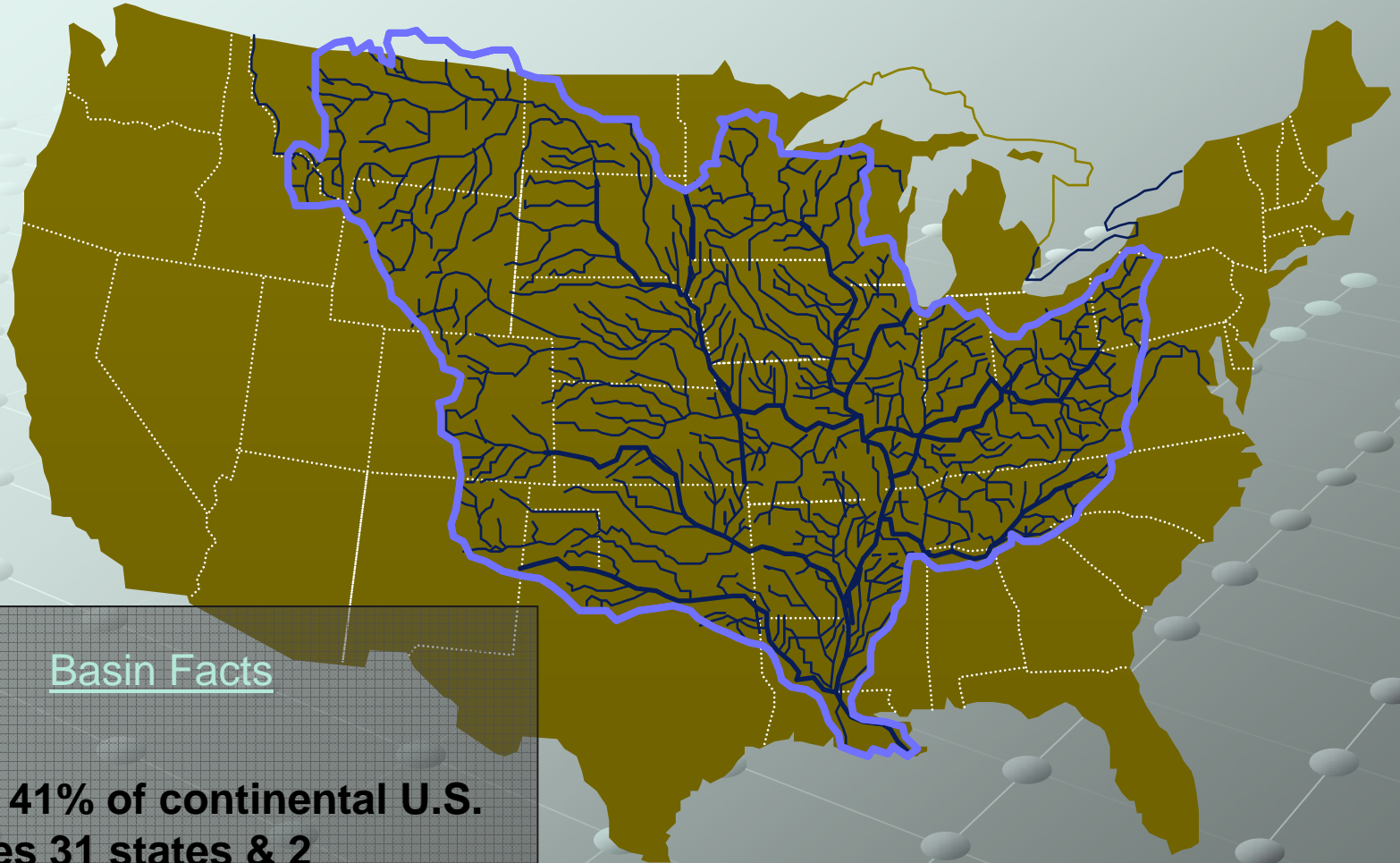


# Levees in Louisiana & Certification



# Mississippi River Basin



## Basin Facts

**Drains 41% of continental U.S.  
Includes 31 states & 2  
Canadian provinces  
Total area drained 1.25 million  
square miles**

# Major Flood Events

Changes the way the Nation & Louisiana  
view flood control responsibilities



# Civil War Period

- **State Board of Levee Commissioners**

Following the Civil War the local system of levee administration was abandoned. It was replaced in 1866 by a uniform system of statewide control which placed all responsibility for a levee system in Louisiana in a single Board of Levee Commissioners.

