



RESTORE  
AMERICA'S  
ESTUARIES

November 16, 2010

## Hurricane Protection and Environmental Restoration

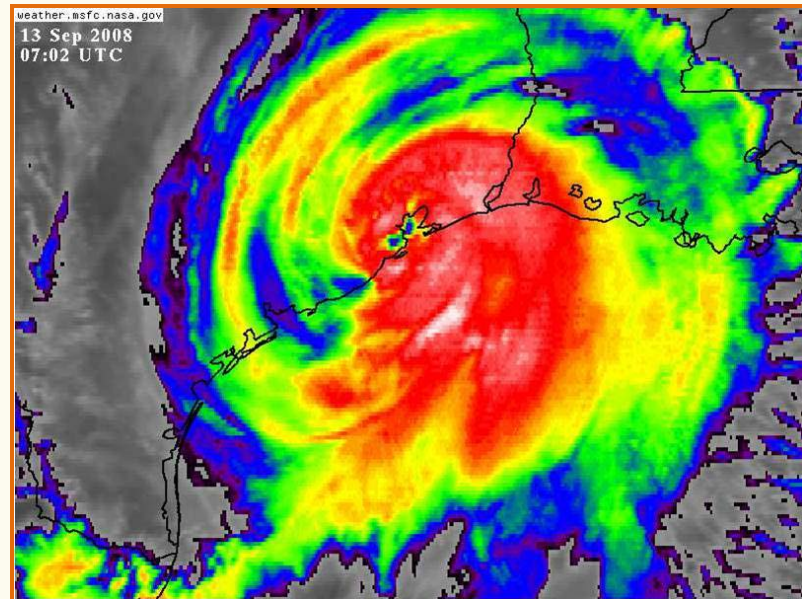
Presented by:

Colonel (Ret.) Leonard Waterworth

**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



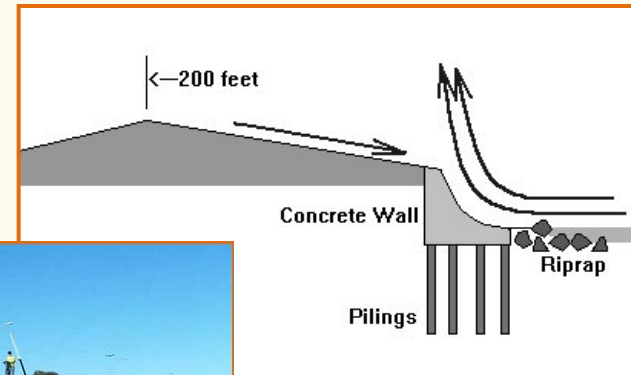
## Storm (cont.)

- ☪ 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



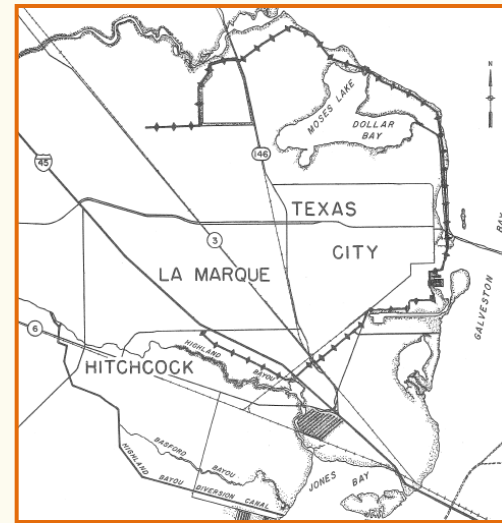
## Storm

- 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

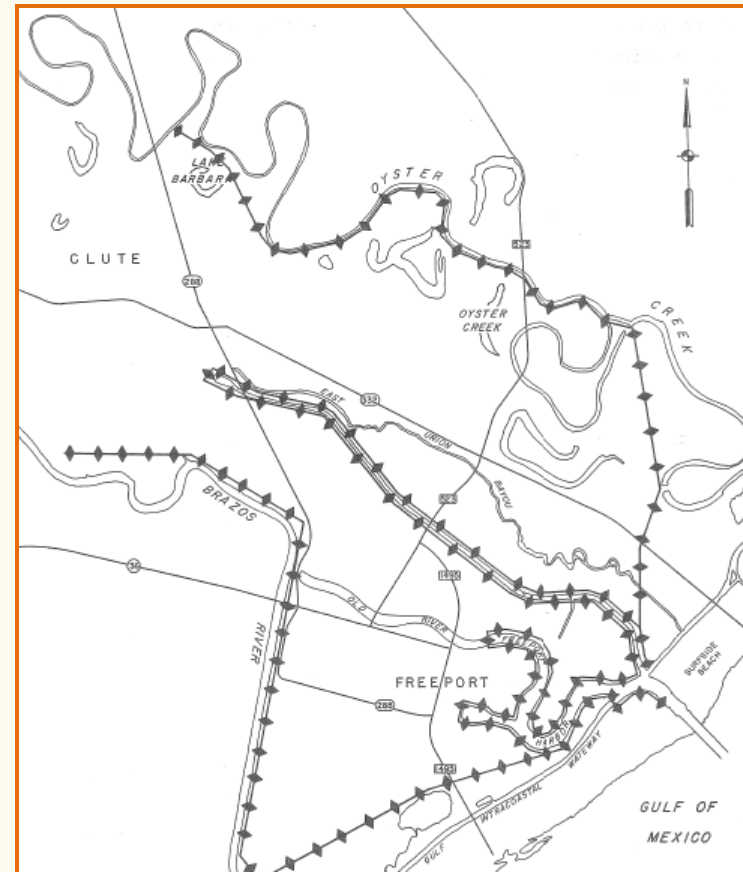
- 6 Texas City Dike
  - 6 Construction of Levees in Texas City began in 1962, a year after Hurricane Carla, to protect the refineries
  - 6 Construction was completed in 1982
  - 6 Provides protection for 36 square miles from hurricane storm surge elevation of 15 feet





## 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
- ⌚ 3<sup>rd</sup> 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 <sup>th</sup> 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 <sup>th</sup> in the world and 1 <sup>st</sup> 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 3<sup>rd</sup> 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?

