

NHWC 2015 Workshop Flood ALERT2 Implementation Summer / Fall 2015

**Ronald Havran
Valerie Lomas
Mark Moore
Richard Velasco**

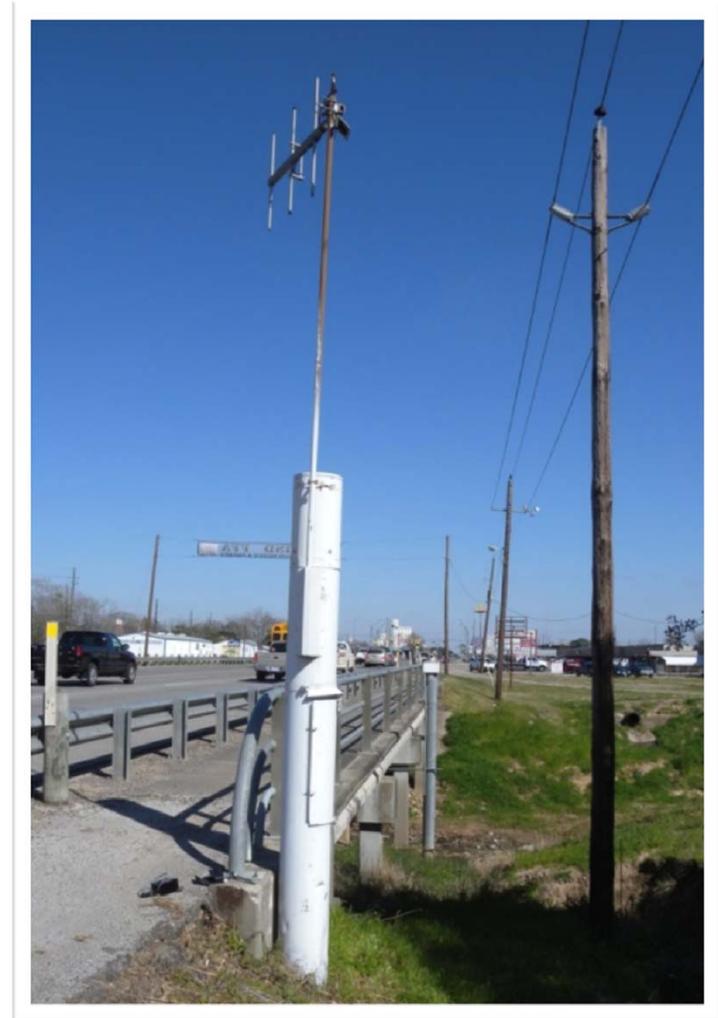


Outline

- **ALERT System History**
- **ALERT2 System Overview**
- **Hydrologic Technician ALERT2 Knowledge Base Training**
- **ALERT2 Install Preparation and Procedures**
- **ALERT2 System Monitoring**

