

Mid-bay gate (M)

SSPEED models showed that a mid-bay gate, if used in combination with dredged containment berms (E), would provide substantial surge reduction in the western and upper portions of the bay. Preliminary estimates indicate the mid-bay gate would provide a significant level of surge protection for the west side of Galveston Bay and the industrial complex along the Houston Ship Channel.

Dredged berms (E)

The proposed dredge-containment berms along the Houston Ship Channel within the bay have been evaluated with computer models. Existing berm sites along much of the Houston Ship Channel have been constructed by the Army Corps of Engineers for depositing the material that is routinely dredged from the ship channel. Some of these berms, like the one that makes up Atkinson Island, are as high as 25 feet above sea level. There are periodic openings between the berms to allow for small boat traffic and for bay circulation. This mid-bay protection scenario was found to provide significant storm-surge reduction for storms that blew across the bay from east to west and southeast to northwest, thereby helping to protect the west side and the upper portion of the bay, including the industrial complex along the ship channel. However, substantial amounts of water would still enter into these protected portions of the bay if there were no gate across the mouth of the ship channel.

Galveston levee (H)

Significant parts of eastern Galveston Island, including much of the historic portions of the city, are vulnerable to bayside storm-surge flooding, which has occurred during numerous hurricanes, including Ike. SSPEED evaluated the protection a new levee on the backside of Galveston would provide as part of a larger regional storm-surge protection strategy. Other variations of the Galveston levee alignment will be analyzed in the future, including scenarios with a unified ring-levée system around the city that is tied into the Galveston Seawall. Future analyses of scenarios also will include comprehensive storm-surge and economic damage-cost analyses.

Raising of Texas Highway 146 (C)

The proposed raising of Texas 146 to form a 25-foot levee was evaluated in the earlier phases of the SSPEED Center's work. The levee would provide storm-surge protection west of the roadway and could be coupled with other components as part of a regional surge protection plan. Others are studying this scenario in more detail.

Lower-bay gate (L)

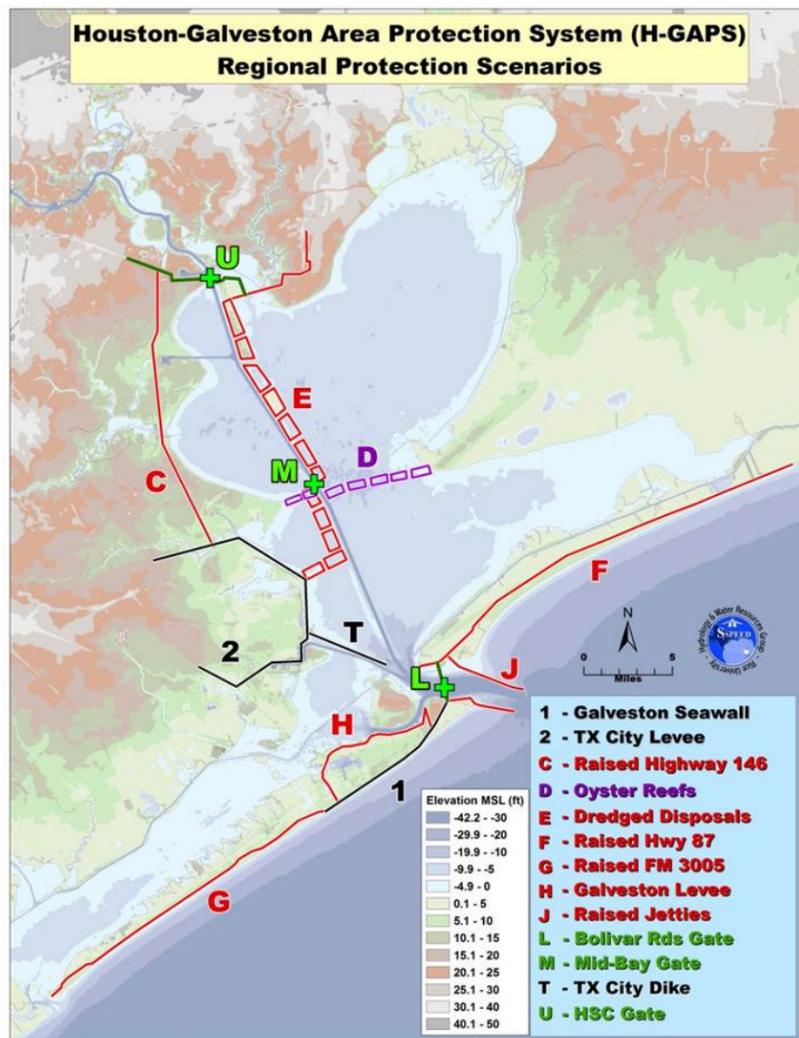
Computer models showed that a 10,000-foot-long floodgate across Bolivar Roads would be very effective at reducing both the amount of water entering the bay and the height of storm-surge flooding within the bay, but could be expensive based on the costs of other large coastal barriers that have been recently constructed around the world. The environmental impacts that could result from the reduction in flow capacity from this long floodgate under normal tidal exchange between the Gulf of Mexico and Galveston Bay have not yet been fully evaluated.