- **State Board of Public Works**

In 1867 major flood occurred destroying miles of levees which had cost thousands of dollars to build. A State Board of Public Works took over the job of rebuilding the levees the following year. However, another flood in 1871 once again washing away their works.

- The assessed value of taxable property dropped from nearly 14 million dollars in 1860 to an all-time low of less than half a million dollars in 1868.



# Louisiana Levee Company

- State administration ended with the 1871 flood, but statewide authority continued in a private corporation, the Louisiana Levee Company. The company was established by a special legislative act to assume full charge of the levee system and to carry on its work under contracts with the state.
- A three-mill property tax instituted but it not enough money to provide complete protection. Extensive breaches were left open. The result was loss of property, and a general decrease in taxable wealth. Levee defects were due mainly to lack of proper supervision. Levees were allowed to grow up in weeds and trees which prevented them being sodded. Levees were used as public roads and tenant houses and gardens were on top of them.

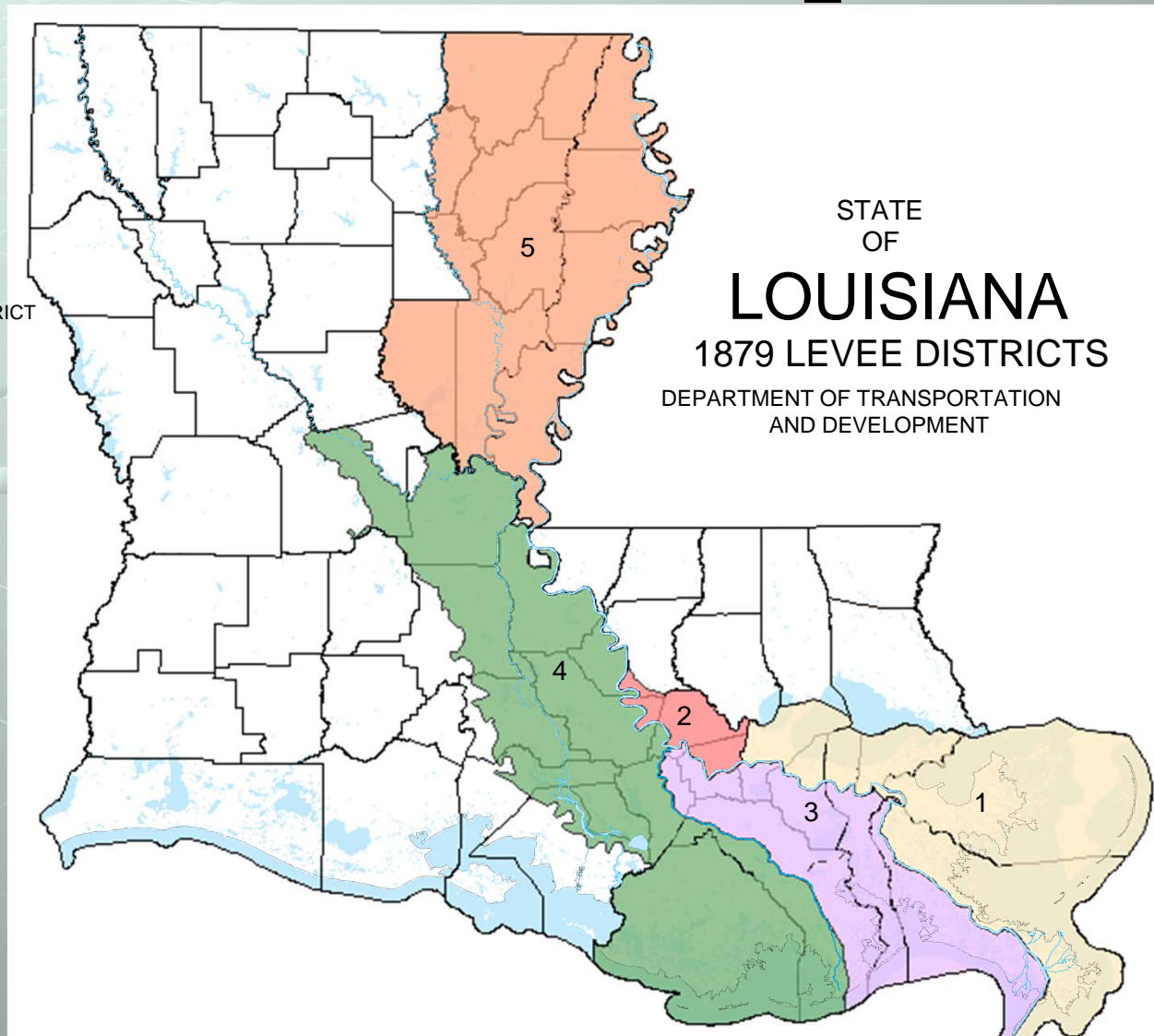
# Local Levee Districts

- Dissatisfaction with the Louisiana Levee Company lead to it's abolishment well before the expiration of its original 21 yr state authorization.
- Louisiana turned to a system of Local Levee Districts, each governed by a board of commissioners vested with authority and responsibility for the levee system within the territorial limits of its district.

# 1879 – 1880 Louisiana created 5 Levee Districts

## Legend

- 1 FIRST LEVEE DISTRICT
- 2 SECOND LEVEE DISTRICT
- 3 THIRD LEVEE DISTRICT
- 4 FOURTH LEVEE DISTRICT
- 5 FIFTH LOUISIANA LEVEE DISTRICT





# 1927 Mississippi River Flood





Intersection of Hwys. 65 & 80  
Tallulah 5/10/1927

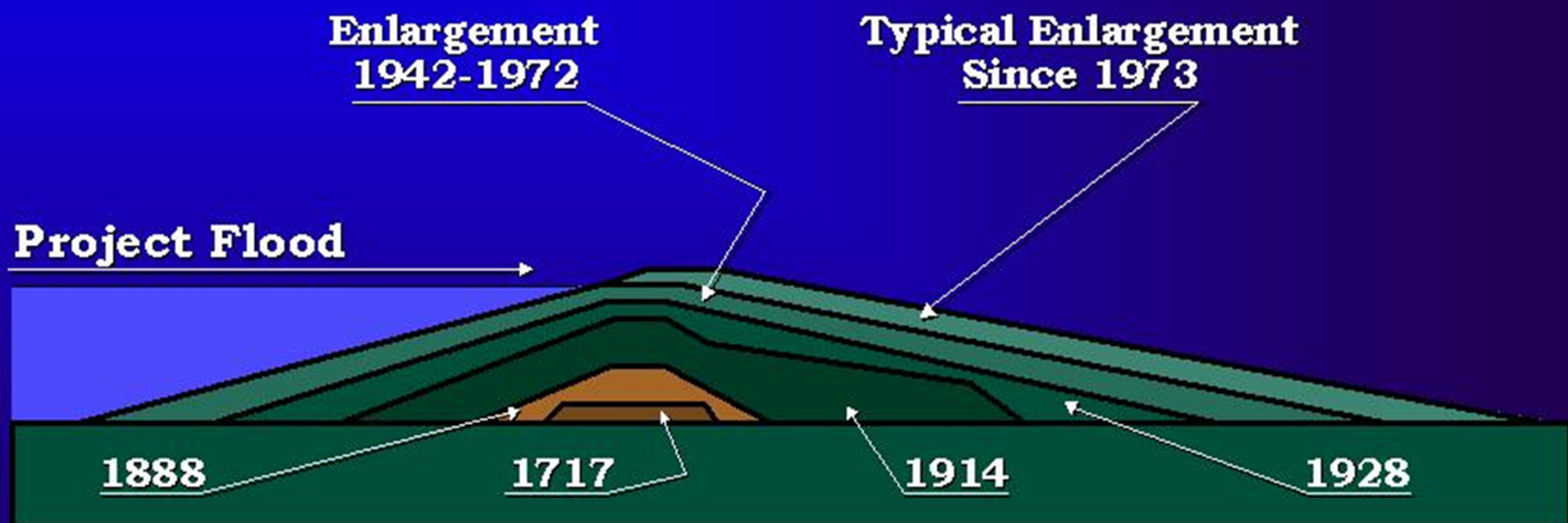
# Federal Project Sponsors

## LEVEE DISTRICTS

- When Federal Government agreed to develop flood control measures for the Mississippi River Valley, Louisiana designated the levee districts as local governing body to fulfill non-federal sponsor roll
- Louisiana empowered the Districts to levy and collect taxes, appropriate levee easements and cooperate with Corps of Engineers for flood control projects