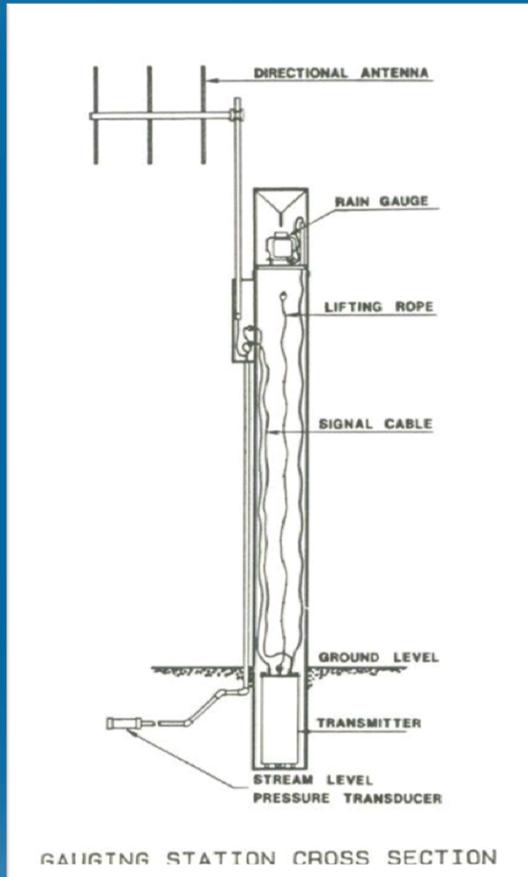
FWS History

- **1979: concept formed after TS Claudette dropped 43 inches of rain**
- **1982: system started with 12 gage stations in 5 watersheds at HCFCD**
- **1989: expansion to all 22 watersheds with 68 gage stations**
- **1996: O&M moved from HCFCD to newly formed HC Office of Emergency Management**

