U.S. Army Corps of Engineers

New Orleans
Hurricane Protection System
Repair and Restoration Update

Louisiana Transportation Engineering Conference

13 Feb 2007
Agenda

• Hurricane Protection System Overview and Improvements
• Current Work Status
• HSDRS Funding Re-allocation Proposal
• Louisiana Coastal Protection and Restoration
New Orleans Area
Hurricane and Storm Damage Reduction System

Legend
- Federal
- Federal Non-COE
- Non-Federal
New Orleans Topography

City of New Orleans Ground Elevations

From Canal St. at Mississippi River to the Lakefront at U.N.O.

Elevations in Feet NGVD

Mississippi River Bank

Canal St at River

St. Louis Cathedral

Esplanade at St. Claude

Derbygn at I-10

Gentilly Blvd at Allen

Dillard Univ Campus

St. Anthony at Wildair Dr

Wainright Dr at L. C. Simon

Uno Side of Wainright Dr

London Avenue Canal Floodwall

Hurricane Levee / Floodwall (14.0 Feet)

Floodwall along Mississippi River

23 FT

Project Design Flowline (18 Feet)

One Team: Relevant, Ready, Responsive, Reliable
HSDRS Program Funding ($M)

Total Funds: $5,707 M

- Storm Proofing
- Existing Pump Stations, $250
- Southeast Louisiana (SELA), $225
- Permanent Pump Stations, $530
- Navigable Floodgates, $350
- Levees, Floodwalls, Armoring, $4,301

Chart does not include the following:
- $30M for repair of non-fed levees in Terrebonne Parish
- $20M for ecosystem restoration
- $3M for MRGO study

One Team: Relevant, Ready, Responsive, Reliable
HSDRS Improvements

**Repair**

- Undamaged Levee
- Subsided Levee

**Correct Floodwall Deficiencies**

- Restore
- Complete
- Certify

**Improve**

- Navigable Floodgates
- Permanent Pump Stations
- Storm Proof Pump Stations

---

One Team: Relevant, Ready, Responsive, Reliable
Design Improvements

- Levees raised to provide higher level of protection
- Levee base constructed wider for greater stability
- Stability berms constructed to provide additional support
- Wave berms constructed to reduce wave run-up
- Better, stronger borrow material used to ensure higher level of stability
- Armoring to provide resilience and protect against scour
Completed Protection Work

- All damaged repaired.
- Deficiencies Corrected.
- Floodwalls Armored.
- Transitions Strengthened.
- 25 miles of new levees and floodwalls restored to design heights.

→ Protection Stronger and Better than before Katrina!
HSDRS
Repair Summary: Phase 1

Protection Restored Schedule
- Restore pre-Katrina protection by 1 Jun 06
- 100% complete towards pre-Katrina Protection Restored

Program Facts
- Repaired system
  - 220 total miles of levees and floodwalls repaired
  - 2.3 mi new floodwall
  - 22.7 mi new levee
  - 195.3 mi scour repair (98 mi MRL completed 17 Mar)
  - 3 interim gated closure structures (IGCS)
  - 4 closure structure repairs
  - Approx. 5.5 million cubic yards of borrow required
- Fully funded at $1.1 B
- Construction
  - 59 projects by 26 Contractors
  - 90% of work by local contractors - 38% by HZ/8(a)
  - $557M in construction activity
- Supply
  - Two supply contracts – clay and temporary pumps
  - 1,566,000 cy of clay supplied to date @ 47.1M
  - 34 IGCS pumps purchased @ $35.3M
- Real Estate
  - 894 acres commandeered
  - 404 ownerships anticipated
  - $63M anticipated property value
  - 155 vessels removed from levee
Phase I Repairs

Lower Ninth Ward Floodwall Breach Repair
Phase I Repairs

**IPET Finding:** I-Walls failed catastrophically from overtopping.

**Solution:** Provide performance redundancy by **armoring levees and floodwalls.**

*Floodwall Scour Repair on IHNC*
IPET Finding: Transition Zones between levees/floodwalls and gate structures were a weak link.

