

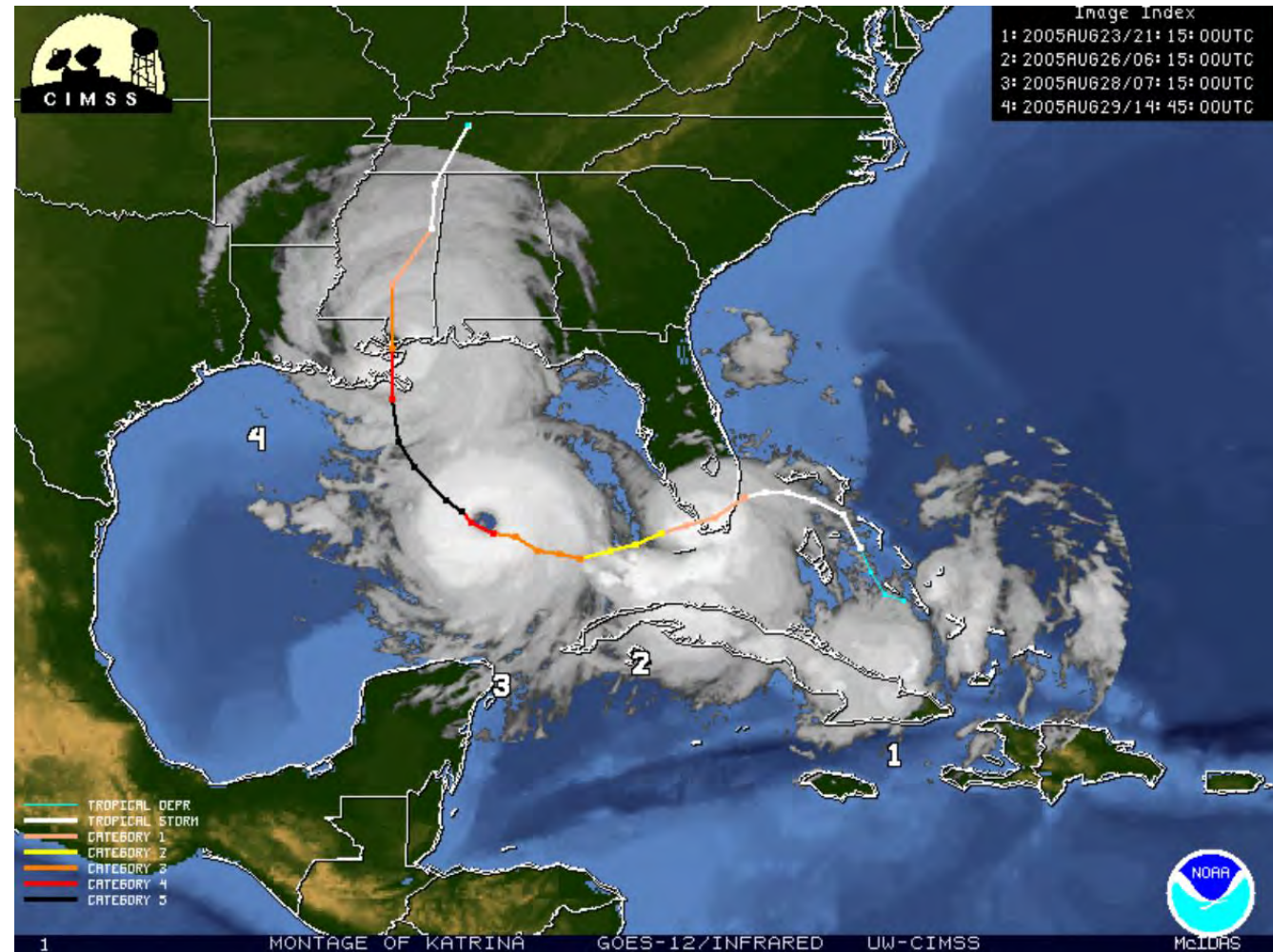
Levee and Pump Station Improvements In Southeast Louisiana After Hurricane Katrina