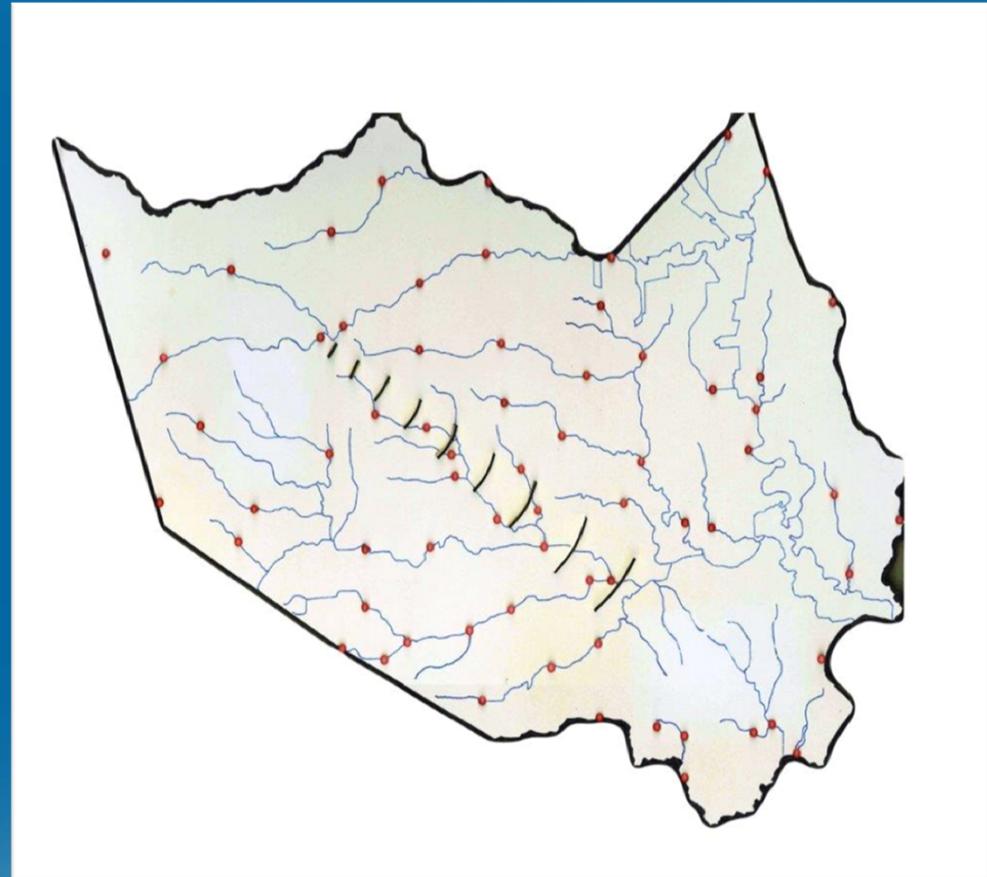


Flood Warning System History

Standpipe



Original ALERT Sites Map



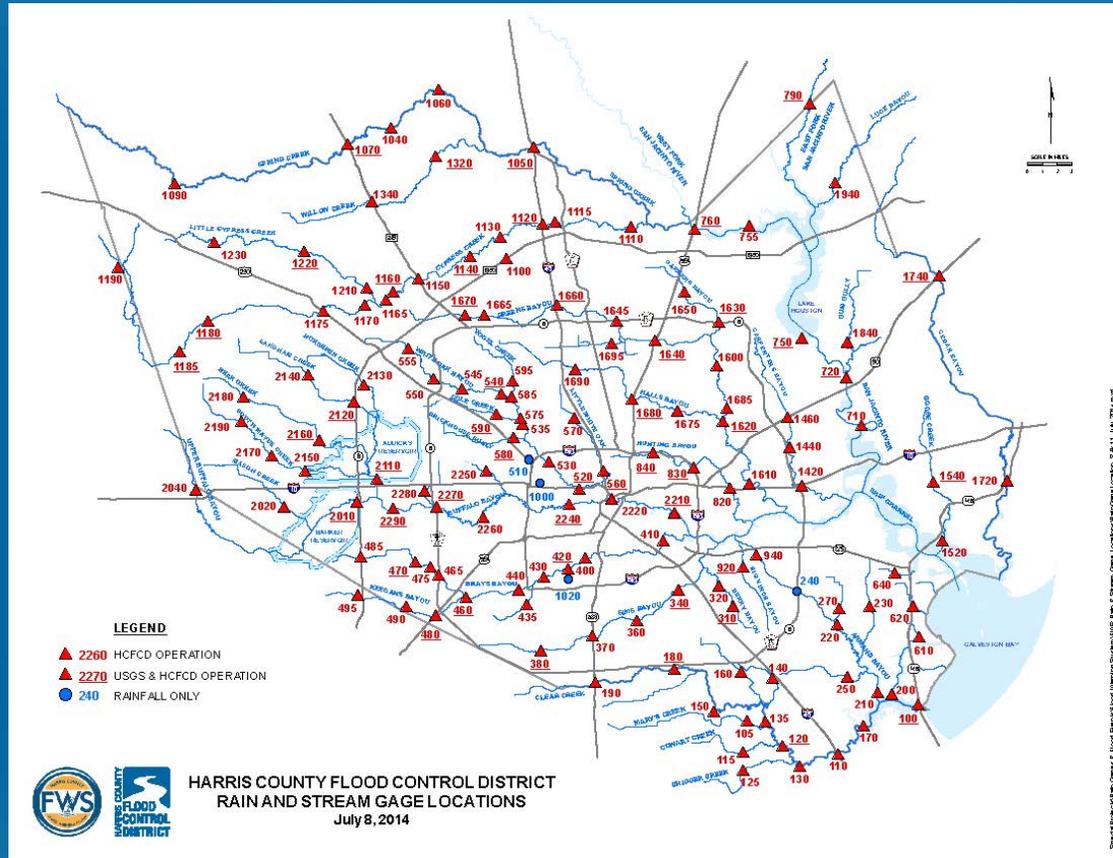
Flood Warning System History

1999: expansion to 105 gage stations following 3 severe floods in fall 1998

2004: expansion to 129 gage stations as a result of TS Allison

2009: As part of FWS review, system transferred to HCFCFD

2015: ALERT2 Installation Upgrade with currently 90 of 139 sites now ALERT2



Goal of the Flood Warning System

“Provide accurate and consistent rainfall, stage, and other data on a reliable real-time basis in a useful form to HCFCD, Harris County officials, NWS, other agencies, and the public to facilitate making decisions before, during and after storm events to reduce the risk of property damage, injuries, and loss of life.”

How can we improve the network to meet the Goal of the Flood Warning System?

