



US Army Corps
of Engineers®



Task Force Hope

Weekly Brief

16 May 2006

One Team: Relevant, Ready, Responsive, Reliable

1



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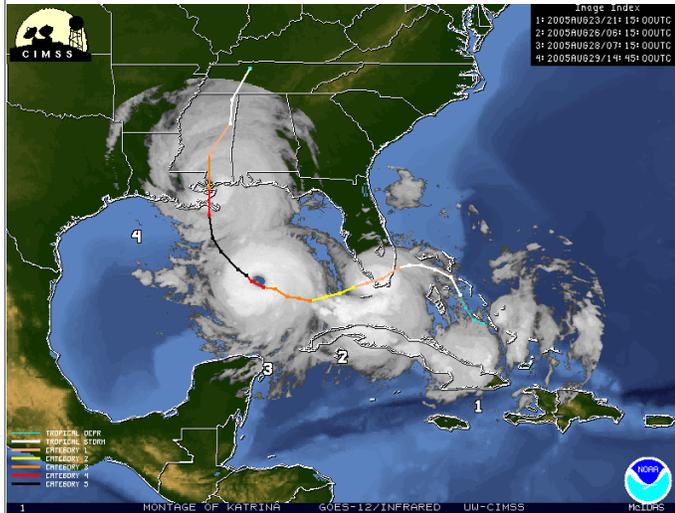
Topics

- Hurricane Katrina & Rita
- Corps emergency missions
- Hurricane protection system
- Congressionally authorized levels of hurricane protection
- Hurricane Protection System restoration summaries
- New Orleans outfall canals
- Louisiana Coastal Protection and Restoration (LaCPR)
- Additional improvements

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2

Hurricane Katrina



- *One of America's largest natural disasters*
- *Cat 5 strength less than 12 hours before landfall*
- *127 MPH wind at Louisiana landfall*
- *Maximum surge of 28 to 30 feet along Mississippi coast*
- *75 percent of New Orleans flooded*
- *More than 1,300 dead*

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**Katrina's initial Louisiana landfall at Buras, Louisiana, 6:10 a.m. 29 Aug, 2005

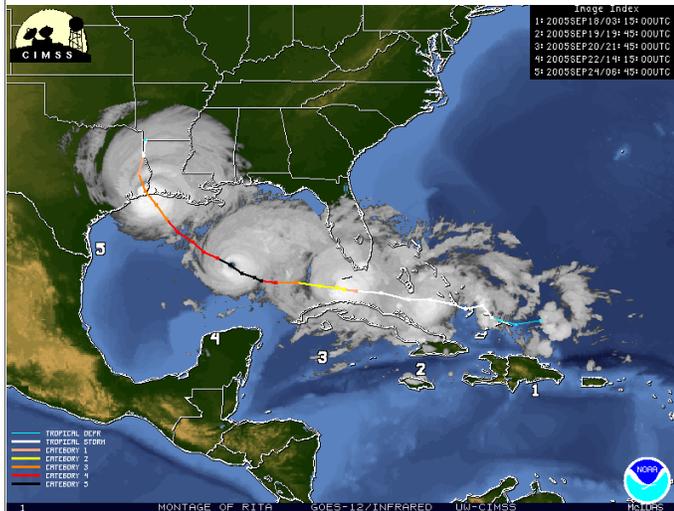
**Dropped from Category 5 to 4 at approximately 2100, 28 Aug. (MVN H&H interpolation of National Hurricane Center data)

**Dropped from Category 4 to 3 at approximately 0500, 29 Aug. (MVN H&H interpolation of National Hurricane Center data)

**Caused an estimated \$100 billion damage (per 27 Jan NOAA news release)

**New Orleans flood percentage per IPET.

Hurricane Rita



- **175 MPH max sustained winds in Gulf of Mexico**
- **120 MPH max sustained winds at landfall**
- **Cat 3 strength at landfall**

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**Hurricane Rita made landfall at about 2:30 a.m. CDT, 24 Sept. 2005 on the extreme southwest coast of Louisiana between Sabine Pass, Texas, and Johnson's Bayou, La. (per NOAA).

**Hurricane Rita caused an estimated \$9.4 billion in damage (per NOAA).

** Hurricane Rita produced the fourth-lowest central pressure ever recorded by a Gulf of Mexico/Atlantic Hurricane, (per MVN H&H, pressure estimated, final report pending).