# Evolution Of Mississippi River Levees



US Army Corps of Engineers



An aerial photograph showing a vast area of a city submerged in floodwater. The water is a deep blue-green color, covering almost all the land except for the rooftops of buildings and some trees. A large bridge with a draw span is visible in the lower-left quadrant, crossing a wide waterway. The city extends far into the background, with the floodwater reaching the horizon. The text "Hurricane Betsy – 1965" is overlaid in the center in a yellow-green font.

# Hurricane Betsy – 1965



# Hurricane Protection

After Betsy – Congress directed & authorized the Corps of Engineers to provide hurricane protection projects

\* Required cost share for federal flood control projects



# In 1968, Congress Authorized National Flood Insurance Program (NFIP)

- A Federal program that made flood insurance available to owners of property in participating communities nationwide through the cooperative efforts of the Federal Government and the community.
- The NFIP encourages state and local governments to exercise sound floodplain management to reduce losses caused by flood.

# Flood Disaster Protection Act of 1973

- Required flood insurance for
  - new, increased, extension or renewal of any loan secured by improved real estate located in a SFHA.

# NFIP

- Sale of subsidized flood insurance
- Communities adopt and enforce floodplain management measures
  - New construction (residential, commercial and manufactured homes)
  - Substantial improvements
- Special Flood Hazard Areas (SFHA)



# Special Flood Hazard Area

- **BASE FLOOD**

- A flood that has a one-percent chance of being equaled or exceeded in any given year. It often is referred to as the "100-year" flood.