Hydrologic Technician ALERT 2 Knowledge Base Training

- **Training & Skill Sets**

- ❖ Meteorology
- ❖ Hydrology
- ❖ Hydraulics
- ❖ Surveying
- ❖ Electronic Circuits
- ❖ Batteries
- ❖ Power Systems
- ❖ Sensors
- ❖ SDI-12
- ❖ Repeaters
- ❖ Antennas
- ❖ ALERT2
- ❖ Radios
- ❖ Software

- **Following All Install Standards & Procedures**

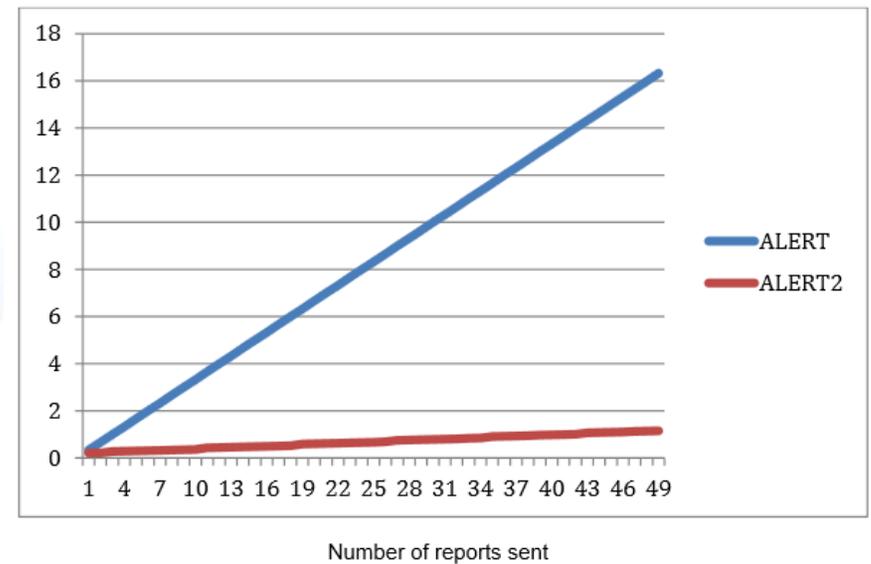
- **Teamwork**

ALERT2 Overview

“ALERT2 is a new protocol optimized for the transport of real-time data over radio telemetry networks. It is the successor to the ALERT introduced in the 1970’s. It offers a 7 – 10 fold increase in net data rate, detects all errors introduced in transmission and corrects the majority of them. It provides greater “data space” that expands the range of sensor identifiers and data resolution.”

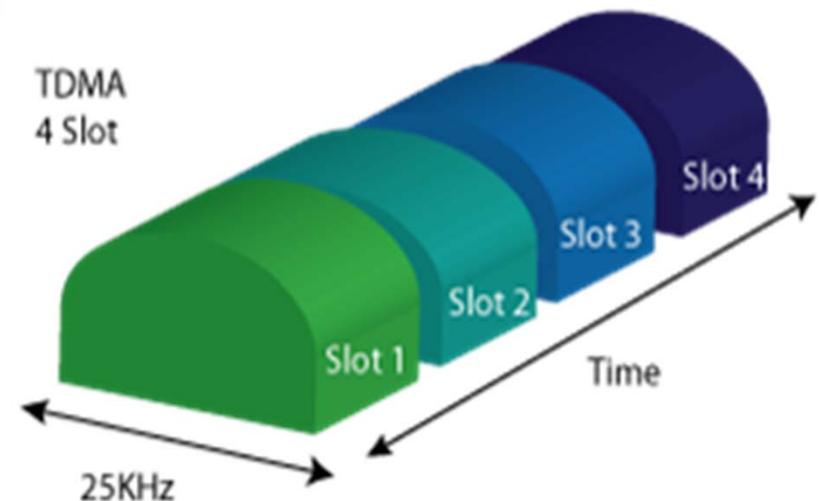
Purpose and Rationale of ALERT2

- Limitations of ALERT in large systems was a serious issue.
- Systems were running out of ID space
- The ALERT community decided to work toward the development of software and hardware



