



RESTORE
AMERICA'S
ESTUARIES

November 16, 2010

Hurricane Protection and Environmental Restoration

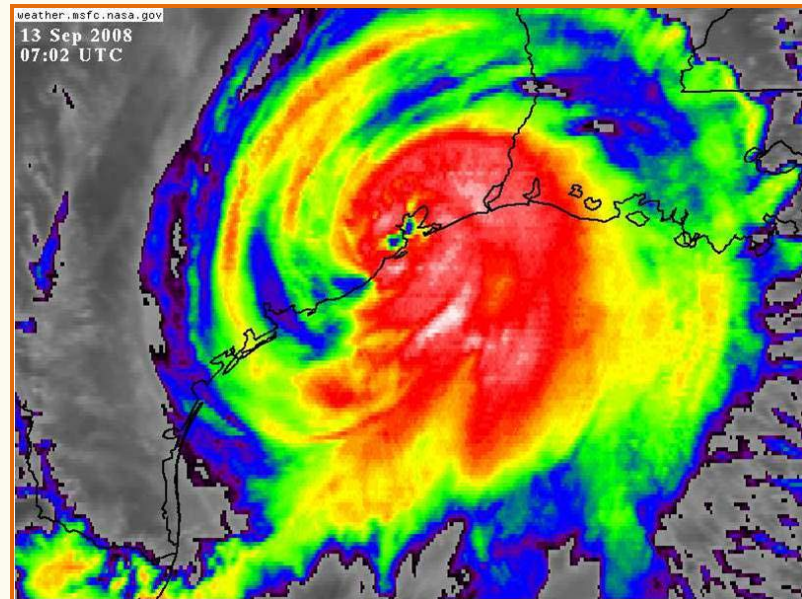
Presented by:

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DANNENBAUM
ENGINEERING CORPORATION

How do we protect *People/Environment/Economy*

- 6 1900 Year Storm
- 6 Hurricane Carla
- 6 Hurricane Ike
- 6 Gulf Coast
Community
Protection Recovery
District (GCCPRD)



Storm

- ⌚ Hit Galveston on September 8, 1900
- ⌚ Nicknamed the “Great Storm”
- ⌚ Winds estimated at 130-140 mph
- ⌚ Highest point on the island was 8.7 feet high – Storm Surge elevation was 15.7 feet high



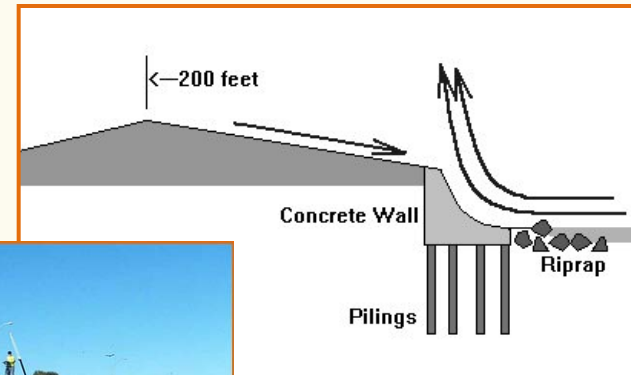
Storm (cont.)

- Galveston was the *Wall Street* of the South
- Galveston had a population of 37,000 people in 1900 and there were approximately 6,000 deaths
- 3,600 Buildings were destroyed
- Damages were estimated at \$20M which would equal close to \$50M today



Response

- Seawall was built to protect from future hurricanes
- Construction began in 1902 and was completed in 1962
- Seawall extends 7 miles along the Galveston coast and is 17 feet high



Response (cont.)