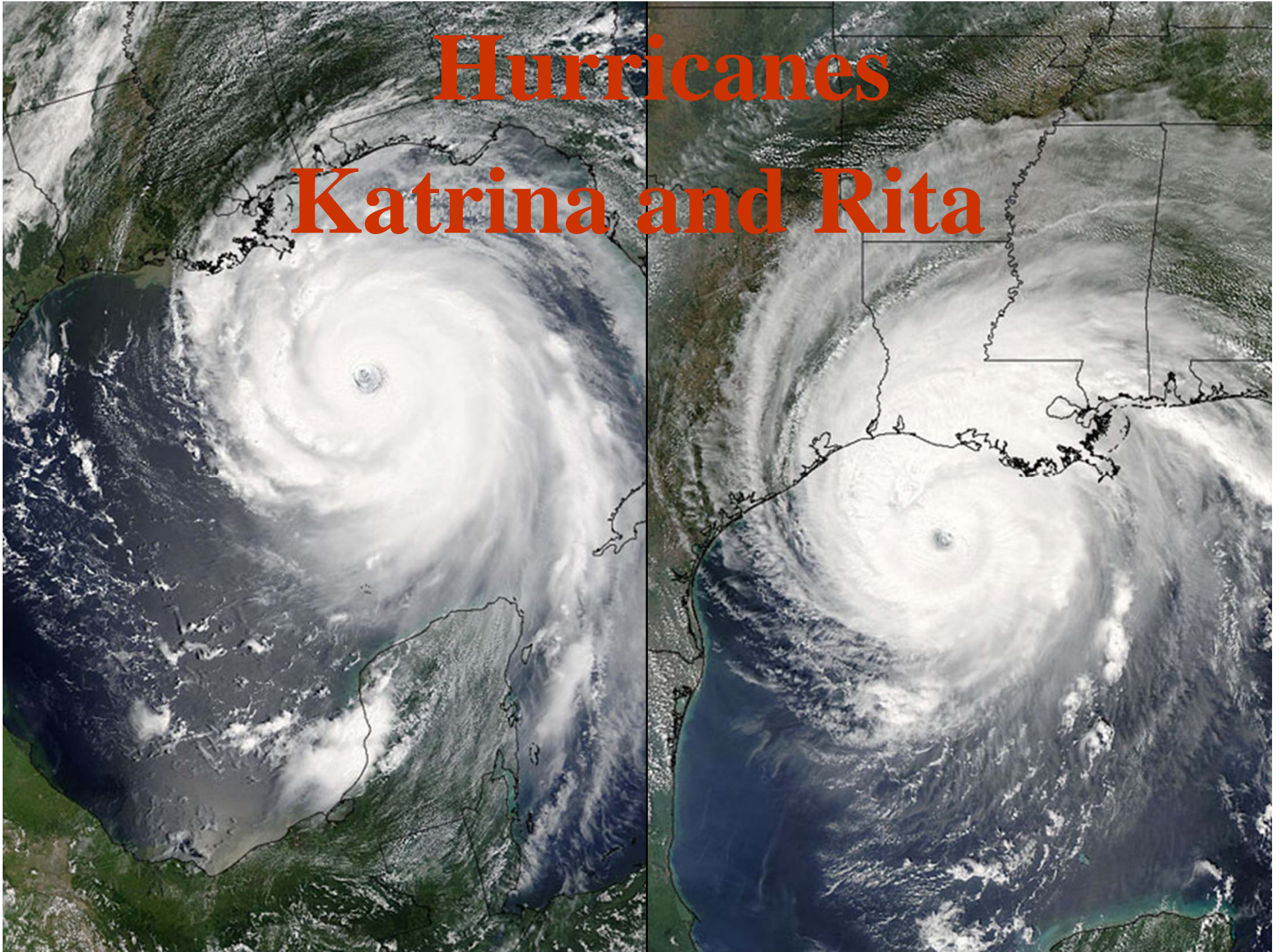
# FEMA Guidance and Policy Timelines

● In recognition of the Nation's aging infrastructure:

- Feb 1981: FEMA issues interim levee mapping policy
- Aug 1986: 44 Code of Federal Regulations (CFR) outlines requirements for showing how levee protection is depicted on DFIRMs
- Aug 2005: FEMA issues guidance clarifying levee owner's or community's responsibilities for providing data and documentation to support a levee system's ability to provide 1-percent-annual-chance flood protection