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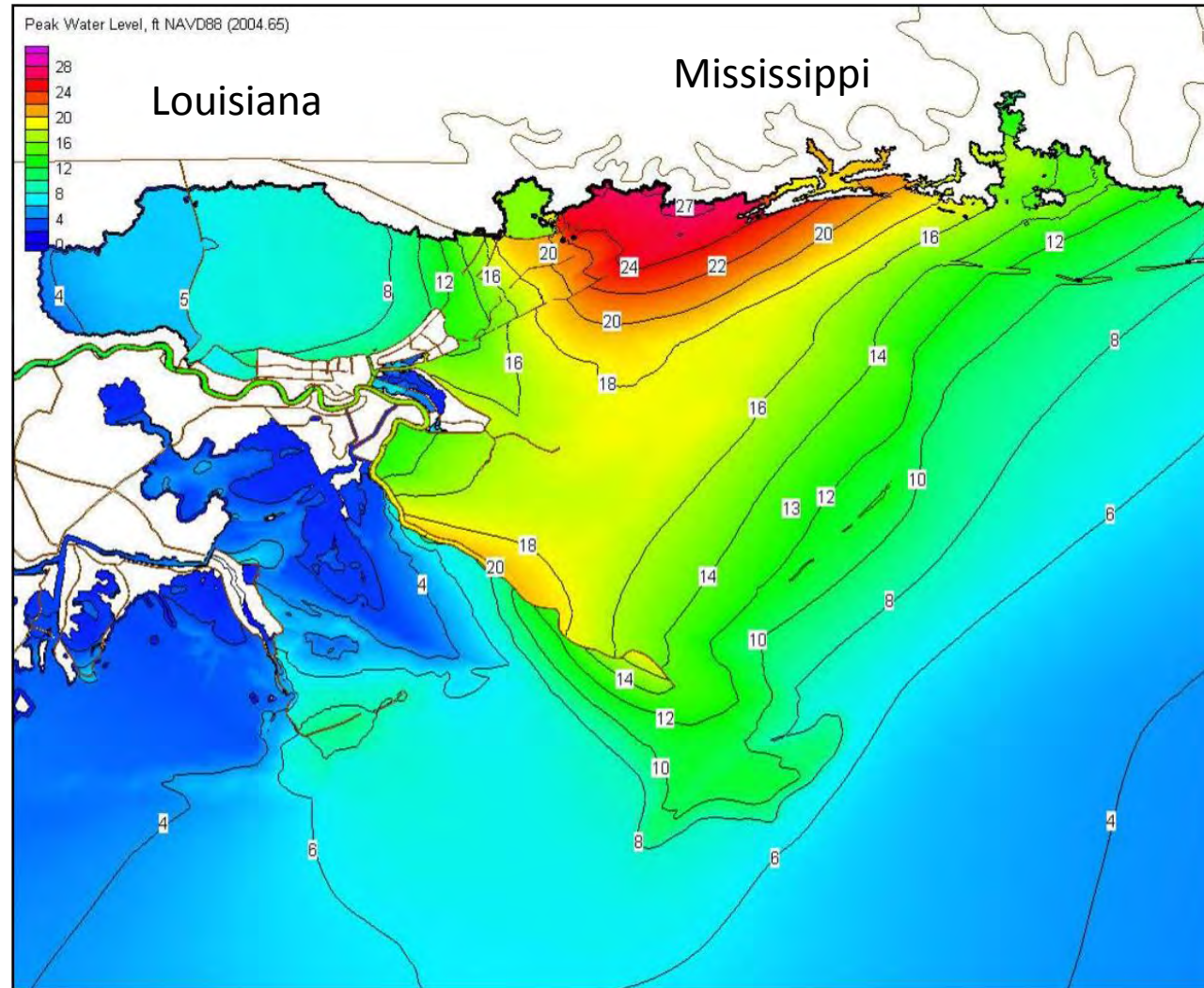


Hurricane Katrina August 2005

- Reached peak strength as Category 5 hurricane on August 28, 2005 (175 MPH winds)
- Made landfall as Category 3 on August 29, 2005 in Southeastern Louisiana
- The hurricane generated a 28' storm surge and 55' waves



Hurricane Katrina – Peak Water Levels



Hurricane Katrina - Impact



Hurricane Katrina - Impact



Hurricane Katrina - Impact



Levee and Floodwall Breaches

- Storm exceeded design criteria
- 50 Major breaches
 - All but four breaches were due to over-topping and erosion
- Levees: Scour eroded backsides and tops of levees
- Four T-Wall breaches: Foundation failures – Structures built in layer of marsh sediment