- 6 Total cost of the seawall was almost \$15.5M



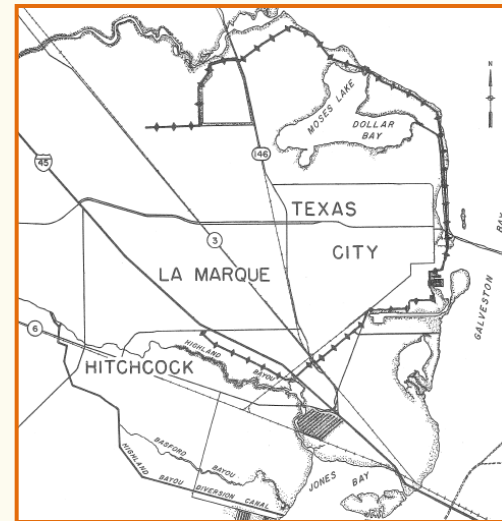
Storm

- ⌚ Hit the Texas Coastline on September 10, 1961
- ⌚ Winds reached as high as 170 mph in Port Lavaca
- ⌚ Storm Surge elevation measured 22 feet
- ⌚ Lives lost were 46
- ⌚ Damages were estimated at \$325M which would equal close to \$2B today



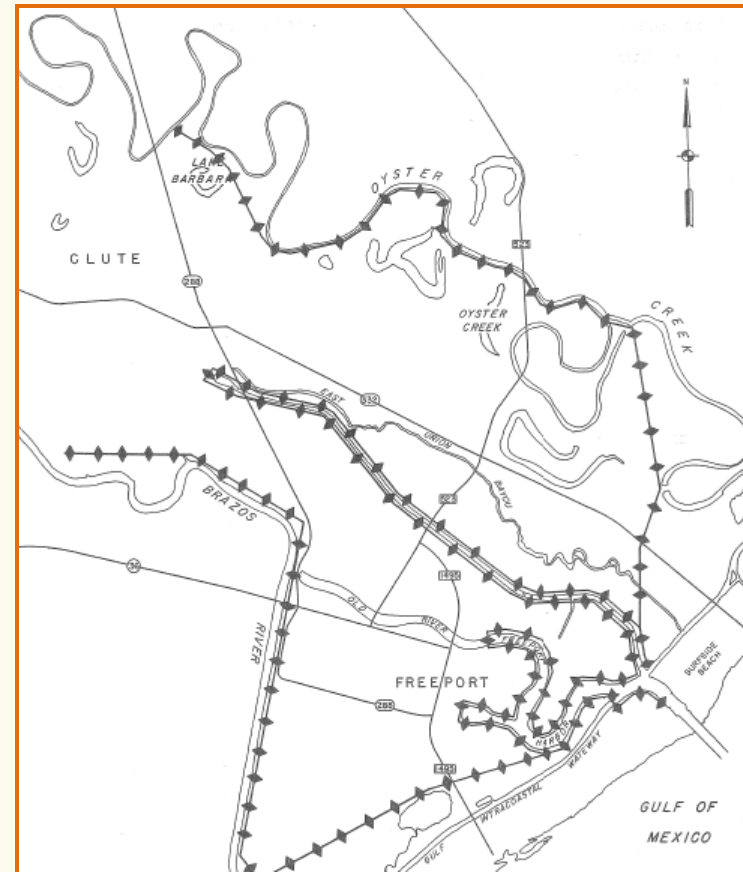
Response

- 6 Texas City Dike
 - 6 Construction of Levees in Texas City began in 1962, a year after Hurricane Carla, to protect the refineries
 - 6 Construction was completed in 1982
 - 6 Provides protection for 36 square miles from hurricane storm surge elevation of 15 feet



Response (cont.)

- 6 Freeport Levee
 - 6 Designed to protect 42 square miles from storm surges from hurricanes
 - 6 Total length of system is approximately 53 miles
 - 6 Varies in elevation from 15-21 feet



Storm

- ⌚ Hit near Galveston, Texas on September 13, 2008
- ⌚ Maximum sustained winds were 145 mph
- ⌚ Maximum storm surge height was 15-20 feet



- ⌚ Lives lost were close to 200
- ⌚ Cost of damage approximately \$30B
- ⌚ 3rd largest financial loss from a natural disaster in history of US

Storm (cont.)

Houston Statistics – WHAT IF A HURRICANE WERE TO HIT HOUSTON??

Houston ranks 4 th largest city in US	Covers 10,000 square miles with 10 counties
18 Universities/10 Community Colleges	US Energy Headquarters with 9 refineries producing 2.33 million barrels of crude oil
World-famous Texas Medical Center based in Houston	Johnson Space Center attracts nations best high-tech professionals
Port of Houston ranked 6 th in the world and 1 st in the US	ExxonMobil Baytown is largest petroleum & petrochemical complex in US

Storm (cont.)