Corps of Engineers Emergency Missions



Task Force Hope Personnel: 1,713 currently assigned

- **Water:** *Completed*
- **Ice:** *Completed*
- **Emergency power:** *299 generators installed*
- **Flood water removal:**
 - *By pumping*
 - *Accomplished in 53 days*
 - *Volume -- more than 732,000 acre-feet (250 billion gallons) removed*
- **Temporary roofing:**
 - *131,210 structures*
 - *100% complete*
- **Temporary structures**
 - *1,036 total required*
 - *92% complete*
- **Debris removal**
 - *41.3 million cubic yards removed*
 - *84% complete*
- **Structural debris removal**
 - *1.02 million cubic yards removed*
 - *13% complete*

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**Primary ongoing missions assigned to the Corps by the Federal Emergency Management Agency are debris removal, structural debris removal, and temporary public buildings missions.

**160 generators installed in Mississippi, 139 generators installed in Louisiana.

**Temporary roofing mission provides protection to private homeowners, schools, daycares, public buildings and other buildings used as shelters or relief locations. Estimate includes both Louisiana and Mississippi.

**The Corps is providing critical public structures to areas where the storms have damaged or destroyed buildings, including classrooms in communities absorbing dislocated students from other areas. Estimate includes both Louisiana and Mississippi.

**Debris removal mission assigned to the Corps by the Federal Emergency Management Agency.

**Debris removal includes both Louisiana (21.7 mil cy removed) and Mississippi (19.6 mil cy removed).

**Structural debris removal includes structures on public rights of way and on private property. Before removal, local governments need to provide demolition plans and rights of entry. Structural debris removal includes both Louisiana and Mississippi. To date mission is 13 % complete based on quantity of debris. Total structural debris estimated at 7.9 million cubic yards.

****Current as of 16-MAY-2006**



Louisiana & Mississippi Debris Missions



measured in million cubic yards (mcy)	Louisiana (% comp.)	Mississippi (% comp.)
Estimated Total Debris	27.03 (80%)	22.2 (88%)
Estimated Total Structural Debris	7.1 (4%)	0.83 (87%)
Overall Total (million cubic yards)	34.1 (65%)	23.0 (88%)

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**Debris removal mission assigned to the Corps by the Federal Emergency Management Agency.

**FEMA estimates debris volume of 60.3 million cubic yards in Louisiana and 46.0 million cubic yards in Mississippi.

**Corps responsible for the following debris: Hurricane Katrina created an estimated 20.8 million cubic yards of debris in Louisiana, while Hurricane Rita accounted for an estimated 6.3 million cubic yards. Hurricane Katrina created an estimated 22.2 million cubic yards of debris in Mississippi.

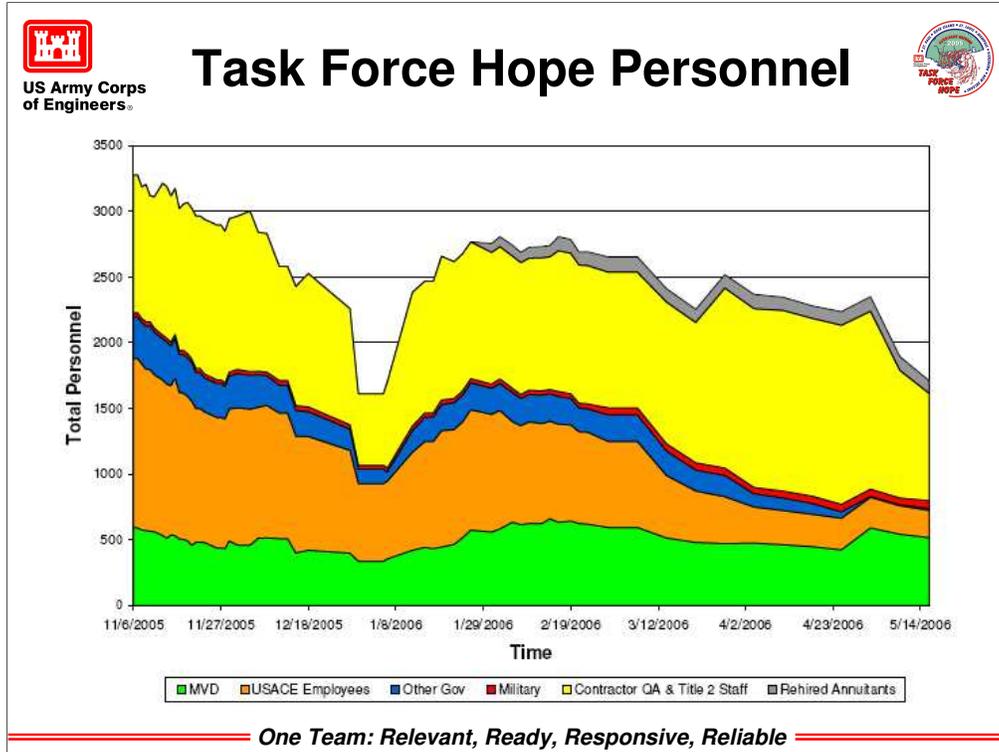
**Largest debris removal mission in U.S. history

**Previous largest debris mission resulted from 1992's Hurricane Andrew in Florida, which produced more than 15 million cubic yards.