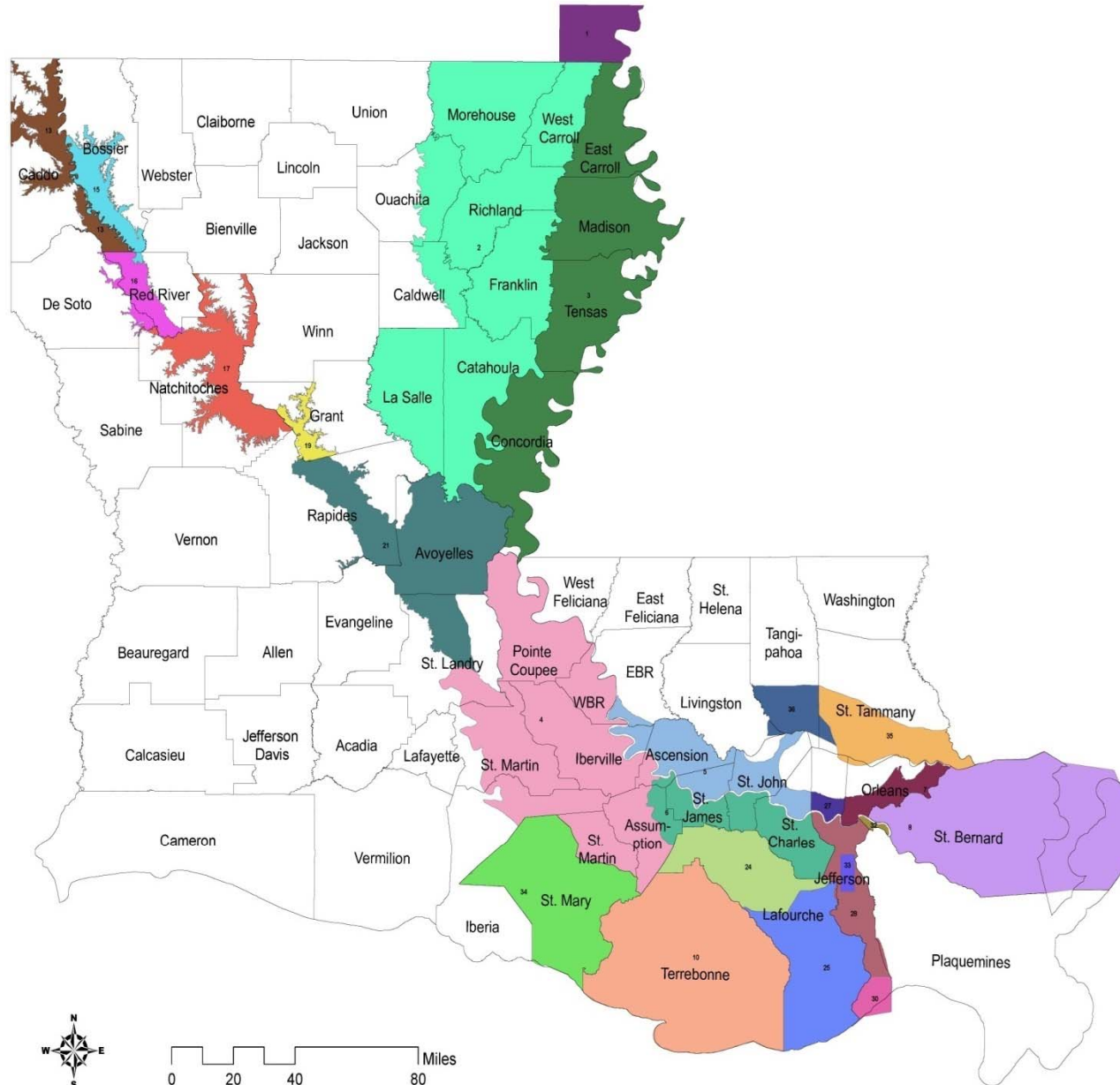


# Hurricanes Katrina and Rita





# LOUISIANA LEVEE DISTRICTS & PARISHES



## Legend

### LeveeDistricts

- 8 LAKE BORGNE BASIN
- 32 ALGIERS
- 4 ATCHAFALAYA
- 15 BOSSIER
- 13 CADDO
- 27 EAST JEFFERSON
- 3 FIFTH
- 30 GRAND ISLE
- 33 LAFITTE
- 6 LAFOURCHE BASIN
- 17 NATCHITOCHES
- 19 NINETEENTH
- 24 NORTH LAFOURCHE CONSERVATION
- 7 ORLEANS
- 5 PONTCHARTRAIN
- 16 RED RIVER
- 21 RED RIVER, ATCHAFALAYA, & BAYOU BOEUF
- 25 SOUTH LAFOURCHE
- 1 SOUTHEAST ARKANSAS
- 34 ST MARY
- 35 ST TAMMANY
- 36 TANGIPAHOA
- 2 TENSAS
- 10 TERREBONNE
- 28 WEST JEFFERSON
- Parish Boundaries