Solution: Provide performance redundancy by *armoring transition zones*.
Phase I Repairs

New Orleans East:
East Back Levee Breach Repair
Current Project Status

- **Lake Pontchartrain and Vicinity**

**Lake Pontchartrain and Vicinity**

**Levees**
- **Objective:** Provide protection to the IHNC/GIC area.
- **Status:** Currently assessing alternative plans.
- **Levee:** 81 miles

**Floodwalls**
- **Objective:** Provide surge protection to the outfall canals.
- **Status:** Phase 2 design work begun (site selection, hydraulics, geotech).
- **Floodwall:** 11 miles

**Navigable Floodgates**
- **Objective:** Provide protection to the IHNC/GIC area.
- **Status:** Recently approved.
- **2 Contracts Estimated**
West Bank and Vicinity

Current Project Status:
- **Levees**: 47 miles
- **Floodwalls**: 9 miles

70 Total Contracts
10 Contracts in construction
Existing Pump Station Repairs

Status Update

<table>
<thead>
<tr>
<th></th>
<th>Repairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Projects</td>
<td>26</td>
</tr>
<tr>
<td>Complete</td>
<td>11</td>
</tr>
<tr>
<td>In Construction</td>
<td>9</td>
</tr>
<tr>
<td>In Design</td>
<td>6</td>
</tr>
<tr>
<td>Prepping for P&amp;S</td>
<td>0</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total # PS</td>
<td>65</td>
</tr>
<tr>
<td>Orleans</td>
<td>24</td>
</tr>
<tr>
<td>Jefferson Parish</td>
<td>17</td>
</tr>
<tr>
<td>St. Bernard</td>
<td>8</td>
</tr>
<tr>
<td>Plaquemines</td>
<td>16</td>
</tr>
</tbody>
</table>
Objective:
• Complete repairs and storm proofing by 2010
Southeast Louisiana Urban Flood Control Project

Work Description
- Jefferson: Channels Improved: 24, Bridges Replaced: 7, Pump Stations Improved: 4, New PS: 2
- Orleans: Channels Improved: 6, Pump Stations Improved: 1, New PS: 2

Contracts
- Complete: 39
- FC&CE Funds: $224,755,000
- Awarded Since Katrina: 4
- In Design: 10
Interim Gated Closure Structures

- London Ave. Closure Structure
- Orleans Canal Closure Structure
- 17th St. Canal Closure Structure
## Closure Structures

### Pumping Capacity

**Current Status & Schedule**

(as of 12 Feb 07)

<table>
<thead>
<tr>
<th>Date</th>
<th>17th St. Canal</th>
<th>Orleans Ave. Canal</th>
<th>London Ave.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current *</td>
<td>4,000 cfs (Temporary Pumps)</td>
<td>2,200 cfs (Temporary Pumps)</td>
<td>2,800 cfs (Temporary Pumps)</td>
</tr>
<tr>
<td>1 JUNE 2007 **</td>
<td>5,200 cfs (West 4) (Temporary and Portable Pumps)</td>
<td>2,200 cfs (Temporary Pumps)</td>
<td>2,800 cfs (Temporary Pumps)</td>
</tr>
<tr>
<td>New Contracts Late-July, Mid August ***</td>
<td>7,600 cfs (Temporary Pumps)</td>
<td>2,200 cfs (Temporary Pumps)</td>
<td>5,000 cfs (Temporary Pumps)</td>
</tr>
</tbody>
</table>

### Issues

**17th St. Canal**

- Will reach interim goal of 5200 cfs at 17th St. Canal upon reinstalling portable pumps and resolving pulsation problem.

- Pulsation problems with the pumps currently installed are preventing us from reaching the design capacity. Modifying pumps (motor spring replacement) to resolve.

- 7,600 and 5,000 cfs:
  - Pump supply contract awarded 22 DEC 2006.
  - Construction/installation contract awarded 31 Jan 07.