**Katrina generated more debris in Mississippi alone than Hurricane Andrew (15 million cubic yards) the previous most destructive hurricane in U.S. History. The final debris removal total for Katrina and Rita in Mississippi alone is estimated to be three times greater than Andrew.

**Total estimated Corps debris mission in both Louisiana & Mississippi would fill the Louisiana Superdome nearly 10.6 times (total 49.2 million cubic yards/4.6 million cubic yards = 10.6 times; Superdome volume = 4.6 million cubic yards)

****Current as of 16-MAY-2006**

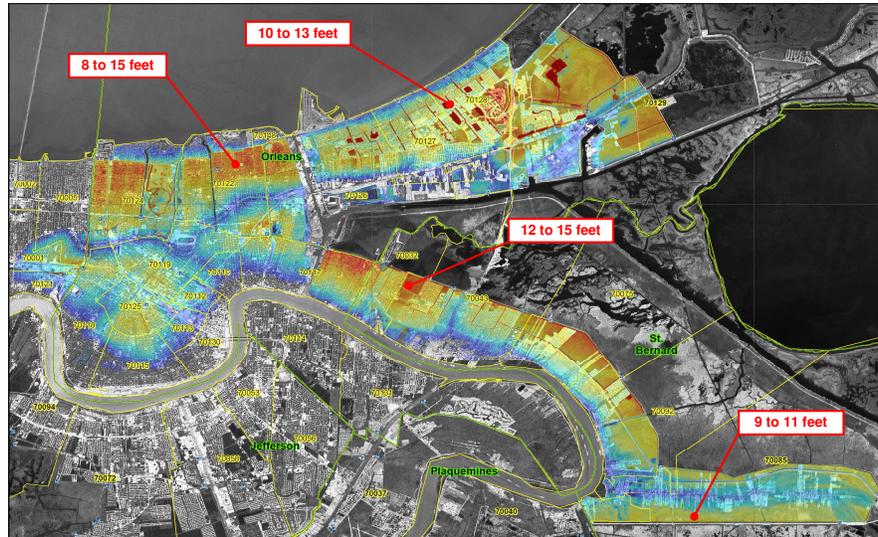


****Personnel includes 516 MVD employees, 207 other USACE employees, 16 other government agencies, 58 military, 819 contractor QA & Title II staff, and 97 rehired annuitants.**

****Current as of 16-MAY-2006**



New Orleans Maximum Flooding Depth



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**75 percent of the city of New Orleans flooded (per IPET)

**Illustrated flood depths based on preliminary data and high water marks. Numbers will become more specific as data is verified.

(maximum New Orleans flood depths pending from MVN hydrology)



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Authorized Protection Levels



Design Hurricanes

Project Location	Date Authorized	Central Pressure Index	Wind		Forward Speed
			Speed	At Radius of	
Lake Pontchartrain & Vicinity	October 1965	27.6 inches	100 mph	34.5 miles	5.75 – 12.66 mph
Grand Isle & Vicinity	1965 – 1976	28.15 inches	87 mph	35 miles	13 mph
New Orleans to Venice	October 1962	28.1 inches	90 mph	34.5 miles	11 mph
West Bank & Vicinity	1986	27.4 inches	115 mph	34.5 miles	12.6 mph

Congress currently authorizes protection from flood waters resulting from winds of 90-115 MPH.

Saffir-Simpson Scale (1970)

Scale Number	Winds (mph)
1	74 – 95
2	96 -110
3	111 – 130
4	131 – 155
5	155 +

Katrina at LA Landfall

Category 3
127 mph wind
27.17 inches central pressure
15 mph forward speed
90 miles – extent of hurricane force winds
230 miles – extent of tropical force winds

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10

**Note the differences between Katrina and the specifics of the various hurricane protection projects.

**Various Louisiana hurricane protection projects were designed and approved at different times the last 50 years and do not match up precisely with any specific rating on the Saffir-Simpson Scale, which was established in 1970.