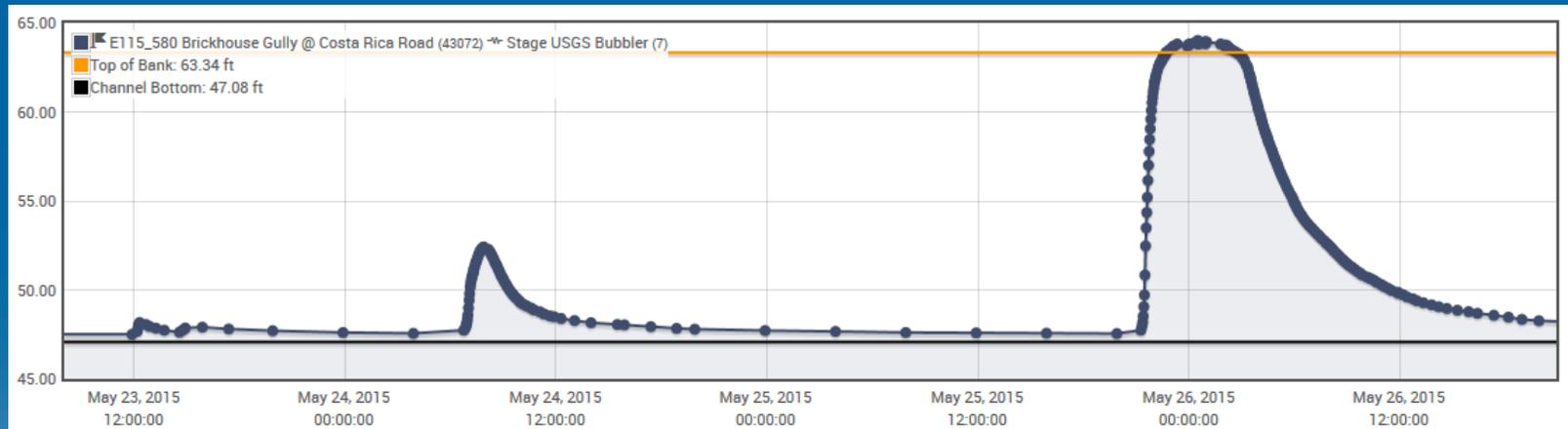
- In an ALERT2 system every gaging site reports independently of all other sites at its programmed time.
- **More complete information**
ALERT2 has increased capacity due to higher speed.
- **Eliminated data loss/collision**
- **Retains benefits of ALERT** such as robust paths to high energy per bit, low power requirements at remote sites, and an open standard that encourages competition.

Advantages of ALERT2 vs ALERT



Benefits for Users of the FWS

- Significant error reduction.
- Knowing the time a report at a site for a sensor will be available.
- No rollover issues of data values that were limited in the ALERT
- Elimination of revalidation of data in software program.
- Faster interpretation of channel conditions.



Design

- Upgrade sites to standard set-up.
 - All stilling wells were removed.
- Sites must be NEMA box enclosure or USGS tie-in co-located site.
 - Standpipe sites changed to standard NEMA box.