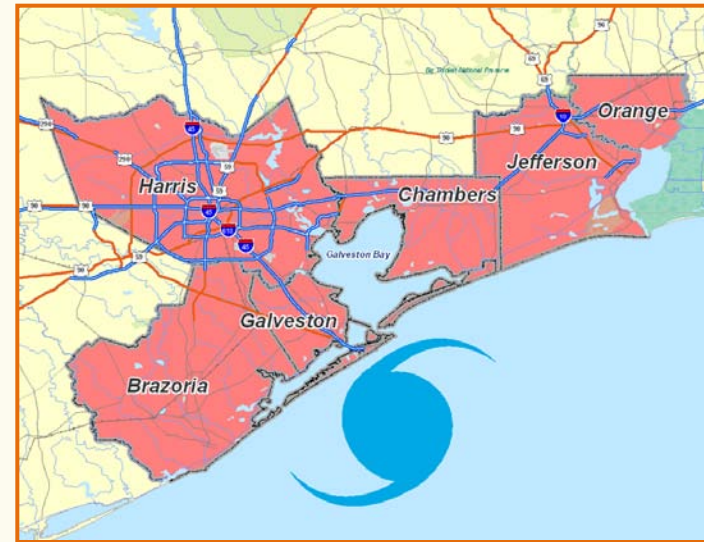
# What is GCCPRD?

- 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:

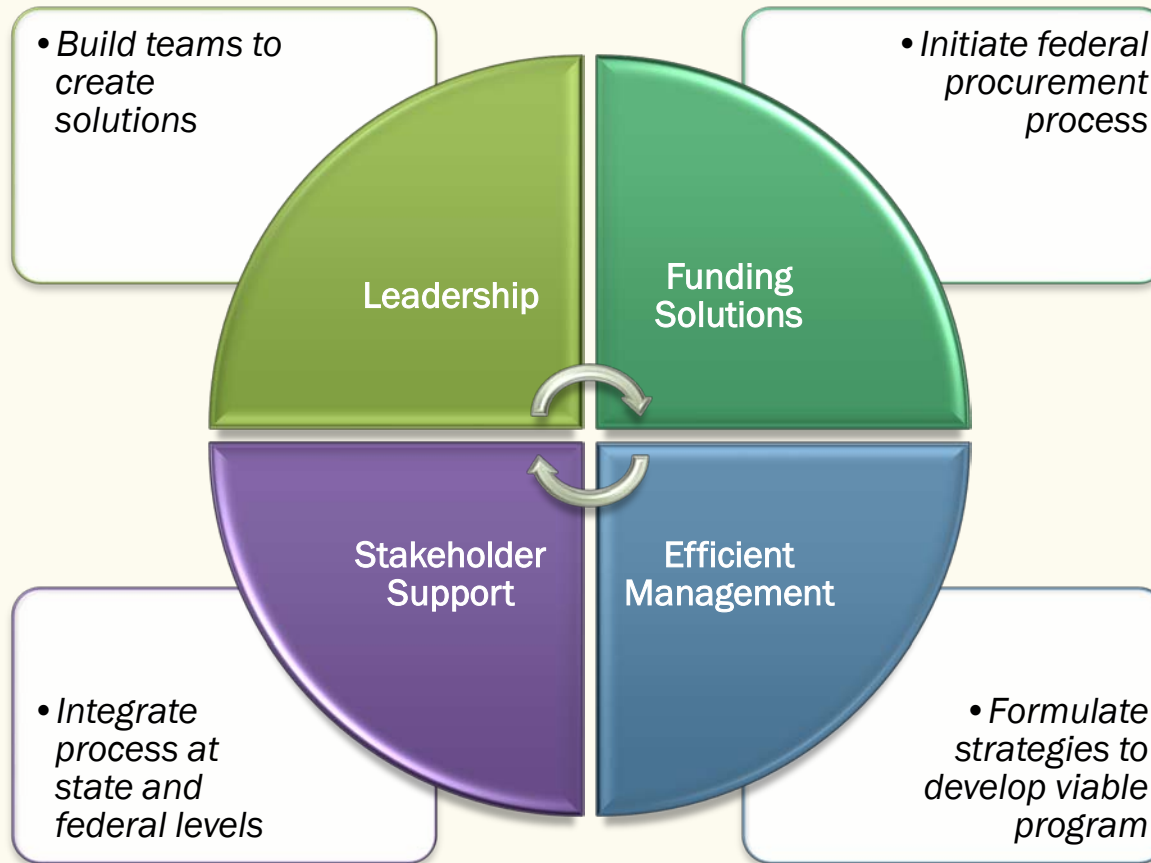
1. Houston-Galveston Ship Channel
2. Freeport
3. The Sabine/Neches River



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

[Len.Waterworth@dannenbaum.com](mailto:Len.Waterworth@dannenbaum.com)

(713) 520-9570

### ☪ Attend Workshops

### ☪ Follow our progress on our website

☪ [www.GCCPRD.org](http://www.GCCPRD.org)

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

## In Summary...

- ⑥ 1900 Year Storm - *Responded*
- ⑥ Hurricane Carla - *Responded*
- ⑥ Hurricane Ike – *Are we going to respond?*
- ⑥ Gulf Coast Community Protection Recovery District (GCCPRD) – *First step*

Thank you