**Katrina made landfall at [Buras, Louisiana, 6:10 a.m. 29 Aug, 2005](#)



Southeast Louisiana Hurricane Protection System



- **Repair:**
 - Return pre-Katrina protection to hurricane-damaged components by 1 June 2006
- **Restore:**
 - Restore undamaged levees/floodwalls to originally authorized heights by 1 Sep 2007
 - **Correct Floodwall Deficiencies**
- **Complete:**
 - Accelerated completion of unconstructed portions of authorized projects by Sep 2007
- **Improve:**
 - Make improvements to optimize the performance of the existing system
- **Certify:**
 - **Raise system to provide 100 year level of protection**
- **Evaluate Higher Levels of Protection:**
 - Louisiana Coastal Protection and Restoration Report - preliminary report due June 2006, final December 2007

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11

**REPAIR -- 1 June marks arrival of new hurricane season

**RESTORE -- raising levees to compensate for settlement and subsidence

**COMPLETE -- original completion date had been 2017



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Hurricane Protection System Funding Status



Component	Funding (Millions)
FUNDING TO DATE (Through 3rd Emergency Supplemental)	
Repair Existing System and Restore to Design Height	\$1,533
Complete Authorized System	
New Orleans to Venice (Hurricane Protection)	\$33
West Bank and Vicinity (Hurricane Protection)	\$147
Lake Pontchartrain and Vicinity (Hurricane Protection)	\$120
Southeast Louisiana (Interior Flood Damage Reduction)	\$225
Grand Isle (Hurricane Protection)	\$15
Larose to Golden Meadow (Hurricane Protection)	\$4
TOTAL FUNDING TO DATE	\$2,077
PRESIDENT'S PROPOSAL FOR 4TH SUPPLEMENTAL	
Outfall Canal Closures and Pump Stations	\$530
Improvements to IHNC	\$350
Selective Armoring of Levees and Floodwalls	\$170
Storm Proofing Pump Stations	\$250
Incorporate non-Federal Levees in Plaquemines Parish	\$60
'Jump Start' Eco-system Restoration	\$100
TOTAL 4TH SUPPLEMENTAL	\$1,460
TOTAL ANTICIPATED PROGRAM	\$3,537

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12

The Corps is responsible to the Department of Defense and the Department of Army in implementing missions assigned to us by law and regulation. In our Civil Works program our domestic stakeholders are governmental, commercial, and even individual citizens. The Corps' military customers span Army and Air Force major commands and installations across the country. Internationally, working under Department of Defense and Department of State guidance, the Corps' operations range across the globe, from Iraq and Afghanistan to Russia, Japan, and Korea.



Estimated Cost to Provide Protection to Base Flood Elevation (Billions)



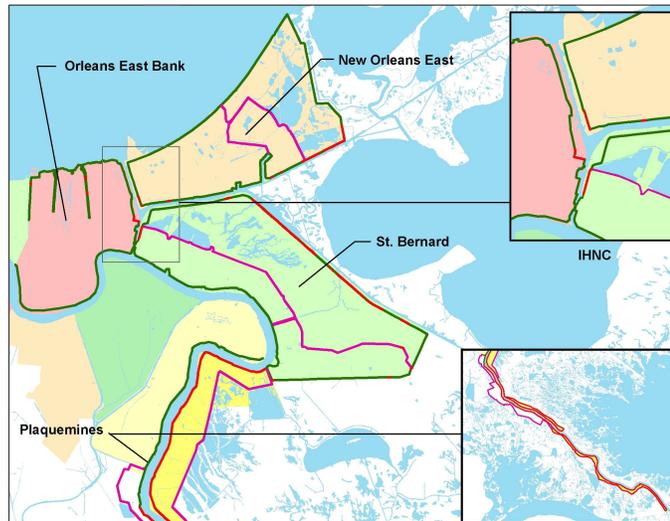
Previously Appropriated Funds	\$2.08	
Pending Supplemental Request	\$1.46	
Total Funds Provided/Requested	\$3.54	
Additional Cost for New Orleans Metro Area and Belle Chase		
• Floodwalls	\$1.6*	} \$2.5
• 100-year Protection	\$0.8	
• Non-Federal Levees (West Bank of Plaquemines)	\$0.2	
Additional Costs for Lower Plaquemines Parish		
• T-Walls	\$0.5	} \$1.6
• 100-Year Protection	\$1.1	
Total Additional Costs	\$4.10	

* Assume 36 miles of floodwall replacement per IPET analysis

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Hurricane Protection System Restoration Program Summary



Hurricane Protection System

- 350 miles
- 71 pump stations

Damage

- 41 miles severe, 128 miles moderate damage
- 34 pump stations were non-operational