CPRA  
Coastal Protection and  
Restoration Authority of Louisiana

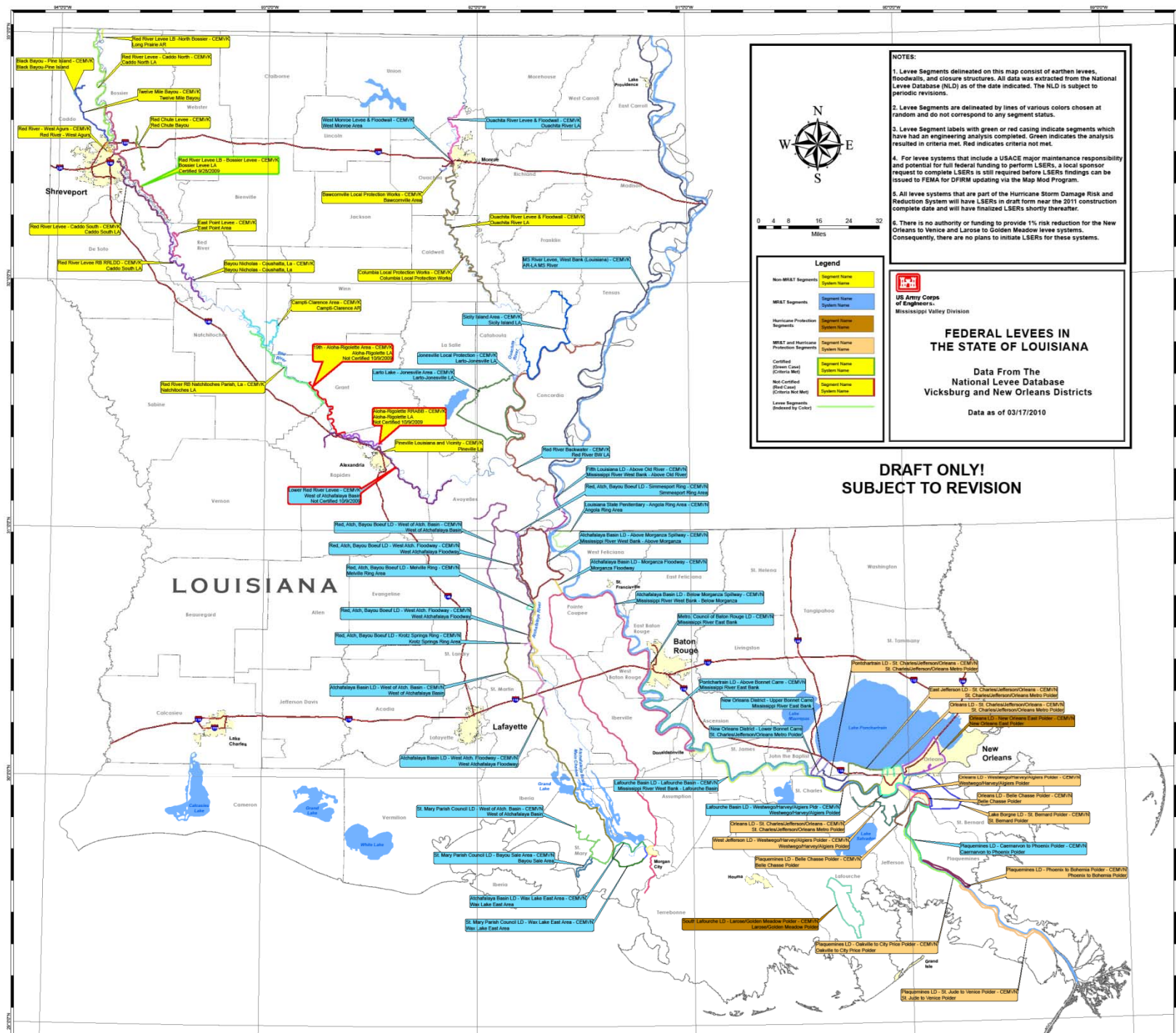
# Guidance and Policy Timelines

- Sep 2006: FEMA issues guidance granting levee owners 24 months to submit the documentation to support the levee's capability to provide 1-percent-annual-chance flood protection
- Levee owners sign a formal agreement to provide the documentation within 24 months acknowledging:
  - That the levee currently meets the 1-percent criteria
  - That lack of or sufficiency of documentation will result in the areas impacted by the levee being designated as flood prone on DFIRMs



# Certified Levee System

- A levee system that meets minimum design, operation, and maintenance standards
  - as specified in 44 CFR 65.10
- The design criteria and structural requirements outlined in paragraphs (b)(1) through (7) must be *certified* by a
  - registered professional engineer
  - or a federal agency responsible for levee design



# Accredited Levee System

- A levee that the FEMA has shown on the Flood Insurance Rate Map as providing protection from the 1-percent-annual-chance or greater flood
  - based on the submittal of data and documentation as required by § 65.10



# FEMA Levee Accreditation and Certification

- FEMA accredits levees that meet the criteria of 44CFR65.10 as providing protection from the 1-percent annual flood chance  
*based on the certification provided by levee owner's engineer*
- FEMA accredits certification documents provided by the levee owners and removes PAL notes where applicable
- FEMA review is for the sole purpose of establishing appropriate flood insurance risk zone determinations for FIRMs/DFIRMs
- FEMA's review and final determination does not constitute a determination on structure/ system performance

# How Does a Levee Become Accredited?

- To be accredited, a levee must meet ALL Section CFR 65.10a-e requirements, including
  - General Requirements
  - Design Criteria
  - Operation Plans and Criteria
  - Maintenance Plans and Criteria
  - Certification Requirements
- FEMA's review and response is based on the data and documentation that are submitted by the levee owner