Stilling Well Removal

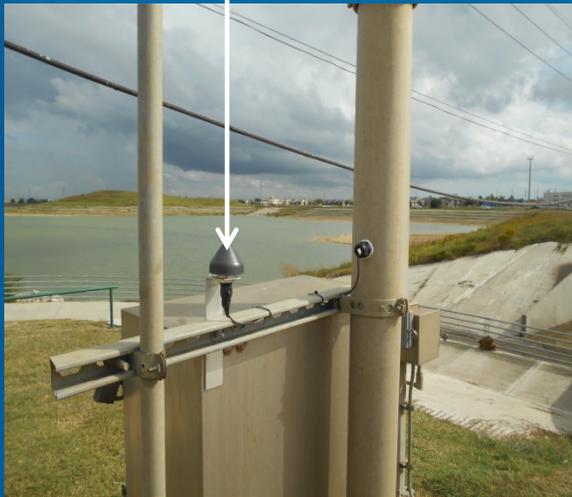


ALERT2 Install Preparation and Procedures

- **Shop Preparation**
 - Mounting Back Panel to Back Plate
 - Assemble Components & Supplies
- **Field Install Of Components**
 - GPS Antenna
 - Radio Antenna & Mast Assembly
 - Solar Panel Mounting On Mast Assembly
 - Mounting & Wiring Of Back Panel & Associated Components
 - Connecting Sensors
- **Types Of Installs**

