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OTT Hydromet Application Notes / Success Stories

## Harris County Flood Warning System Case Study



Harris County (Photo courtesy of J. Lindner, Harris County Flood Control District)

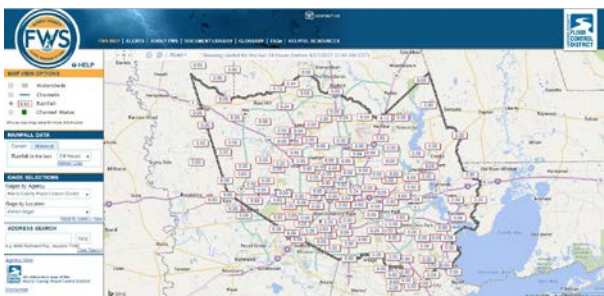


OTT Radar Level Sensor (Photo courtesy of J. Lindner, Harris County Flood Control District)

### Background

The Harris County Flood Control District in Texas was created in 1937 in response to the devastating floods that struck Downtown Houston and Harris County between 1929 and 1935. The District's boundaries include 3.7 million people in 34 jurisdictions one of which is the City of Houston.

The District's responsibility includes 22 watersheds and 1500 miles of open channel drainage network. The District is using its "Flood Warning System" (FWS) to measure rainfall and water level amounts in real-time, to provide up-to-date flood information to decision makers, the media, and the citizens of the region. The installation of the FWS gauge system began in 1982, initially with 13 stations. Since then, the number of gage stations has grown to 153, of which 19 have the OTT RLS and 38 the CBS water level sensors.



Map of Harris County (Photo courtesy of J. Lindner, Harris County Flood Control District)

### What is monitored?

- 153 monitoring stations use a variety of water level measurement technologies, including OTT Radar Level Sensors (OTT RLS), OTT Compact Bubbler Sensors (CBS), and pressure transducers

- Water level (rate of rise) and precipitation (intensity and accumulation)

## Why monitor?

The goal of the Harris County Flood Warning System is to provide information collected by gage stations in near real time in a user friendly format to decision makers, emergency management authorities, the National Weather Service, and the citizens of the region to protect life and property. Water level response in creeks and bayous is critical information needed by first responders and the National Weather Service when making decisions on issuing targeted flood warnings and properly messaging needed actions.

On Memorial Day 2015, rainfall amounts of 8-11 inches occurred over the heavily populated areas of southwest Houston in 3 hours, resulting in one of the worst flooding events along Brays Bayou since 1983. Only 11 months later another massive rainfall event occurred on the evening of April 17<sup>th</sup> into the morning of the 18<sup>th</sup> where widespread rainfall totals of 10-16 inches fell across the northwest 1/3<sup>rd</sup> of Harris County in 12 hours resulting in one of the most devastating floods since the catastrophe of Tropical Storm Allison (2001). A total of 9800 homes were flooded and 9 persons died.

Intense flooding rainfall is not uncommon in Harris County given its closeness to the Gulf of Mexico and influences from both stalling frontal systems in the spring and fall and tropical weather systems in



*Memorial Day 2015 Flood (Photo courtesy of J. Lindner, Harris County Flood Control District)*

the summer. Hourly rainfall rates can commonly exceed 3-4 inches with the highest known hourly



*Brays Bayou at Lawndale Radar Unit (Memorial Day 2015 Flood) (Photo courtesy of J. Lindner, Harris County Flood Control District)*

rainfall rate of 6.9 inches recorded at a gage location in the southern part of the county on April 18, 2009. Excessive rainfall and flooding is the natural disaster in Harris County and having a robust and reliable data collection system to monitor both rainfall and water level responses is not only necessary, but vital.

## Current monitoring system:

For detecting rate of rise at designated gage locations, the OTT RLS and CBS measure water level using proven non-contact water level measurement techniques and are unaffected by rising flood waters. This critical data is transmitted in real-time and can be viewed on the Harris County Flood Warning System website: <http://www.harriscountyfws.org/>. The flood warning information is also available to the public via a mobile app. Elected officials and media rely on this site. "There is a lot of confidence in the system now compared to several years ago when vast amounts of data were being lost due to data contention and the maintenance of the field equipment was inadequate" stated Jeff Lindner Director of Hydrologic Operations at the District. "With the current system it is an anomaly to have incorrect data." said Jeff. Also, key is having proper technology in place and knowing how to operate and maintain all aspects of the system.

The OTT CBS and RLS are critical for water level measurements. "Could not do what we do during flood operations without the water level devices", indicated Jeff who also states that his technicians only visit the OTT RLS radar and CBS bubbler sensors two times a year for bi annual maintenance of the site. "Really been maintenance-free, and can withstand intense storms if installed and anchored correctly. We have only lost one radar, where water went over the bridge and the radar was struck by a floating

tree.” Referring to OTT CBS bubbler Jeff stated “Bubbler devices are a must have where radars may not be an option and pressure transducers may not work, one of our bubblers worked in 2 ft of freshly deposited silt.”

Having a reliable system in place to monitor water levels, including OTT sensors, has allowed the Harris County Hydrologic Division to begin focusing on collecting discharge measurements, which are needed to maintain and adjust rating curves vital to flood forecasting efforts.

### Technology Used:

- OTT RLS - Radar Level Sensor (19)
- OTT CBS – Compact Bubble Sensor (38).

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More information on OTT solutions and products on [www.ott.com](http://www.ott.com)



*Radar mount struck by tree at Buffalo Bayou Downtown (Memorial Day 2015 Flood) (Photo courtesy of J. Lindner, Harris County Flood Control District)*