

**The Galveston Bay Park Plan:
Rapid Hurricane Protection and Long-Term Economic Stability for Galveston Bay**
By the SSPEED Center Team
(April 2024)

It has been 15 years since Hurricane Ike, a Category 2 hurricane, wiped out Bolivar Peninsula, and narrowly missed the Houston region. We may not continue to be so lucky. It is time to act quickly to protect us both in the near future and long-term. The Galveston Bay Park Plan is an in-bay, multi-use, 25-foot-high hurricane surge flood protection barrier concept being explored by the Severe Storm (SSPEED) Center at Rice University that combines flood protection with navigation improvements along the Houston Ship Channel. This in-bay barrier is estimated to cost from \$3 billion to \$6 billion and can be constructed in about five to seven years. It is compatible with the larger Coastal Barrier plan being developed by the U.S. Army Corps of Engineers, while providing greater protection to the west side of the bay and the industries along the Ship Channel.

This exploratory work on the Park Plan was completed by the SSPEED Center from funding provided by the City of Houston, Harris County, the Port of Houston and private entrepreneur Joe Swinbank. It offers the opportunity for protecting the most people and our national economic resources in the shortest amount of time, while the Corps works to bring about broader and more comprehensive protection with its Coastal Barrier plan.

The basic concept of the Park Plan is to initiate implementation of the Port of Houston's dredging project (Project 12) to deepen the Houston Ship Channel and use the dredged material from that project to build the hurricane surge protection levee portion of the Park Plan. Dredging would begin in the upper portion of Galveston Bay and the virgin clay that is dug up for the channel deepening would be used to construct the 25-foot-high levee portion of the Park Plan that will run from Chambers County on the northern end of the project to the Texas City levee on the southern end. Additionally, the Texas City levee may need to be raised and extended westward to address backside vulnerability from surge flooding crossing Galveston Island.

A diagram of the levee portion (first phase) of the park plan is shown in Figure 1 and the use of dredged material is shown in Figure 2. Additionally, park space and environmental enhancement are world-class design attributes for everyday use by the public that would be phased in over time as maintenance dredging contributes sediment to be beneficially used for park and wetland creation purposes, as shown in Figure 3.