Cost

- \$ 798 million

Percent of Pre-Katrina Protection Restored

87 % Complete

33 of 59 contracts complete

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14

**Map shows areas damaged by Katrina and to be repaired by the 1 June hurricane season.

**More than 350 miles of levees in the southeast Louisiana area

**41 miles sustained severe damage, 128 miles of levee sustained minor damage

**IHNC = Inner Harbor Navigation Canal, St. Bernard and Plaquemines are local parishes

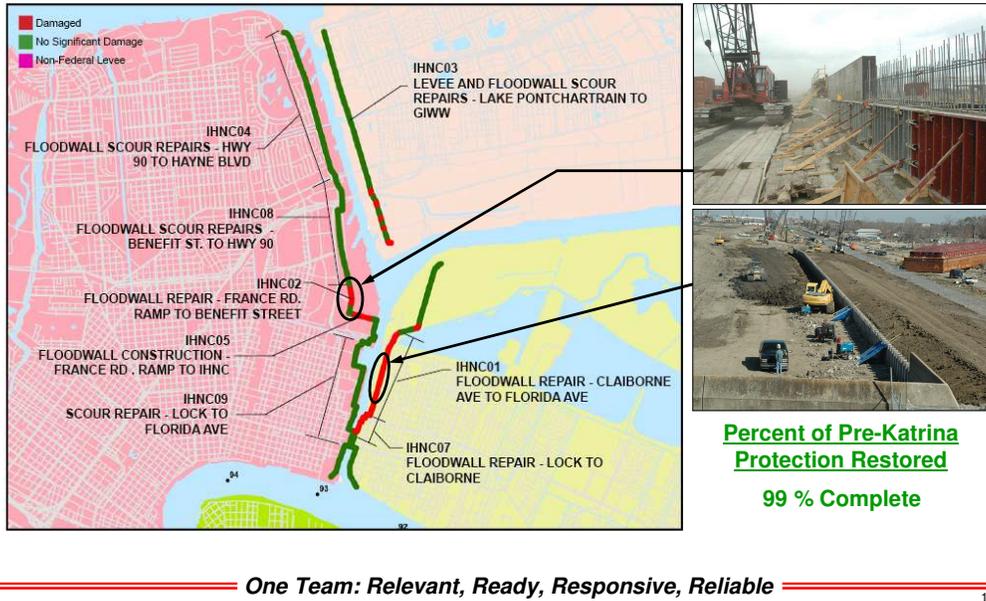
**The following seven slides address segments of the above system in greater detail and identify the contracts required to complete the repair work.

** Initially 34 pump stations were considered damaged base on non-operational status. A total of 66 pump stations received hurricane damage.

****Current as of 16-MAY-2006**



Inner Harbor Navigation Canal

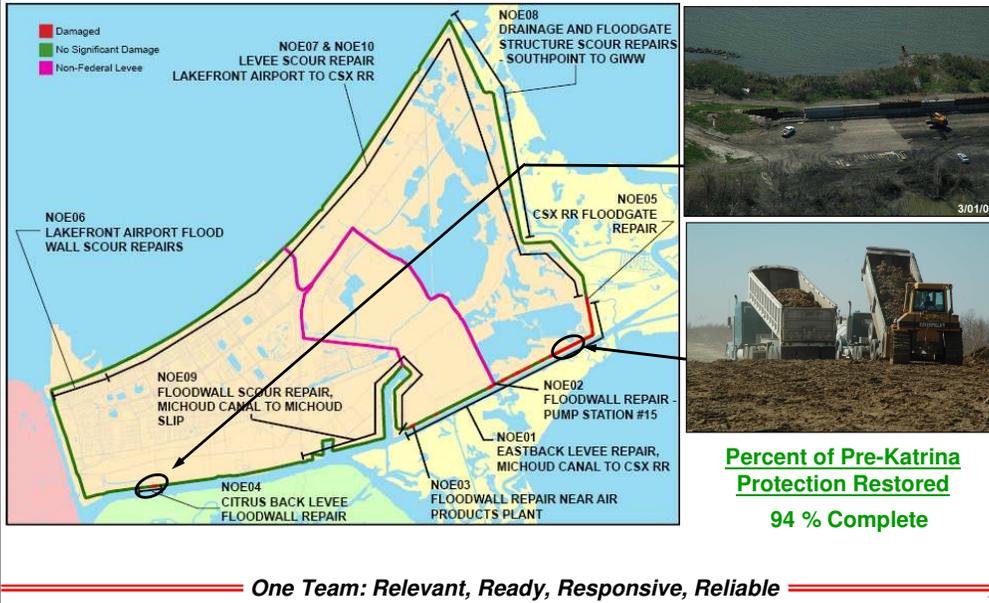


**Majority of this segment is I-wall construction, damaged portions being constructed by T-wall construction.

**In this area, storm surge overtopped the flood walls which resulted in backside scouring and ultimately led to flood walls being breached.