Raised Texas City Dike (T)

SSPEED has not yet evaluated scenarios for the proposed raising of the existing Texas City Dike. Future storm-surge protection analyses will compare this scenario with the proposed Galveston levee for measuring levels of backside flood protection during hurricane events.

Upper-bay gate (U)

SSPEED research has found that an upper-bay gate built at the mouth of the Houston Ship Channel -- near the Fred Hartman Bridge -- would be very effective in reducing the risk of catastrophic storm-surge flooding within the industrial complex of the Houston Ship Channel. Though the upper-bay gate could be tied in with other levees and regional protection options, it would not provide direct protection against storm-surge flooding within Galveston Bay.



Oyster reefs (D)

SSPEED evaluated the storm-surge protection that would result from the proposed construction of oyster reefs across the middle of Galveston Bay, along with vertical retaining walls. Modeling for this scenario found that the reefs alone would not adequately reduce storm surge in the western and northwestern portions of the bay in the event that hurricane-force winds crossed over the large open expanse in the upper portion of the bay.

Galveston Seawall (I)

Raising the existing 17-foot Galveston Seawall would provide additional protection from coastal storm surge for the city of Galveston. SSPEED has evaluated this scenario and assessed the level of surge protection a raised seawall would provide.

Raising Texas Highway 87 (F) and Farm-to-Market Road 3005 (G)

Computer models showed that raising of Texas 87 along Bolivar Peninsula and FM 3005 along the west end of Galveston Island would provide significant reduction of storm surge within Galveston Bay, especially as

the size of the storm surge along the coastline increased. SSPEED focused on analyzing these scenarios with elevated heights ranging from 10 to 17 feet above sea level. Other coastal surge barriers, such as levees and dikes, are also being evaluated.

Texas City levee (2)

The elevation of the Texas City levee varies from 15 to 25 feet. Based on analyses of FEMA flood plain maps, SSPEED determined that the levee may need to be raised in certain locations to provide 100-year storm-surge protection. Computer evaluations of this scenario have been used to assess protection from in-bay storm-surge flooding of the Texas City industrial complex. SSPEED's analyses indicate that the height of the levee should match the height of any other storm-surge protection components that are constructed to provide in-bay surge protection.

Raised jetties (J)

Analyses of computer simulations found that raising the existing jetties at the Bolivar Roads Channel would provide minimal storm-surge reduction within the bay because significant amounts of water would still enter the bay through the Bolivar Roads Channel opening.

Texas Coastal Exchange

The Texas Coastal Exchange (TCX) is a SSPEED Center concept that provides a mechanism for private landowners to be paid for the creation and management of the ecological value of their private property. An online tool is currently under development that would allow landowners to better understand the ecological values that they might sell their private lands for, as well as a platform that would bring sellers and buyers together. The TCX could create a willing buyer/willing seller economic activity that can survive flooding.

Lone Star Coastal National Recreation Area

The Lone Star Coastal National Recreation Area (LSCNRA) is a SSPEED Center concept to create economic activity in association with existing protected areas along the upper Texas Coast. This is a storm-surge-buffer concept that realizes income from ecotourism associated with the world-class birding and other recreational opportunities that exist, but are largely unrealized along the Texas coast. The LSCNRA has been developed as a proposal by a coalition of local partners and a steering committee supported by the National Parks Conservation Association. If created, the LSCNRA is expected to provide over \$200 million per year in income and generate over 5,000 jobs in Chambers, Galveston, Brazoria and Matagorda counties, while providing an anchor for a system of resilient, ecosystem-based economic activities that are compatible with surge flooding.