEVATION: EL +28’

500-YEAR STILL WATER ELEVATION*: EL +22.5’

HURRICANE KATRINA’S STILL WATER ELEVATION* AT THIS LOCATION: EL +18’

100-YEAR STILL WATER ELEVATION*: EL +18’

Top of Floodwall: EL +32’

Top of Base Slab: EL +21’

Top of Stabilization Slab: EL +17.5’

St. Bernard Parish Floodwall, near the IHNC Tie-In

(not labeled to scale)

*Still water elevation does not include waves

Working Draft
If Earthen Levees Were Built to Reduce Risk from a 100-year Storm in St. Bernard Parish...

- The expanded footprint would encroach into nearby waterways, and more than 1,450 acres of land would be impacted.

- Operation and Maintenance costs would be greater.

- Construction would require about 25 million cubic yards of additional borrow material, further driving up the cost.