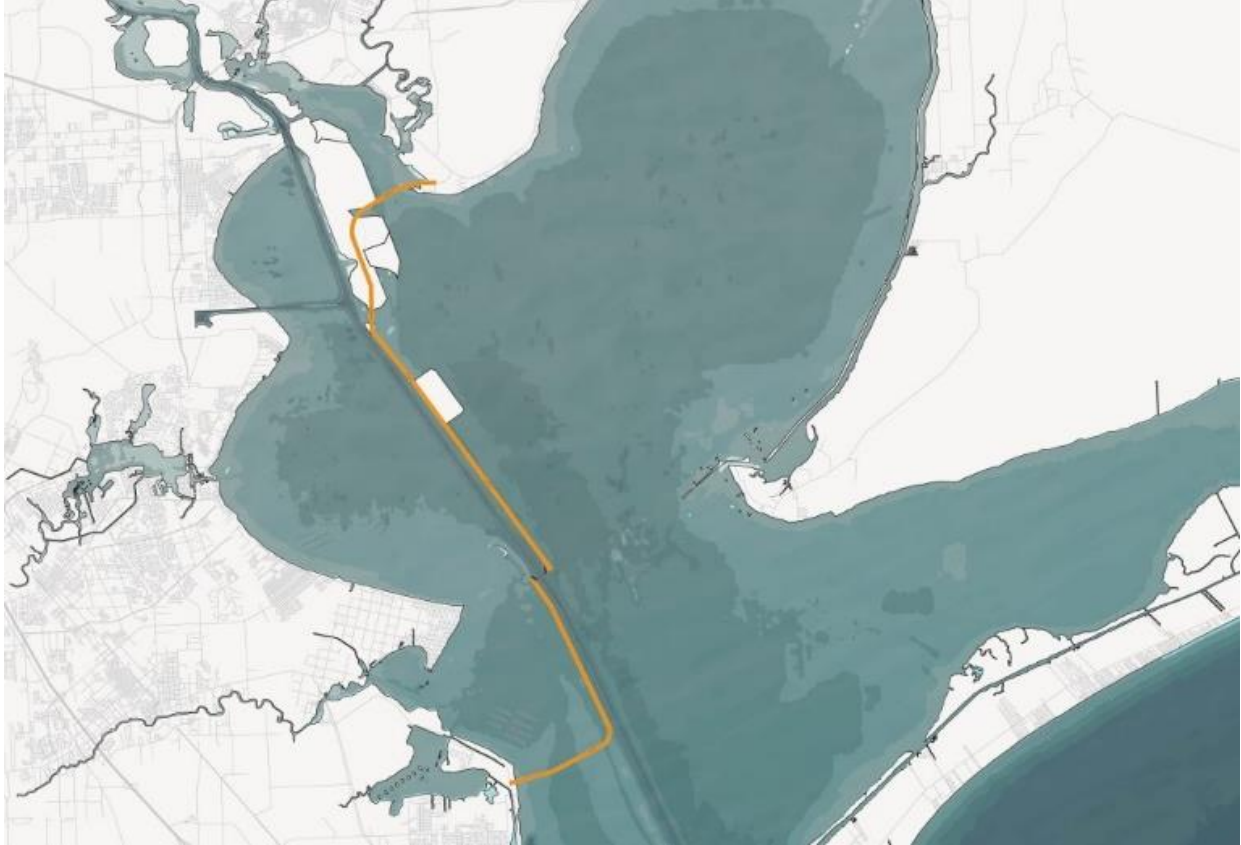


Figure 1. Layout of 25-foot leveed barrier adjacent to the Houston Ship Channel. (Image by Rogers Partners Architects for SSPEED Center.)

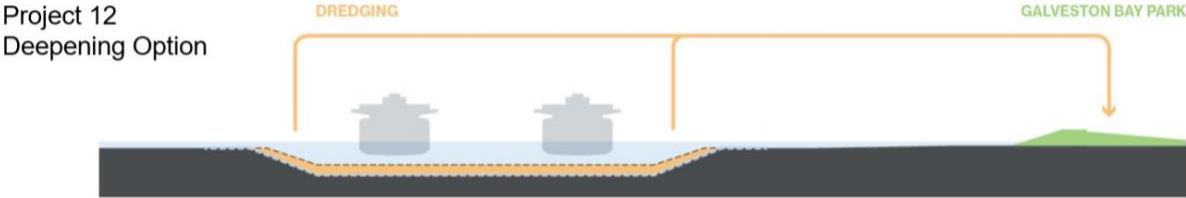


Figure 2. Diagram illustrating use of Houston Ship Channel dredged material for levee construction. (Image by Rogers Partners Architects for SSPEED Center.)



Figure 3. Vision of Park Plan’s Environmental and Park Amenities (image by Rogers Partners Architects for SSPEED Center)

The purpose of this 25-foot-high barrier is to provide in-bay surge protection from Category 3, 4 and 5 hurricanes that will overtop the Corps’ design for its Coastal Barrier. Over time, as the federal procurement process evolves, the Coastal Barrier can be completed to provide broader and more comprehensive protection for the entire bay system. But in the short-term, the Park Plan can provide significant reduction in surge vulnerability at a very high rate of return on the investment and can also propel forward our next required navigation improvements for the Ship Channel.

As part of this in-bay system, a new navigation gate structure will have to be built in the mid-portion of Galveston Bay where the levee switches from the east side of the channel to the west side in order to make the connection with the Texas City levee. The engineering firm of Walter P. Moore and Associates, Inc. has created an elegant and relatively inexpensive gate design that is deployed from either side of the channel and connects to make an arc that will more naturally withstand hurricane surge. This structure is shown in Figure 4.