# Levee Certification Criteria

- Design memorandums, computations, as-built drawings
- Subsurface information; foundation material characteristics
- Annual and periodic inspection reports
- Surveys, geospatial information, levee geometry
- Levee zoning, levee materials, construction methods, construction records
- Performance history, any flood performance records
- Operation and Maintenance Manual
- Repairs or upgrades made to the levee system
- River velocities, wave properties, or overtopping potential



# H&H Analysis

- Discharge vs. Frequency
- Stage vs. Discharge
- Surge, Wind Wave and Wave Period

# Geotechnical Analysis

- Overtopping
- Slope stability
- Under seepage
- Through-seepage
- Surface erosion
- Wave attack
- Flood duration
- Seismic Stability

# Other Analyses

- Structural
- Mechanical Electrical
- Interior Drainage
- Local Flooding Sources
- Wave Overtopping





# Certification Liability Issue

## ● Professional Liability Makes Certifications:

- More Expensive
- Higher Risk
- Not insurable?
- Harder for communities to obtain



# ASCE Policy Statement 529 - Levee Certification

- recommends that FEMA amend its NFIP regulation 44 C.F.R. 65.10 that requires a Professional Engineer's certification
  - to require only that a P.E. make a "compliance determination" in the development of NFIP insurance rates



# ASCE Policy Statement 529 - Levee Certification

- encourages FEMA to adopt a hazard-ranking system for flood maps that is based on either
  - the maximum flood that will likely be experienced in an area (the Probable Maximum Flood),
  - or a locally established plan for development, land use, building codes, emergency preparedness (especially warning, evacuation, and risk communication), as well as an efficient and orderly system of indemnification for the inevitable losses when levees fail or are overtopped.

# Memorandum

## U.S. Department of Transportation Federal Highway Administration

Date: September 10, 2008

### ● **ACTION:** Highway Embankments versus Levees and other Flood Control Structures

- Recent FEMA map modernization and levee certification initiatives have revealed that for many years some highway embankments may have been either inadvertently or incorrectly designated as levees or other flood control structures. Also, some NFIP communities incorrectly assumed that these embankments provided some level of protection

# FHWA MEMO

- **FHWA discourages DOTs in certifying highway embankments as levees or allowing any such certification by any entity**
- **FHWA recommends that DOT's decline any certification request from any entity that may contact you on this subject**
- **Additionally, we recommend informing the FHWA's Office of Bridge Technology, Hydraulics and Geotechnical Team (HIBT-20) of the request.**



# FHWA MEMO

- FHWA does not have flood control standards for highway embankments.
  - FHWA regulations and design standards relate to the interaction of highways and bridges with floodplains. These regulations are found in 23 CFR 650 Subpart A: “Location and Hydraulic Design of Encroachments on Flood Plains
- FHWA regulations (23 CFR 650 Subpart A) attempt to keep encroachments (embankments) entirely out of floodplains. Where this was not feasible, regulations and practice required most Interstate embankments to be sufficiently elevated to avoid overtopping by a flood with a 2 percent chance of being exceeded in any given year
- This requirement does not imply an embankment provides an additional flood control role. Instead, the intent is to prevent loss of the embankment as a result of overtopping flows associated with smaller floods.

# Mississippi River Levee Breach Simulation

Mississippi River Commission video clip

# Katrina Surge overtopping a Levee (Orleans Levee District)



*I -510 Bridge*



# **The Levee Withstood the Overtopping with some erosion, But did not Fail**



**"That's  
all  
folks!"**



**Questions ?**

# US Army Corps of Engineers

- Who certifies? Not FEMA
- Data submitted must be certified by a registered professional engineer or
- A Federal agency with responsibility for levee design may certify the levee.



# Provisionally Accredited Levee (PAL) System Designation

- While under the 24 month PAL agreement:
  - Levees without known defects and previously shown as providing 1-percent-annual-chance flood protection are considered “Provisionally Accredited Levees” (PAL)
  - Are reflected on DFIRMs as provisionally accredited providing 1-percent-annual-chance flood protection
- Allows FEMA to continue the congressional mandate to update the Nation’s flood insurance maps while allowing levee owners time to obtain documentation
- PAL agreements not applicable to levees that do not currently meet the 1- percent-annual chance protection

# Insurance Considerations

- Flood Insurance rates are based on current effective Flood Insurance Rate Maps (FIRMs)
- Flood Insurance rates will **NOT** change until the end of the map process





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