Levee Over-topping



Mississippi River Gulf Outlet (MRGO) Levee Over-topping

Floodwall Breach



17th Street Canal Levee Breach

Floodwall Breach



London Avenue Canal T-Wall Breach

Floodwall Breach



Hurricane Katrina Effects

- Damage estimated at \$151 billion
- Costliest disaster ever to occur in the United States
- 1,500 Lives lost
- Population:
 - Before Katrina: 437,000
 - 1 Year After: 158,000
 - 2014: 383,000



Hurricane and Storm Damage Risk Reduction System (HSDRRS)

- Congress approved \$14.5 billion in funding
- The US Army Corps of Engineers established “Task Force Guardian”
 - Mission to repair and restore the HSDRRS to pre-Katrina conditions by June 1, 2006
- The US Army Corps of Engineers additionally was tasked to complete 100-year storm protection by June 1, 2011
 - Based on new models for 100-year protection
 - Modeled 152 storms with varying intensities

Hurricane and Storm Damage Risk Reduction System (HSDRRS)

- The \$14.5 billion HSDRRS program includes five parishes:
 - Orleans Parish
 - Jefferson Parish
 - St. Charles Parish
 - St. Bernard Parish
 - Plaquemines Parish
- 350 Miles of Levees and Floodwalls
- 73 Pumping Stations
- 3 Canal Closure Structures with Pumps
- 4 Gated Outlets
- Structural Features Built Reduce the Risk Associated with a 100-year Storm



Hurricane and Storm Damage Risk Reduction System (HSDRRS)

