Storm Surge Protection: Concepts & Concerns

Bob Stokes, President
Galveston Bay Foundation
Galveston Bay Foundation

**Mission:**
To preserve and enhance Galveston Bay as a healthy and productive place for generations to come

**Program Areas:**
- Advocacy
- Education
- Land conservation
- Habitat restoration
- Water quality and quantity
Our Vision for Galveston Bay

We envision a future Galveston Bay that is brimming with vitality, connected to people and contributing to the community in every way.

-- GBF Strategic Plan, 2016
So what do we need to protect?
Concepts
Ike Dike Concept - Gates

TAMUG
SSPEED Center – H-GAPS

“Mid-Bay” Strategy

- Coastal Spine (F, 1 and G)

- HSC Gate in middle of Galveston Bay (M)

- Backside Galveston Levee (H)

- In-bay Berms with small gates (E)

Note: SSPEED focusing studies with Coastal Spine on existing roadways
SSPEED Center – Mid-Bay Strategy

[Map showing Mid-Bay strategy]
GCCPRD Phase 3 Study
Recommended Actions

- High Island to San Luis Pass Coastal Spine parallel to Hwy 87 and FM 3005
- Gate at Bolivar Roads
- Navigation Gate at Clear Lake
- Galveston Ring Levee
**Study Purpose**

**Coastal Storm Risk Management (CSRM)** - Develop and evaluate coastal storm damage risk reduction measures for coastal Texas residents, industries and businesses which are critical to the nation's economy.

**Ecosystem Restoration (ER)** - Increase the net quantity and quality of coastal ecosystem resources by maintaining, protecting, and restoring coastal Texas ecosystems and fish and wildlife habitat.

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Corps of Engineers – Coastal Texas Protection and Restoration Feasibility Study

Region 1: Alternative A - Coastal Barrier/Nonstructural System

Coastal Texas Protection and Restoration Study

Alternative A
- High Island to Bolivar Peninsula
- Bolivar Roads and Houston Ship Channel Gates
- Galveston Seawall
- Galveston Ring Levee
- Seawall to San Luis Pass
- Deer/Lake Sites
- West Side of Galveston Bay Nonstructural Improvements
- Galveston Island Nonstructural Improvements
- Galveston Bay Bridge Restoration

Map showing the proposed areas for Alternative A in Coastal Texas.
Corps of Engineers – Coastal Texas Protection and Restoration Feasibility Study

Region 1: Alternative B - Coastal Barrier

Coastal Texas Protection and Restoration Study

Alternative B

- High Island to Fort Belvoir
- Bolivar Roads and Houston Ship Channel Gates
- Existing Texas City Dike
- Existing Texas City Hurricane Road Protection Levee (HFRFL)
- West Extension of Texas City HFRFL
- Galveston Seawall
- Galveston Ring Levee
- East Lake Gates
- West Side of Galveston Bay Noreastual Improvements
Region 1: Alternative C – Mid Bay

Coastal Texas Protection and Restoration Study

Alternative C

- Double Bayou to Smith Point
- MidBay Navigation and Environmental Gating
- Existing Texas City Hurricane Flood Protection Levees (HFPL)
- West Extension of Existing Texas City HFPL
- Galveston Seawall
- Galveston Ring Levee
Environmental Questions & Concerns for All Concepts

- Direct and indirect impacts to habitat and bay species including water column changes
- Changes to bay circulation and salinity
Impacts Seen in The Netherlands – Eastern Scheldt (De Ronde, 1990)

- Tidal range decreased by 15-20%
- Tidal prism (volume) decreased by 30%
- Intertidal area decreased by 30%
- Salt marsh area decreased by 60%
- Loss of intertidal and salt marsh destroyed large feeding area for birds
Potential Impacts in Galveston Bay from Ike Dike
(M. Ruijs, 2011 Master’s Thesis – 2D Modeling)

- Reduction in flow area of Bolivar Roads
- Reduction in tidal prism (volume)
- Increased speeds in Bolivar Roads resulting in scour
- Decreased speeds inside the Bay resulting in sedimentation of channels
Potential Impacts in Galveston Bay from Ike Dike (M. Ruijs, 2011 Master’s Thesis – 2D Modeling)

- More of the ebb flow is directed to HSC
- More of the flood flow is directed to sides of Bay
- Blocking of sediment by barriers and redistribution of sediment due to decrease in tidal prism could exacerbate the sediment deficit problem in the Bay
Potential Impacts in Galveston Bay from Ike Dike  
(M. Ruijs, 2011 Master’s Thesis – 2D Modeling)

- Residence time of water in the Bay will increase – decreased salinity, increase in concentration of contaminants
- Changes to habitats – tidal flats and marshes MAY decrease – needs more investigation
Ruijs’ Recommendation

“The effects of the changing hydrodynamics, water quality and morphology on the ecology should further be investigated by an ecologist. It should be investigated what the effects are on the habitats and its flora and fauna.”
Study and Understand Environmental Impacts

- Ensure that we fully evaluate impacts to make an informed decision
- Fiscally responsible to understand those impacts ahead of time
- Consistently heard that we would learn lessons from the Dutch
- Mitigate impacts where necessary
Questions?

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