Galveston Bay Statistics

Bird watching makes up significant part of tourism economy in Galveston Bay

- Endangered birds which visit Galveston Bay are the Brown Pelican, Whooping Crane, and Eskimo Curlew

Galveston Bay has the 3rd largest concentration of recreational boats in US

- Galveston Bay contributes 1/3 of Texas' commercial fishing income

In 1930 shrimp became most important fishery for Galveston Bay

Response

- Near miss
- The Ike Dike project was proposed
- Proactive response by leadership
 - Governors/Judges
- Gulf Coast Community Protection Recovery District was created

Question:
How do we mitigate storm damage for people,
environment, and economy?

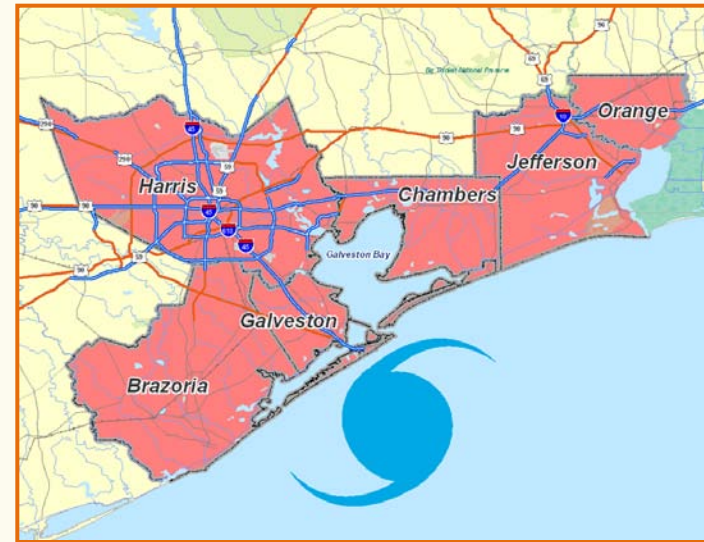
What is GCCPRD?

- ⑥ Gulf Coast Community Protection Recovery District
 - ⑥ The creation of the District is a direct “Leadership” response to the \$30 Billion of damage Hurricane Ike inflicted along the Texas Coastline
 - ⑥ Also to address community concerns over the loss of a potential larger Hurricane storm



What is GCCPRD all about?

- 6 PEOPLE – Six county region along the North Texas Coastline is home to an estimated 4 million people and is projected to grow to 6 million in next 25 years
- 6 Serve 6 major counties along the Gulf Coast
 1. Harris County
 2. Galveston County
 3. Brazoria County
 4. Chambers County
 5. Jefferson County
 6. Orange County



What is GCCPRD all about? (cont.)

- 6 ENVIRONMENT – Galveston Bay complex and Sabine Neches River are home to the largest ports in the US and home for two of the most productive ecosystems in US
- 6 Support commercial and private fishing
- 6 Biggest recreational boating communities in the nation



What is GCCPRD all about? (cont.)

6 **ECONOMY** – Our local petrochemical complex is one of the largest in the US

6 Includes:

1. Houston-Galveston Ship Channel
2. Freeport
3. The Sabine/Neches River



6 Products and goods shipped, manufactured and distributed through coastline are measured two ways:

1. Billions of dollars
2. Percentages of National Gross Domestic Product (GDP)

What is next for GCCPRD?



How can you help GCCPRD?

☪ Input

☪ Contact Us

☪ Col. (Ret.) Leonard Waterworth

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☪ Attend Workshops

☪ Follow our progress on our website

☪ www.GCCPRD.org

☪ With your help we can achieve our goals of protecting our People, Environment, and Economy

In Summary...

- ⌚ 1900 Year Storm - *Responded*
- ⌚ Hurricane Carla - *Responded*
- ⌚ Hurricane Ike – *Are we going to respond?*
- ⌚ Gulf Coast Community Protection Recovery District (GCCPRD) – *First step*

Thank you