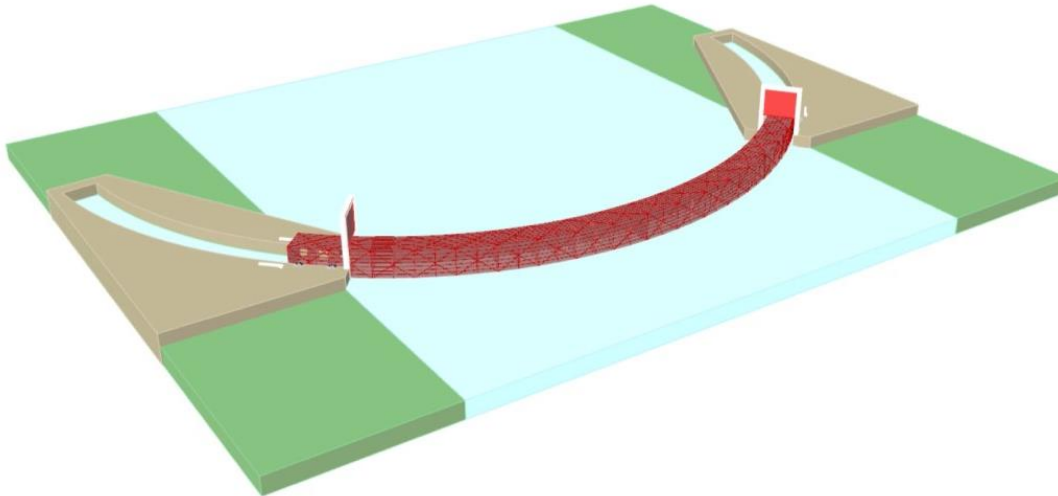


Figure 4. The Park Plan’s navigation gate across the Ship Channel, which deploys from dry docks at either side of the channel and floats to the center of the channel where the arc is connected and lowered to the bottom to block the oncoming hurricane surge. (Image by Walter P. Moore for SSPEED Center.)

And make no mistake about it. The Ship Channel and Bayport industrial complexes have significant vulnerability. At the current time, a Category 3 or larger storm would generate well over \$100 billion in industrial damage and would destroy much of the LaPorte, Seabrook, Clear Lake, Kemah and Texas City communities. It would likely be the worst human, economic and environmental disaster in United States history. An example of the extent of current vulnerability of the Galveston Bay region from a small Category 4 storm surge is shown in Figure 5 below. The top figure shows the storm surge while the bottom figure shows the effect on reducing the storm surge when both the Coastal Barrier and the Galveston Bay Park Plan are in place.

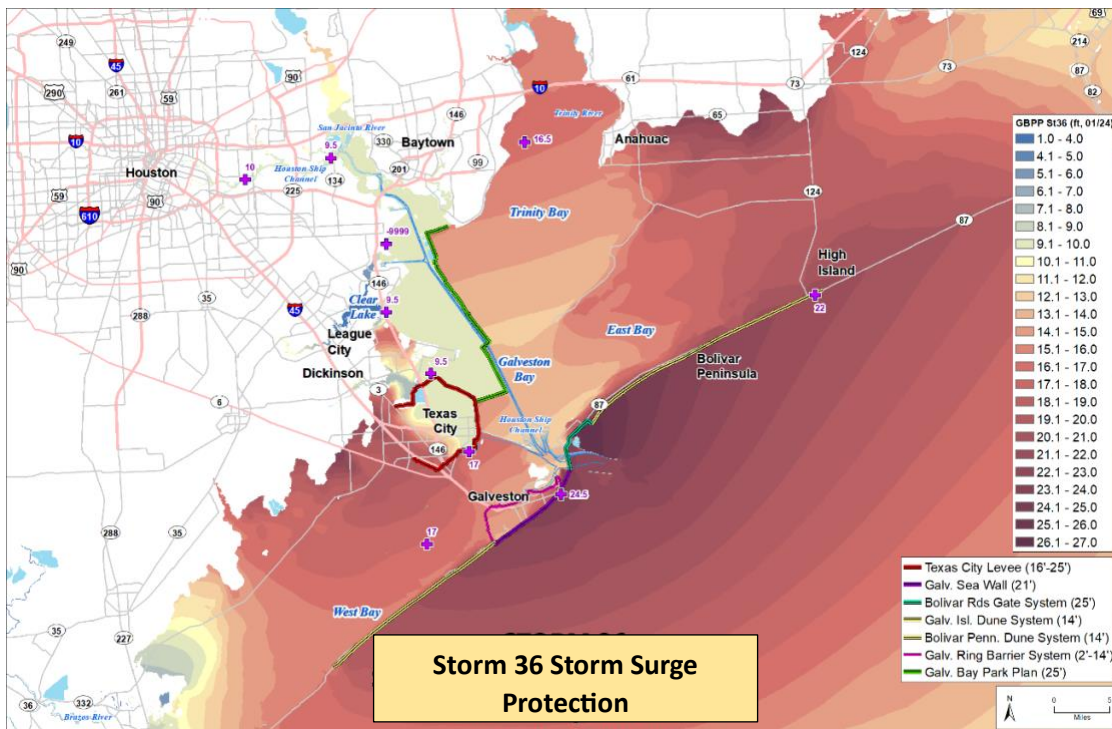
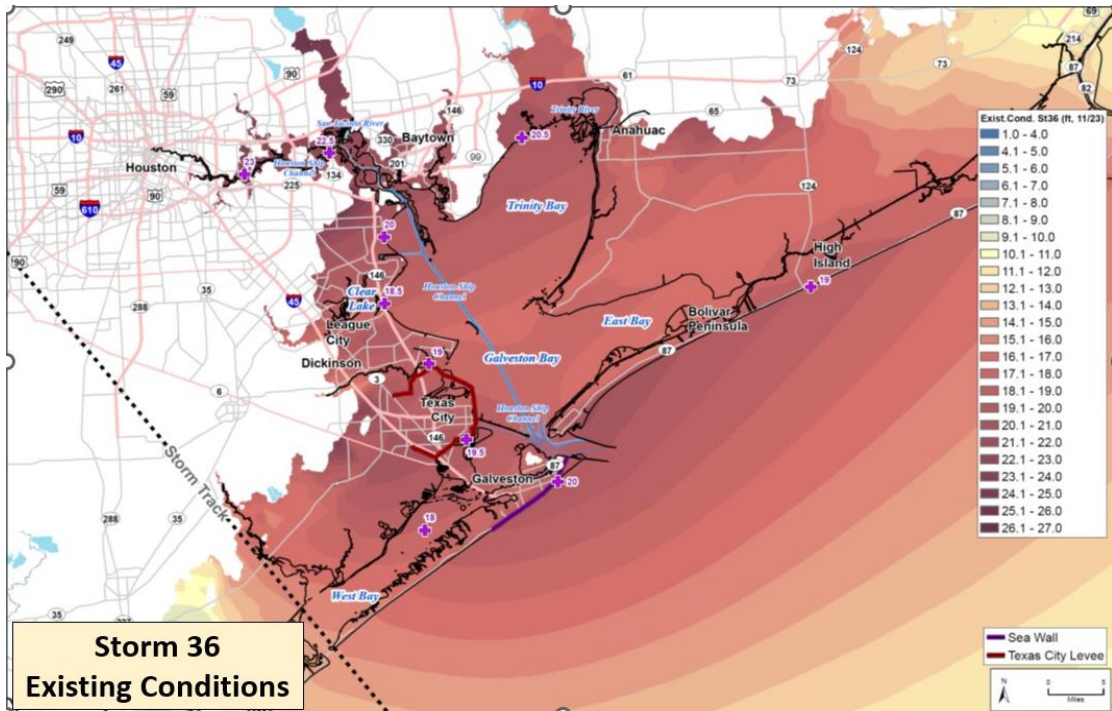


