

## **HURRICANE IKE AND HARRIS COUNTY FLOOD CONTROL DISTRICT**

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**Overview:** Hurricane Ike made landfall at Galveston Island, Texas at 2:10 a.m. on Saturday, September 13<sup>th</sup> as a 110 mph category 2 hurricane and tracked north-northwest through eastern Harris County along and east of I-45. The hurricane produced devastating storm surge and rainfall flooding across Harris County along with sustained winds of 60-70 mph and wind gusts of 80-90 mph. Widespread flood and wind damage occurred throughout Harris County.

### **Storm Surge**

Hurricane Ike produced the highest storm surge along the upper Texas coast since 1915. On Galveston Island only the 1915 hurricane and the Great Hurricane of 1900 had higher storm surges than Hurricane Ike. At Sabine Pass, Ike produced the highest storm surge on record of 14.24 feet, surpassing that of the deadly Hurricane Audrey surge in 1957. Ike's surge was roughly 3 feet higher in southwest Louisiana than Hurricane Rita's surge and extended along the Gulf coast to the New Orleans area. The surge extended 15-18 miles inland across Chambers County and inundated 80-90% of Galveston Island. Where the eastern eyewall crossed the coast along the Bolivar Peninsula, near complete destruction of structures was noted from both the storm surge and large 6-8 foot Gulf wave action.

### **Wave Action – Galveston Bay**

Wave action of 4-6 feet accompanied the storm surge along the west side of Galveston Bay resulting in extensive damage to homes and businesses along the shoreline. The common factor of the coastline alignment along with increasing fetch distances from north to south is suspected as the cause of this damage from short period wind driven waves from the east-northeast within the northern eyewall near the peak of the storm surge and maximum sustained winds.

Extensive damage occurred to the Kemah boardwalk and the surrounding buildings and restaurants. High water marks obtained from inside a parking garage suggest a storm surge of around 12.0-13.0 feet at the boardwalk however inspection of the first and second floor restaurants revealed a secondary set of high water marks between 16.0 and 17.0 feet. These marks include the height of the wave action on top of the storm surge and this wave action, when combined with the surge, resulted in the heavy damage to the first floors of the restaurants along the boardwalk.

### **Harris County ALERT System**

The Harris County Flood ALERT system for remote sensing system of rainfall and flood levels sustained damage during the hurricane from both storm surge inundation and wind. A total of 30 gages were damaged resulting in loss of gage communication and data. A total of 14 high water indicator pipes were damaged from wave action and debris

impacts. A team of ALERT system experts was assembled from across the nation and arrived in Harris County on October 13<sup>th</sup> to assess the system and determine how best to repair the damage. The ALERT system will be restored to pre Ike reporting levels by April 2009.

### **Rainfall Total**

The first rainfall-related flood event occurred during the actual landfall of the hurricane as the western and southern eyewall moved across the county. Rainfall started around 9:00 p.m. on Friday, September 12<sup>th</sup> and continued into the early afternoon of the 13<sup>th</sup>. The second heavy rainfall and flood event occurred early on Sunday, September 14<sup>th</sup> in Harris County as the remnant atmospheric moisture of Ike interacted with an incoming frontal boundary from the northwest.

Overall storm rainfall totals averaged 10-13 inches with isolated amounts of 15-18 inches which equal to between a 10-yr and 100-yr rainfall frequency across a large part of the county.

### **House Flooding**

Flooding of homes and businesses occurred from storm surge, bayous overflowing their banks, overland flow (water trying to reach the bayous), and internal drainage (surcharged storm sewers and roadside ditches and large amounts of debris from the hurricane).

Final house count numbers provided to HCFCD from the various jurisdictions in Harris County indicate that between 1200 and 1300 homes were flooded from rainfall alone. The well maintained condition of the channels and the additional storage within the watersheds drainage area due to clogged street storm sewer inlets are the most likely reasons that house flooding was not more widespread.

Within the storm surge areas 2500-2600 homes were inundated with sea water in the Nassau Bay, La Porte, Baytown, Pasadena, Seabrook, and Shoreacres areas. House count numbers were also obtained for the Galveston side of Clear Creek and Clear Lake to find the total inundation from the storm surge for this watershed. The total number of homes flooded around Clear Lake from Hurricane Ike was around 1950. Total flooded houses for Harris County is around 3800 when rainfall and storm surge is combined.