---

* Pumps installed, undergoing testing, and motor spring replacement

** Portables have been removed from 17th St. Canal. Will reinstall by 1 JUNE 2007

*** Developing schedule with pump manufacturers and construction contractors. Current estimate is to complete installation and testing between late July and mid August ’07.

---

On Schedule - Schedule slippage, but can still meet target date - Will not meet target date
Pumping Solicitations

One Team: Relevant, Ready, Responsive, Reliable

• Awarded $52.5 M Contract to M.R. Pittman on 22 Dec. 2006 for vertical flow pump systems for 17th St. and London Ave. Canals.

• Awarded $85 M Design-Build Contract to Weston Solutions, Inc. on 31 Jan. 2007 for construction and installation of pump platform at the 17th St. and London Ave. Canals.
Objective:
• Protect Outfall Canals from storm surge and evacuate the drainage

Permanent Pump Stations

Status:
• 1 Design-Build contract planned
• Phase 2 work (Site analysis, Hydraulics, and D-B solicitation docs.) started 12 October, 2006 and continuing
• Completed formal partnering session (11 & 12 Jan 2007)
• NEPA process beginning
• Total: $530M Currently Authorized
IHNC Navigable Floodgates

Objectives:

• Provide protection to IHNC/GIWW area.
• Complete floodgates by 2010

Status:

• Pursuing Acquisition of Design-Build Contracts
• Innovative Proposals currently Scheduled December 2007
• Total $350 Million Authorized
HSDRS Funding Re-Allocation

• Administration current requests that Congress reallocate $1.3 B of funds appropriated in the 4th FY06 Emergency Supplemental to activities authorized and funded in the 3rd FY06 Emergency Supplemental

• Proposal is to enable most efficient use of available appropriated funds to:
  – Provide the best protection possible with available funds
  – Reduce the time required to construct the total system to authorized design levels

• By reallocating the funds as recommended, the Corps will be able to construct most of the authorized system to pre-Katrina authorized levels and to reduce the time to complete the total project.
### $1.3B Reallocation Proposal

