Hurricanes Katrina and Rita:
The Unwatering of New Orleans
Hurricane Katrina

- Sheer size caused devastation over 100 miles from the center of the storm
- Storm surge caused major catastrophic damage
- Over $75 billion in damages, with economic impact of $250 billion
- Hurricane Protection System overwhelmed by sheer magnitude and strength of the storm
Scope of Damages

- 169 miles of levee and floodwall
- 66 pump stations
- 4 gated structures
Affected Area

Hurricane Protection System
- 284 miles of exterior levee and floodwall
- 48 pump stations
Metropolitan New Orleans

US Army Corps
of Engineers

Map of the Metropolitan New Orleans area with labels for various locations such as Orleans Canal, Lake Pontchartrain, and Jefferson Parish. The map includes symbols for pumping stations, levee breaches, and sheet piles closing canals.

Source: Army Corps of Engineers and Tom Sawyer
City of New Orleans
Ground Elevations

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

Elevations in Feet NGVD
30
20
10
0
-10
-20
-30

Floodwall Along Mississippi River
23 FT
18 FT Project Flowline
Avg Annual Highwater 14 FT

Hurricane Protection Levee & Floodwall
17.5 FT

SPH Design Elevation 11.5 FT
Normal Lake 1.0 FT Level

Gentilly Ridge

Area Map
Lake Pontchartrain
From Canal St. at Mississippi River to the Lakefront at U.N.O.
Orleans East Bank
Reconstruction Area

- Damaged
- No Significant Damage

Local Authorities
- Orleans Levee District
- Orleans Parish Government
- N.O. Sewerage and Water Board
- Louisiana DOTD

Hurricane Protection System
- 19.2 miles of levee and floodwall
- 13 pump stations
- 15 roadway floodgates

Damage
- 1.1 miles of levee and floodwall
- 13 pump stations

Reconstruction Schedule
<table>
<thead>
<tr>
<th>Construction</th>
<th>Start</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hurricane Protection</td>
<td>Oct.</td>
<td>May</td>
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</table>
- Anticipate 9 construction contracts
  - 1 HZ/8(a) ~$1M
  - 8 Unrestricted ~$88M

As of 11 1000 OCT 05
Orleans East Bank

17th St Canal I-wall


London Ave. Canal Breach at Mirabeau Ave.

One Team: Relevant, Ready, Responsive, Reliable
Orleans East Bank - London Avenue Outfall Canal
Inner Harbor Navigation Canal Reconstruction Area

- Local Authorities
  - Orleans Levee District
  - Port of New Orleans
  - Louisiana DOTD

- Hurricane Protection System
  - 12.3 miles of floodwall and levee

- Damage
  - 5 miles of floodwall and levee

Flooding of Container Storage Yard

Northern 9th Ward Breach

Sheetpile Floodwall Collapse
One Team: Relevant, Ready, Responsive, Reliable

US Army Corps of Engineers

Flooding of Container Storage Yard near France Road

Sheetpile Floodwall Collapse – 9th Ward (East Side)

Florida Ave. Bridge Northern 9th Ward Breach (east side)
Basic Strategy

One Team: Relevant, Ready, Responsive, Reliable
Orleans Parish - Inner Harbor Navigational Canal
Orleans Parish - IHNC Floodwalls
Orleans Parish - Inner Harbor Navigational Canal
New Orleans East

Reconstruction Area

- Orleans Levee District
- Orleans Parish Government
- N.O. Sewerage and Water Board
- Louisiana DOTD

Hurricane Protection System
- 39 miles of exterior levee and floodwall (I-wall)
- 8 miles of interior levee
- 8 pump stations
- 2 highway floodgates
- 1 railroad floodgate

Damage
- 4.6 miles of exterior levee and floodwall
- 8 pump stations

Local Authorities
- Orleans Levee District
- Orleans Parish Government
- N.O. Sewerage and Water Board
- Louisiana DOTD

Intracoastal Waterway Breach
Air Products Breach
Citrus Back Levee

Maxent Levee

<table>
<thead>
<tr>
<th>Damaged</th>
<th>No Significant Damage</th>
<th>Non-Federal Levee</th>
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</table>

Citrus Back Levee
Air Products Breach
Intracoastal Waterway Breach
New Orleans East

Citrus Back Levee – NOE04

One Team: Relevant, Ready, Responsive, Reliable
Project Damages for New Orleans East Hurricane Protection
Levee and Floodwall – NOE01
New Orleans - East Reach A
NOE02
St. Bernard
Reconstruction Area

- Damaged
- No Significant Damage
- Non-Federal Levee

Local Authorities
- Lake Borgne Basin Levee District / Orleans Levee District
- St. Bernard Parish Government
- Louisiana DOTD

Hurricane Protection System
- 30 miles of exterior levee and floodwall
- 22 miles of non-federal interior levee
- 8 pump stations
- 2 control structures
- 6 floodgates

Damage
- 8 miles of exterior levee and floodwall (I-wall)
- 1.4 miles of non-federal interior levee
- 8 pump stations
- 2 control structures
- 4 floodgates

Construction

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<tr>
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<td>Nov.</td>
<td>May</td>
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<tr>
<td>Creedmore Structure</td>
<td>Dec.</td>
<td>May</td>
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<tr>
<td>Bayou Dupre</td>
<td>Nov.</td>
<td>May</td>
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<tr>
<td>Bayou Bienvenue</td>
<td>Nov.</td>
<td>May</td>
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As of 11 1000 OCT 05