**Current as of 16-MAY-2006

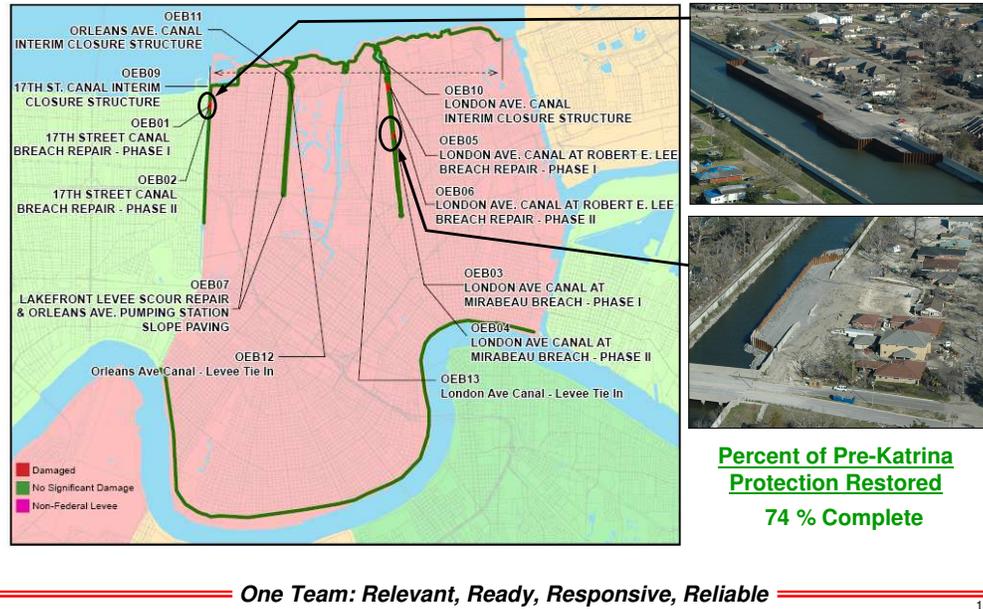
New Orleans East



** In this area, flooding resulted from the overtopping of flood walls and levees.

** Current as of 16-MAY-2006

Orleans East Bank



**New Orleans' three outfall canals provide rainwater drainage from the New Orleans area into Lake Pontchartrain.

**For reasons that are still being investigated, flood walls in the canals were breached after storm surge entered from Lake Pontchartrain.

****Current as of 16-MAY-2006**



New Orleans Outfall Canal Interim Closure Plan



- Three locations on Lake Pontchartrain
- Provides protection by 1 June 2006
- Provide New Orleans with rainwater drainage
- Prevent storm surge
- Pumps permit drainage while closed

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18

**Outfall canals provide rainwater drainage from the New Orleans area into Lake Pontchartrain.

**Gates that can be opened and closed protect the canals from storm-induced surges from Lake Pontchartrain. The pumps will move water into the lake even when the gates are closed.

**The gates will only be closed when water levels in Lake Pontchartrain reach an elevation of 7 feet above sea level, which has only occurred one time the last 74 years (during Hurricane Katrina).

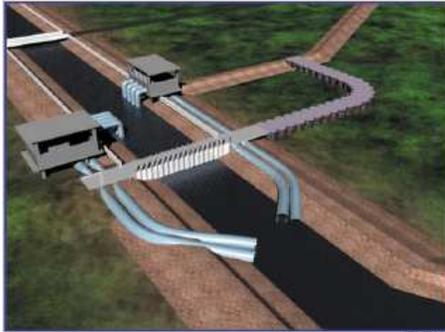
**Lake Pontchartrain has only risen to 6 feet above sea level three times the last 74 years.



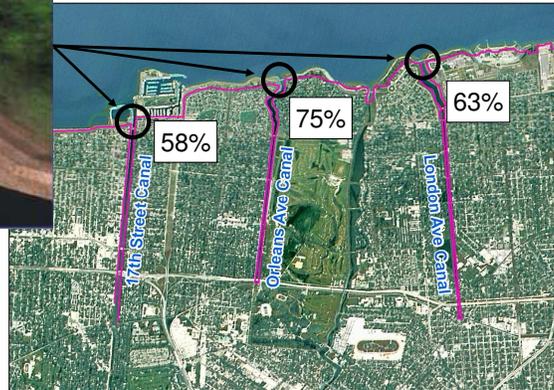
New Orleans Outfall Canal Interim Closure Structure Status



17 th St. Canal CS	58% Complete
Orleans Ave. CS	75% Complete
London Ave. Canal CS	63% Complete