<table>
<thead>
<tr>
<th>Program/Project Activity</th>
<th>Original Approp. ($000)</th>
<th>Proposed Re-allocation ($000)</th>
<th>Balance ($000)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outfall Canal Closures and Permanent Pumps</strong>&lt;br&gt;WCC 391 (FCCE, 4th Supp)</td>
<td>$530,000</td>
<td>($420,000)</td>
<td>$110,000</td>
<td>Funds cannot be utilized at this time. Appropriated funds insufficient to initiate work.</td>
</tr>
<tr>
<td><strong>Improvements to IHNC</strong></td>
<td>$350,000</td>
<td>($0)</td>
<td>$350,000</td>
<td>Funding to be used for original purpose</td>
</tr>
<tr>
<td><strong>Selective Armoring</strong>&lt;br&gt;WCC 393 (FCCE, 4th Supp)</td>
<td>$170,000</td>
<td>($122,000)</td>
<td>$48,000</td>
<td>Funding cannot be utilized at this time. Work cannot be performed until other work is done.</td>
</tr>
<tr>
<td><strong>Storm Proof Pump Stations</strong></td>
<td>$250,000</td>
<td>($0)</td>
<td>$250,000</td>
<td>Funding to be used for original purpose</td>
</tr>
<tr>
<td><strong>Repair Non-Federal Levees in Terrebone Parish</strong></td>
<td>$30,000</td>
<td>($0)</td>
<td>$30,000</td>
<td>Funding to be used for original purpose</td>
</tr>
<tr>
<td><strong>Floodwall Reinforcement or Replacement</strong>&lt;br&gt;WCC 394 (FCCE, 4th Supp)</td>
<td>$1,584,000</td>
<td>($313,000)</td>
<td>$1,271,000</td>
<td>Work deferred to fund construction that will provide pre-Katrina authorized level of protection over a greater area.</td>
</tr>
<tr>
<td><strong>Incorp. non-Fed Levees in Plaquemines Parish</strong>&lt;br&gt;WCC 396 (FCCE, 4th Supp)</td>
<td>$215,000</td>
<td>($175,000)</td>
<td>$40,000</td>
<td>Funding cannot be utilized at this time. Appropriated funds insufficient to initiate work.</td>
</tr>
<tr>
<td><strong>‘Jump Start Eco-system Restoration</strong></td>
<td>$20,000</td>
<td>($0)</td>
<td>$20,000</td>
<td>Funding to be used for original purpose</td>
</tr>
<tr>
<td><strong>MRGO Study</strong></td>
<td>$3,000</td>
<td>($0)</td>
<td>$3,000</td>
<td>Funding to be used for original purpose</td>
</tr>
<tr>
<td><strong>Provide 100-Year Level of Protection</strong>&lt;br&gt;WCC 707 (CG, 4th Supp)</td>
<td>$495,000</td>
<td>($245,000)</td>
<td>$250,000</td>
<td>100-yr work deferred to fund construction that will provide at least pre-Katrina authorized level of protection over a greater area.</td>
</tr>
<tr>
<td><strong>Total 4th Supp</strong></td>
<td>$3,647,000</td>
<td>($1,275,000)</td>
<td>$2,372,000</td>
<td></td>
</tr>
<tr>
<td><strong>Repairs to St. Charles Parish levees</strong>&lt;br&gt;WCC 706 (CG, 3rd Supp)</td>
<td>$25,000</td>
<td>($24,965)</td>
<td>$35</td>
<td>Construction (CG) funds appropriated for work in St. Charles Parish not needed and will be used for other 3rd Supplemental activities.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$3,672,000</td>
<td>($1,299,965)</td>
<td>$2,372,035</td>
<td></td>
</tr>
</tbody>
</table>

**Funds Taken From**

<table>
<thead>
<tr>
<th>Program/Project Activity</th>
<th>Original Approp. ($000)</th>
<th>Proposed Re-allocation ($000)</th>
<th>Balance ($000)</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Completion of Previously Authorized System</strong>&lt;br&gt;West Bank &amp; Vicinity, Lake Ponchartrain &amp; Vicinity&lt;br&gt;WCC 33X (FCCE, 3rd Supp)</td>
<td>$529,000</td>
<td>$519,000</td>
<td>$1,048,000</td>
<td>Will fund contracts ready to award Jan thru Nov 2007 req’d to complete 3rd Supp work in this account for metro NOLA.</td>
</tr>
<tr>
<td><strong>Repair/ Restore Existing System</strong>&lt;br&gt;West Bank &amp; Vicinity, Lake Ponchartrain &amp; Vicinity&lt;br&gt;WCC 337 (FCCE, 3rd Supp)</td>
<td>$1,531,000</td>
<td>$780,965</td>
<td>$2,311,965</td>
<td>Will fund contracts ready to award Jan thru Nov 2007 necessary to complete 3rd Supp work in this account.</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>$2,060,000</td>
<td>$1,299,965</td>
<td>$3,359,965</td>
<td></td>
</tr>
</tbody>
</table>
Louisiana Coastal Protection and Restoration (LaCPR)

- Preliminary Technical Report completed in July 2006
- Characterizes hurricane threat and engineering design challenges
- Multiple lines of defense strategy
  - Coastal restoration/protection
  - Structural measures
  - Non-structural features
- Describes need for using risk reduction decision framework
- Describes plan to produce Final Technical Report
Possible LaCPR Report
Conclusions

• Recommendations for the following:
  – Authorize construction of some features
  – Authorized advanced design work
  – Authorize further study
  – No further action

• Recommendations will be specific to planning units (e.g., East of the river, SW Louisiana, etc...)

[Map image: 100+ Years of Land Change for Southeast Coastal Louisiana]
Discussion and Questions