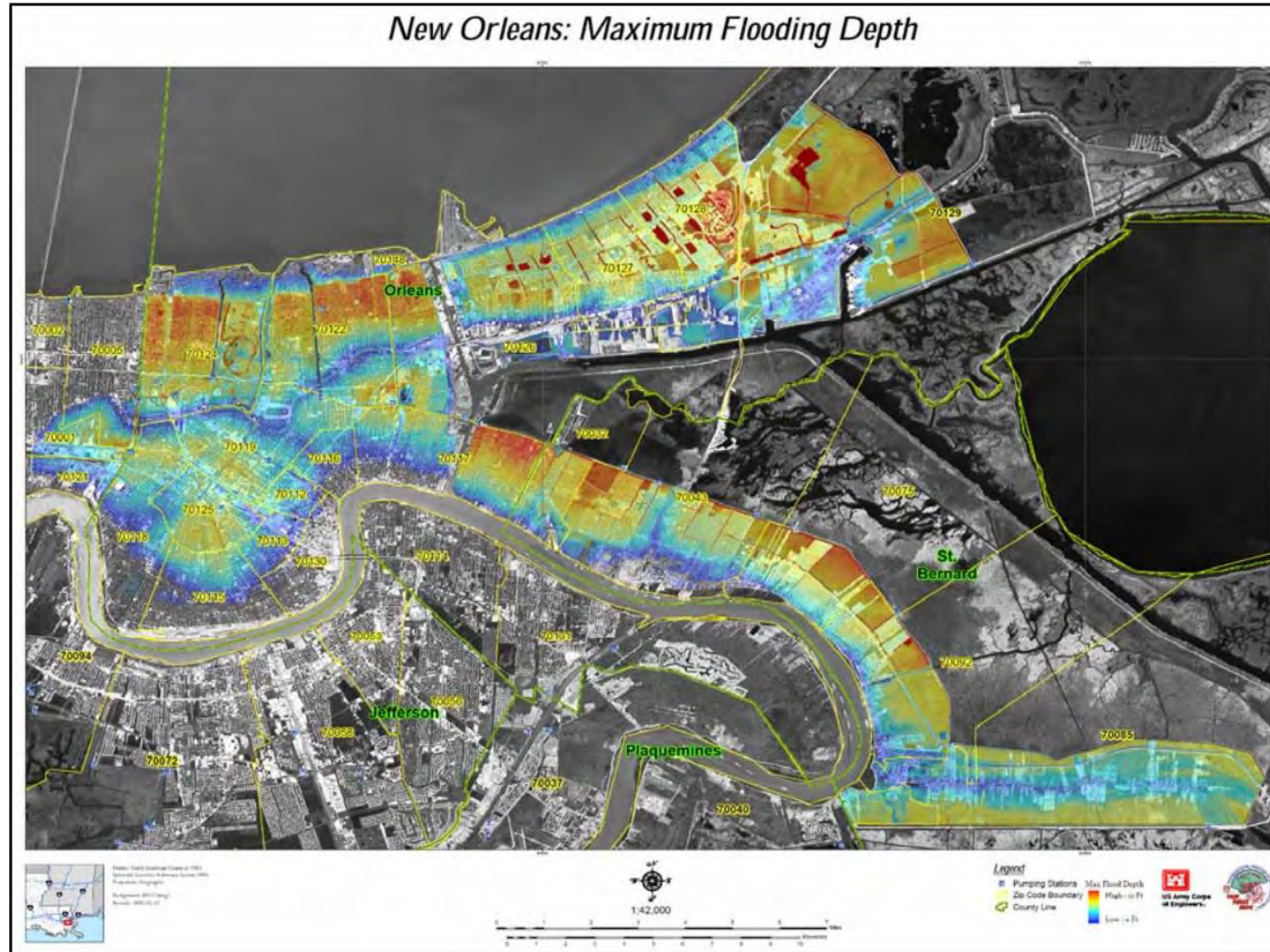


Cross Section of New Orleans



Cross Section of the City of New Orleans looking toward the West
from the line of crossing indicated on the New Orleans Elevation Map

New Orleans - Maximum Flooding Depth



IHNC-Lake Borgne Surge Barrier



IHNC-Lake Borgne Surge Barrier

- Located at the confluence of the Gulf Intracoastal Waterway (GIWW) and the Mississippi River Gulf Outlet (MRGO)
- 1.8 Mile-long surge barrier
- Project Includes:
 - 150' Wide By-Pass Barge Gate
 - 150' Wide Flood Control Sector Gate
 - 56' Wide Vertical Lift Gate
- Construction Cost: \$1.1 billion
 - Largest Design-build civil works project in the history of the US Army Corps of Engineers



IHNC-Lake Borgne Surge Barrier



IHNC-Lake Borgne Surge Barrier



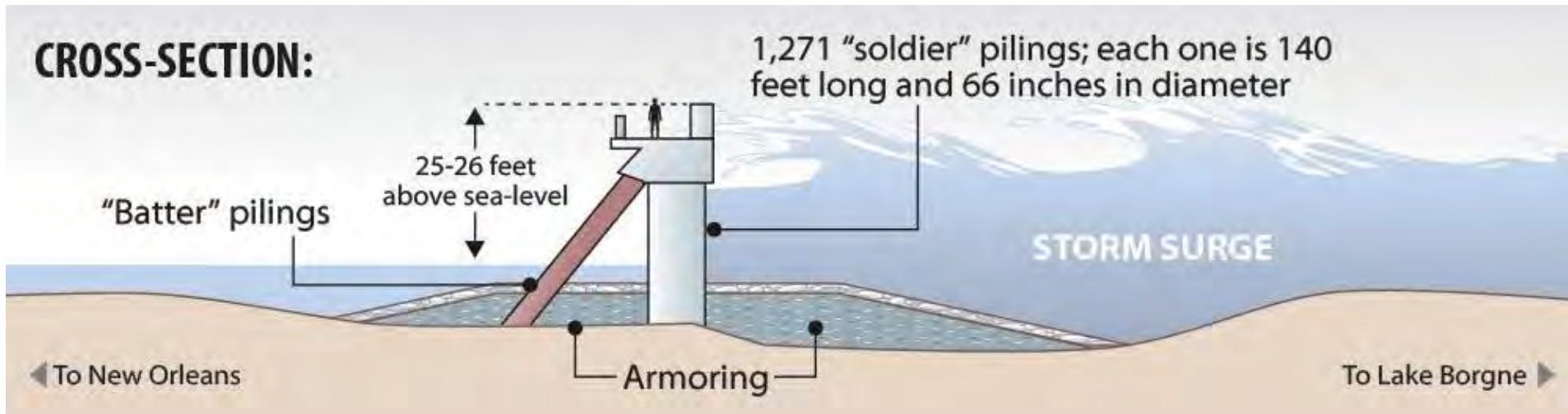
Barge Gate and Sector Gate



Vertical Lift Gate

IHNC-Lake Borgne Surge Barrier

- The 1.8 Mile-long concrete barrier flood wall consists of:
 - 66" Diameter Spun-cast Piles (140' long)
 - 36" Steel Batter Piles
 - Precast Cap Beam
 - 25' Above Sea-Level



