The Ike Dike: A Coastal Barrier Protecting the Houston/Galveston Region from Hurricane Storm Surge

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On September 13, 2008, Hurricane Ike came ashore near the east end of Galveston Island in Texas. Ike's strong Category 2 winds and near Category 5 equivalent storm surge, created sufficient devastation to be ranked as the third costliest hurricane to make landfall in the United States. Two storm surge barriers that mitigated damage and loss of life in the region were the existing Galveston Seawall constructed after the 1900 Galveston hurricane and the Texas City Barrier constructed after Hurricane Carla. Unlike Hurricane Katrina, when the media and the power of political process focused on the difficulties in New Orleans, the impact of Ike on the Houston/Galveston region was quickly forgotten as national attention turned to the US presidential race and the worldwide financial meltdown.

Despite the initial lack of attention, Hurricane Ike may well be a watershed storm. It has already changed how NOAA will classify hurricanes by giving more credence to surge potential. Moreover, the devastation caused by Ike clearly reinforced the century old demonstrated vulnerability of the Houston/Galveston area to hurricane storm surge and triggered ideas on regional approaches to suppressing surge for this urbanized region.

One such approach is the "Ike Dike" concept, a coastal barrier that would protect the Houston-Galveston region, including Galveston Bay, from hurricane storm surge. The project would extend the protection afforded by the existing Galveston Seawall along the rest of Galveston Island and along the Bolivar Peninsula, with a 17ft high revetment near the beach or by raising the coastal highways. The addition of flood gates at Bolivar Roads, the entrance to the Houston, Texas City, and Galveston ship channels, and at San Luis pass on the west end of Galveston Island would complete a coastal spine. At 17ft heights, the Ike Dike approach could conceivably provide a barrier against hurricane surges into the Bay for a storm expected to occur every 10,000 years. The coastal spine could be built using existing, proven technology such as the gates and barriers now in use in the Netherlands and in the recently completed New Orleans Hurricane Barrier. Greater New Orleans is now protected by a 133 mile perimeter of levees, flood walls and gated barriers. The total cost of Greater New Orleans Hurricane and Storm Risk Reduction System is about a billion dollars. The strategy is to keep massive surges from entering the system by shortening the outer protection needed by using 4 gated passages. The System was started in 2008 and achieved 100-yr surge event protection in June 2011. When compared to New Orleans Barrier, the Ike Dike is a simpler and less costly project, yet would afford protection for a much larger industrial base and population. The Dutch Deltaworks, the New Orleans Barrier and the Ike Dike share the proven Dutch strategy in that they shorten the perimeter as much as possible, keep the surge out of internal waters, and use gates to accomplish this. However, because the areas needing protection in the Houston-Galveston region are above Sea Level, less robust technologies relative to the New Orleans situation will be needed to achieve the desired protection.

Important research needs to be completed so details of the coastal barrier Ike Dike design and its costs and benefits can be better understood. This work is necessary to convince decision-makers at the regional, state and national level of the merits of the project.

Ultimately federal government support for the construction and maintenance of the barrier will depend on detailed quantifiable analyses of its costs and benefits. Although the antidotal evidence of the national value and strategic importance of the Galveston Bay petrochemical, maritime and related economies is strong, it must be fully detailed and documented. Potential losses to the local, state, and national economies with and without surge suppression must be understood and quantified. Moreover, in order to truly define the benefits, this understanding must be carefully based on the probabilities of tropical hurricanes impacting the region, rather than speculative hurricane possibilities.

A necessary component to the economic and barrier design studies is probabilistic storm surge inundation information for the region, with and without an Ike Dike in place. Engineers from the Homeland Security Center of Excellence at Jackson State University led by Dr. Robert Whalin (Center Director) and Mr. Thomas Richardson (Center Deputy Director) working with engineers at the United States Army Corps of Engineers Engineer Research and Development Center will conduct the necessary storm surge modeling studies. This modeling will comprise integral input information to our economic and barrier research strategies and better quantify Galveston Bay's important role as a retention basin for surge waters.