Figure 5. Computer simulation of storm surge from small Category 4 storm (FEMA Storm 36) coming ashore near San Luis Pass. Top figure shows existing conditions and bottom figure shows with storm protection in place (Image by Dr. Clint Dawson and Dr. Avi Gori for SSPEED Center.)

A clear path forward exists here. The Corps of Engineers' Coastal Barrier project has been assessed in an overall environmental impact statement (EIS) that set up a process called a "tiered" environmental impact analysis. Under the Corps' project, there are several elements – a 14-foot-high coastal sand dune barrier system on West Galveston Island and Bolivar Peninsula, a 21-foot-high gate structure across Bolivar Roads which is the pass between Galveston Island and the Bolivar Peninsula, a levee system (with varying heights) and a seawall heightening project (to 21 feet) for the City of Galveston, and an in-bay component involving two flood protection gates, one on Dickinson Bayou at 18 feet and another on Clear Lake at 17 feet. Under the "tiered" environmental analysis system, each of these four projects will have their own EIS and no work can be undertaken until the individual project's second-tier EIS documents are completed and approved.

The basic implementation concept being explored by the SSPEED Center is to accelerate the timing of the in-bay "tiered" analysis by the Corps to include consideration of the Galveston Bay Park Plan's first phase (initial dredging and levee construction) proposal. This in-bay proposal could also be initiated by a permit application to construct this project and the completion of a stand-alone EIS. Either way, the first phase of the Galveston Bay Park Plan could be under construction as soon as two to three years. The bottom line is that there is a pathway forward for our region that advances both navigation and coastal surge protection goals while protecting the long-term integrity of the Corps of Engineers' Coastal Barrier project. Our vulnerability to a major hurricane is very real. Our economic future, and the bay's ecological future, depend on our acting quickly and positively.

It is important for our region to coalesce around this important first step. This goes beyond any area's individual interests about short- and longer-term gains. This project is about protecting the core economic engine of our national economy as well as the Texas and regional economy and the folks living on and near Galveston Bay. The time has come for the region to come together for the benefit of all.