Interim Closure Structure

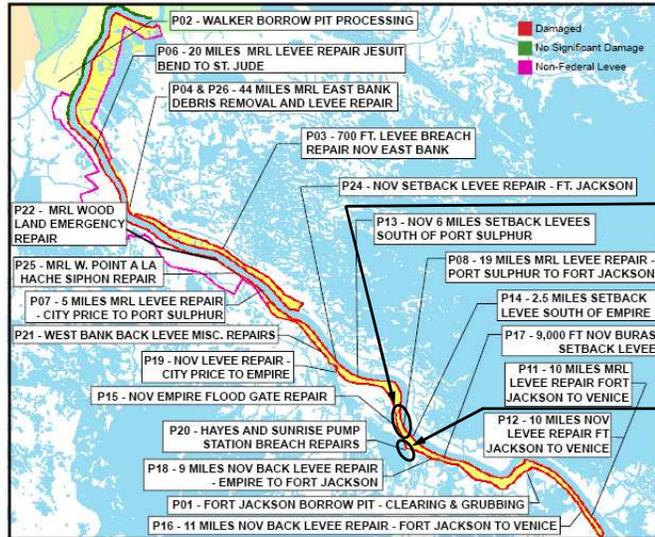


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19

Current as of 16-MAY-2006

Plaquemines Parish



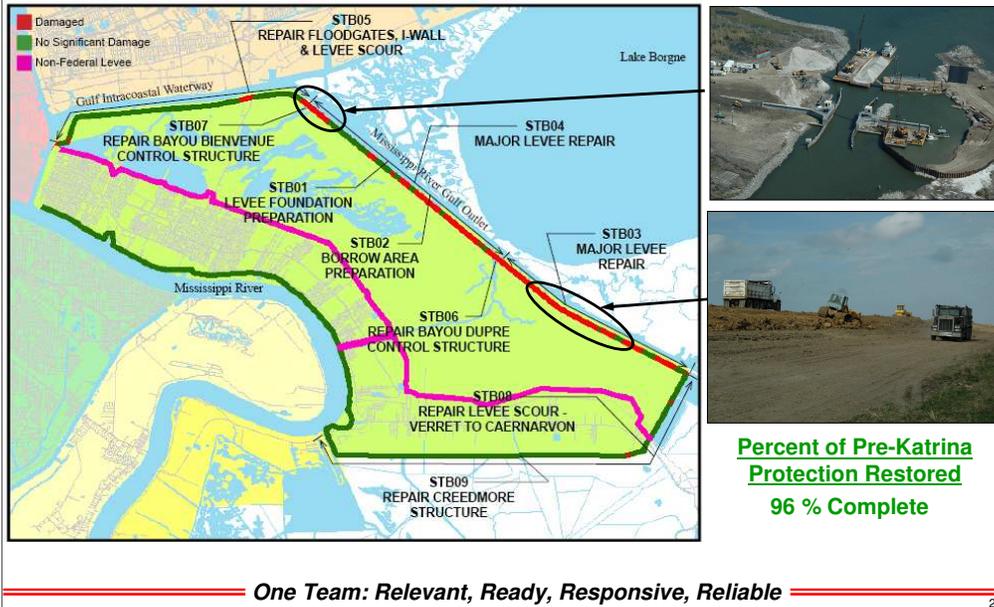
**Percent of Pre-Katrina
Protection Restored
89 % Complete**

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**In this area, flooding resulted from extensive overtopping.

**Current as of 16-MAY-2006

Saint Bernard Parish



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21

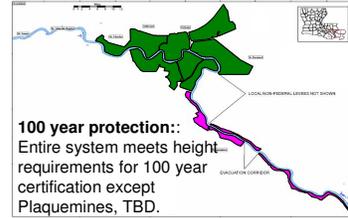
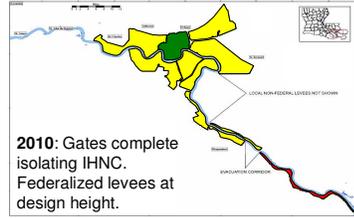
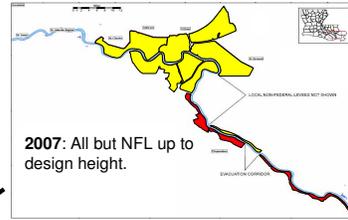
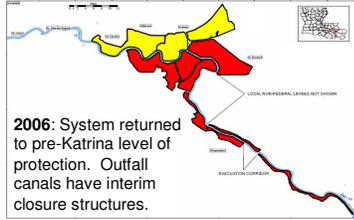
**In this area, flooding resulted from overtopping and extensive backside scouring.

**Current as of 16-MAY-2006



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Relative Risk of Flooding 100 Year Storm



100 Year Storm:
Based on FEMA still water elevations and wave height of 1/2 still water elevations resulting from the worst case track for each area of a hurricane that statistically has a 1 out of 100 (or one percent) chance of being equaled or exceeded in any given year.