IHNC-Lake Borgne Surge Barrier

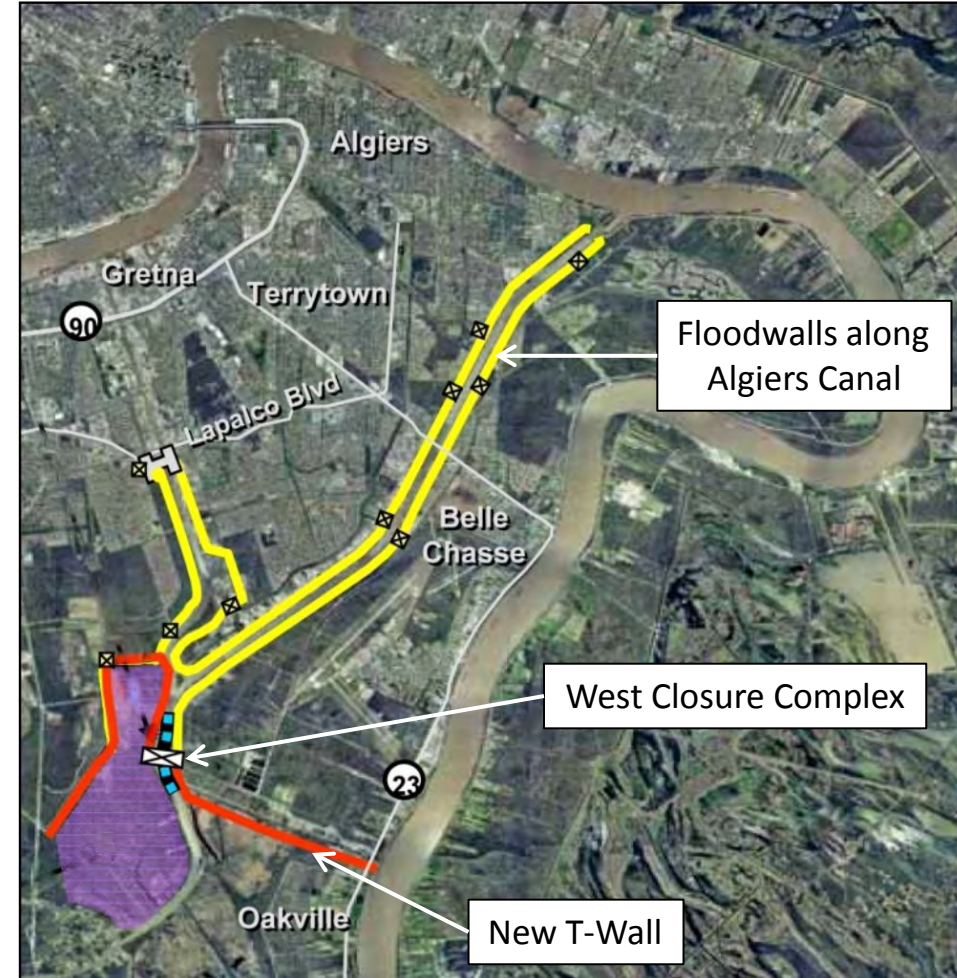


Gulf Intracoastal Waterway – West Closure Complex



Gulf Intracoastal Waterway - West Closure Complex

- Located ½ mile south of the confluence of the Harvey Canal and Algiers Canal on the Gulf Intracoastal Waterway (GIWW)
- Removes 26 miles of levees and floodwalls from direct impact of storm surge
- Construction began in August 2009
- Completed 100-year Storm Protection by June 1, 2011
- Construction Cost: \$1 billion
- Early Contractor Involvement (Construction Management At Risk)



Gulf Intracoastal Waterway - West Closure Complex

- West Closure Complex features include:
 - 19,140 cfs Drainage Pump Station (eleven 1,740 cfs vertical “Flower Pot” pumps)
 - 225’ Navigable Floodgate (Nation’s largest Sector Gate)
 - 4,200’ Concrete T-Wall along edge of Bayou aux Carpes CWA 404(c) Wetlands
 - Five Sluice Gates



Gulf Intracoastal Waterway - West Closure Complex



Gulf Intracoastal Waterway - West Closure Complex



Conclusion

- Overcame huge challenges
 - Analyzed problems and set goals
 - Hard work and team effort by Engineers, Contractors, and US Army Corps of Engineers
- Completed 100-year protection by June 1, 2011



Questions?

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