Bayou Bienvenue Control Structure
Breach near Pipeline Canal
Bayou Dupre Control Structure
St. Bernard Parish - Bayou Bienvenue to Bayou Dupre

STB04
St. Bernard Parish - Bayou Dupre to STA. 1007+91 - STB03
Plaquemines
Reconstruction Area

- Damaged
- No Significant Damage
- Non-Federal Levee

Local Authorities
- Plaquemines Parish Government (Buras, Grand Prairie, and Plaquemines Parish West Bank Levee Districts)
- Louisiana DOTD

Hurricane Protection System
- 109 miles of Mississippi River levee and floodwall (34 miles part of NoV)
- 53 miles of Hurricane Protection back levee
- 6.5 miles of floodwall
- One marine floodgate
- Non-Federal/Private: 19 pump stations

Damage
- 20 miles of Mississippi River and Hurricane Protection levee
- 2 miles of floodwall
- Non-Federal/Private levees and pump stations – continuing to evaluate

Reconstruction Schedule
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<th>Start</th>
<th>Comp.</th>
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</thead>
<tbody>
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<td>NOV</td>
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- Anticipate 11 construction contracts
  - 5 HZ/8(a) ~$19M
  - 6 Unrestricted ~$60M

As of 11 1000 OCT 05
Plaquemines - Hurricane Protection Back Levees West Bank - St. Jude to City Price Reach - P19
Plaquemines - Hurricane Protection Back Levees West Bank - Reach A - P19
Plaquemines - Hurricane Protection Back Levees West Bank - Reach B1 - P18
Sunrise Pump Station
Plaquemines - West Bank River Levee (WBRL) - across from Reach A - P19
Plaquemines - Hurricane Protection Back Levees East Bank - Reach C
Plaquemines - Hurricane Protection Back Levees East Bank - Reach C – P03
Task Force Guardian
Program Statistics

- $798 million execution
- 5 million cy borrow material
- 155 vessels removed
- 59 Contracts
- 9 months to deliver
Orleans East Bank - Project Summary

Local Authorities
- Orleans Levee District
- City of New Orleans
- N.O. Sewerage and Water Board
- Louisiana DOTD

Hurricane Protection System
- 13.2 miles of levee and floodwall
- 13 pump stations
- 15 roadway floodgates

Damage
- 1.1 miles of levee and floodwall
- 13 pump stations

Awarded Contracts

<table>
<thead>
<tr>
<th>Project</th>
<th>Awarded Amount ($000)</th>
<th>Solicitation Method</th>
<th>Large/Small Business</th>
<th>Contractor HQ Location</th>
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TOTALS $16,256  Actual $148,950 Planned $165,206 TOTAL

Contract Progress
As of Jan. 17, 2006
IHNC - Project Summary

Local Authorities
- Orleans Levee District
- Port of New Orleans
- Louisiana DOTD

Hurricane Protection System
- 12.3 miles of floodwall and levee

Damage
- 5 miles of floodwall and levee

Awarded Contracts

<table>
<thead>
<tr>
<th>Project</th>
<th>Awarded Amount ($000)</th>
<th>Solicitation Method</th>
<th>Large/Small Business</th>
<th>Contractor HQ Location</th>
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Contract Progress
As of Jan. 18, 2006
New Orleans East - Project Summary

Local Authorities
- Orleans Levee District
- Orleans Parish Government
- N.O. Sewerage and Water Board
- Louisiana DOTD

Hurricane Protection System
- 39 miles of exterior levee and floodwall (i-wall)
- 8 miles of interior levee
- 8 pump stations
- 2 highway floodgates
- 1 railroad floodgate

Damage
- 4.5 miles of exterior levee and floodwall
- 8 pump stations

Awarded Contracts

<table>
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<th>Project</th>
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TOTALS $53,054

Contract Progress
As of Jan. 18, 2006

100%
80%
60%
40%
20%
N/A
AWARDED
ADVERTISED

100%
80%
60%
40%
20%
N/A
AWARDED
ADVERTISED
**Plaquemines - Project Summary**

**Local Authorities**
- Plaquemines Parish Government (Buras, Grand Prairie, and Plaquemines Parish West Bank Levee Districts)
- Louisiana DOTD

**Hurricane Protection System**
- 109 miles of Mississippi River levee and floodwall (34 miles part of NoV)
- 53 miles of Hurricane Protection back levee
- 6.4 miles of floodwall
- One marine floodgate
- Non-Federal/Private: 19 pump stations

**Damage**
- 150 miles of Mississippi River and Hurricane Protection levee
- 6 miles of floodwall
- One marine floodgate
- Non-Federal/Private levees and pump stations

<table>
<thead>
<tr>
<th>Project</th>
<th>Amount (000)</th>
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**Contracts Awarded**

As of Jan 18, 2006

**Total**
- $40,189 Actual
- $62,413 Planned
- $102,602 Total
17th Street Canal Closure Structure Location
Orleans Ave. Canal Closure Structure Location
London Ave. Canal Closure Structure Location
17th Street Canal Closure Structure

- Levee Tie In
- Temporary Pumps
- Gated Structure

Jefferson Parish

Orleans Parish
One Team: Relevant, Ready, Responsive,
North Claiborne to Florida Avenue
France Road to Benefit Street
East of Bayou Dupre - MRGO
Bayou Bienvenue Control Structure
Bayou Bienvenue Control Structure
New Orleans to Venice Empire/Buras Area
Better and Stronger

- Stability
- Interim gated closure structure
- Quality soils
- Engineered features
  - Back scour protection
  - Deeper sheetpiles
  - Improved utility crossings
  - Hardened transition zones

Before

After