- No Overtopping – rainfall only
- Wave Over wash only – breaches possible
- Surge Overtopping – breaches probable
- Level of Protection to be determined

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22

****Current as of 16-MAY-2006**



Louisiana Coastal Protection and Restoration (LaCPR)



Congress directed analysis and design of:

- **Category 5 Hurricane Protection**
- **Full range of measures for flood control, coastal restoration, and hurricane protection**
- **Preliminary Report to Congress – June 2006**
- **Final Technical Report – December 2007**
- **Submit reports on component areas for authorization as practicable**

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23

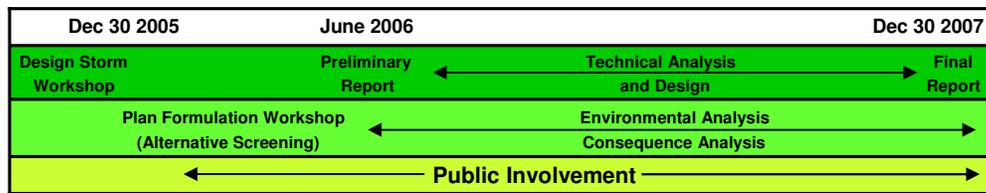


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Louisiana Coastal Protection and Restoration - Status



- Partnership with State Coastal Protection and Restoration Authority
- Working closely with State of Louisiana and Master Plan Development
- Formalizing plan formulation process and alternatives development for presentation in PTR
- Frequent broad based public involvement planned
- Comprehensive hurricane protection and coastal restoration efforts from both short-term and long range perspectives



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24

**Current as of 16-MAY-2006



Louisiana Coastal Protection and Restoration (LaCPR) - Report



- Study approach requires innovation
- Accelerated schedule
- IPET forms basis for analysis and design
- Expert Team
- Outside and independent review
- Extensive public input

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25



Southeast Louisiana Hurricane Protection



ADDITIONAL IMPROVEMENTS

The Bush Administration on Feb. 16 asked Congress to support an additional \$1.46 billion in new funding for improvements to southeast Louisiana's hurricane protection system. If approved, the proposal would pay for:

- Permanent pumps and closures for New Orleans' three outfall canals. **\$530 million**
- Two navigable closures that would prevent hurricane surge from entering the Industrial Canal area. **\$350 million**
- Storm-proofing existing interior drainage pump stations in Jefferson and Orleans Parishes. **\$250 million**
- Selective armoring for critical portions of the New Orleans levee system. **\$170 million**
- Incorporation of Plaquemines Parish west bank, non-federal levees into the federal levee system. **\$60 million**
- Restoration of critical areas of coastal wetlands and ecosystems needed to improve long-term hurricane and storm protection. **\$100 million**

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26

****New Orleans' three outfall canals provide rainwater drainage from the New Orleans area into Lake Pontchartrain.**

****Outfall canal gates and closures would protect outfall canals from storm surge out of Lake Pontchartrain, and pumps will move water from the canals into the lake when gates are closed.**

****Navigable closures would remain open except when surge is imminent, when they would close to protect the Industrial Canal area.**

****Storm-proofing pump stations would allow them to function through storms by hardening them, raising critical equipment, providing emergency power and fuel systems and providing for crew safety.**

****Armoring would be placed at such critical areas as pipeline crossings, backsides of levees and floodwalls most exposed to storm surge, and areas where floodwalls transition to earthen levees.**

****Non-federal levees in Plaquemines Parish would be raised to the same design heights as other federal levees for frequent flooding of state Highway 23 – a major hurricane evacuation route.**

****Restored wetland systems can have a buffering effect on storm surge and waves.**

****Current as of 16-MAY-2006**

Southeast Louisiana Hurricane Protection



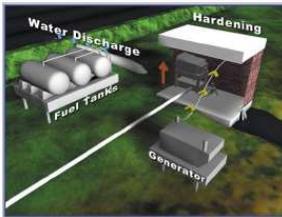
ADDITIONAL IMPROVEMENTS



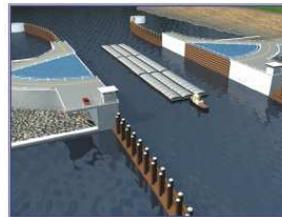
Permanent
Pumps &
Closures



Selective
Armorment



Storm-Proofing
Pump Stations



Navigable
Closures

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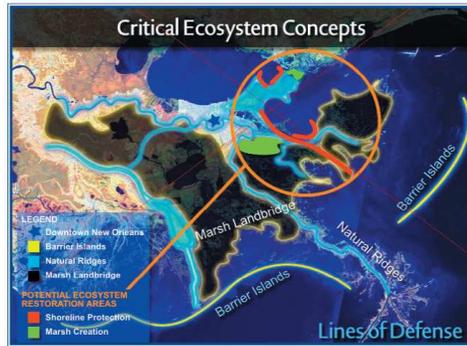
27

**Examples of the proposed additional improvements.

Southeast Louisiana Hurricane Protection



ADDITIONAL IMPROVEMENTS



Wetlands and Ecosystem Restoration



Incorporations of non-federal levees in
Plaquemines