ALERT2 Components

GPS Antenna



Radio Antenna



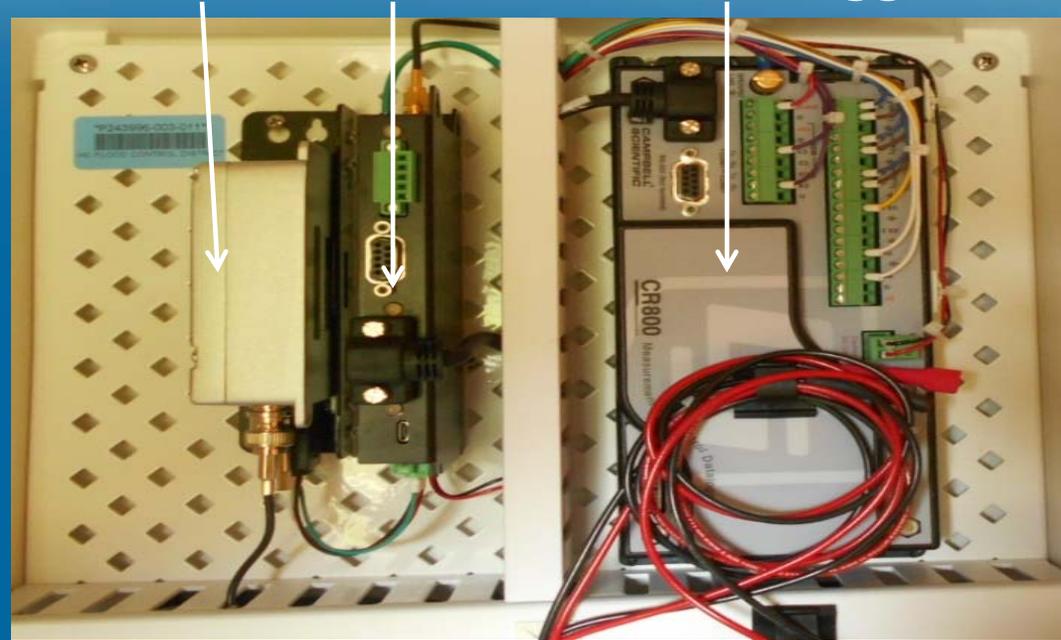
5 W Solar Panel



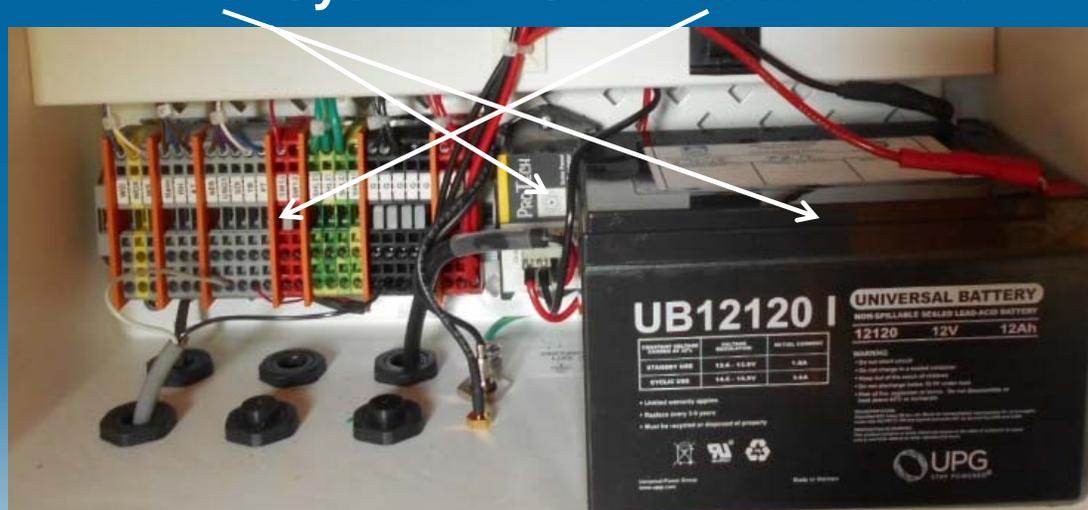
Radio Antenna And Solar Panel Mount



ALERT2 Components (Inside Back Panel) Radio, Transmitter, & Data Logger



Power System & Sensors Interface



ALERT2 Types of Installs

USGS ALERT2 Mounting on Ply board



ALERT2 Types of Installs

NEMA ALERT2 Mounting



ALERT2 Types of Installs

NEMA ALERT PT Install

NEMA ALERT2 PT Install



ALERT Before



ALERT2 Upgrade

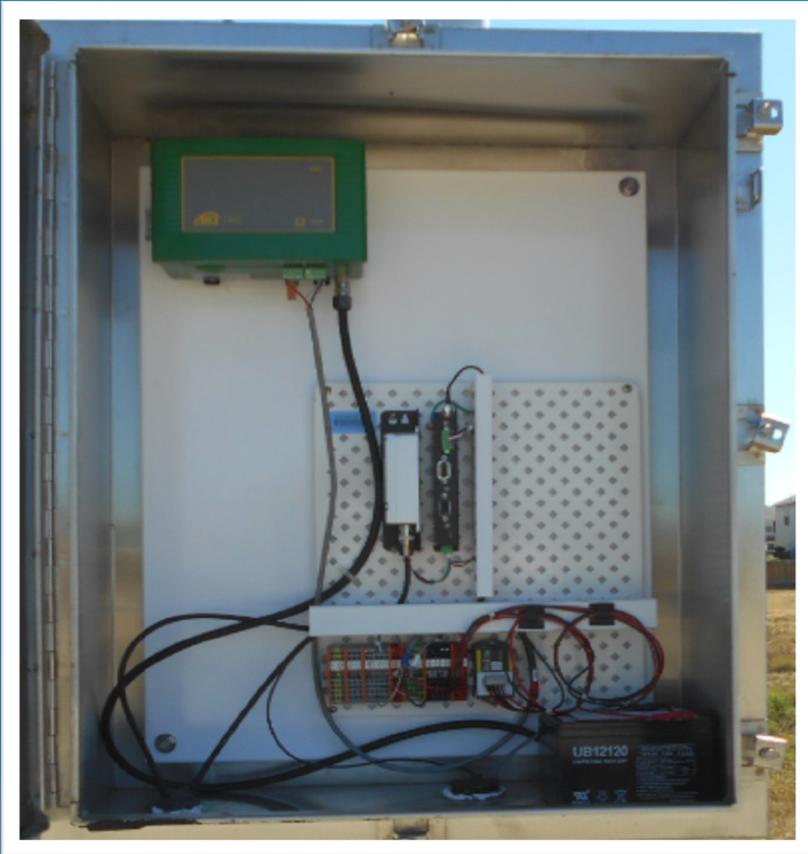
ALERT2 Types of Installs

ALERT Bubbler Install



ALERT Before

ALERT2 Bubbler Install



ALERT2 Upgrade

ALERT2 Types of Installs

ALERT USGS Install



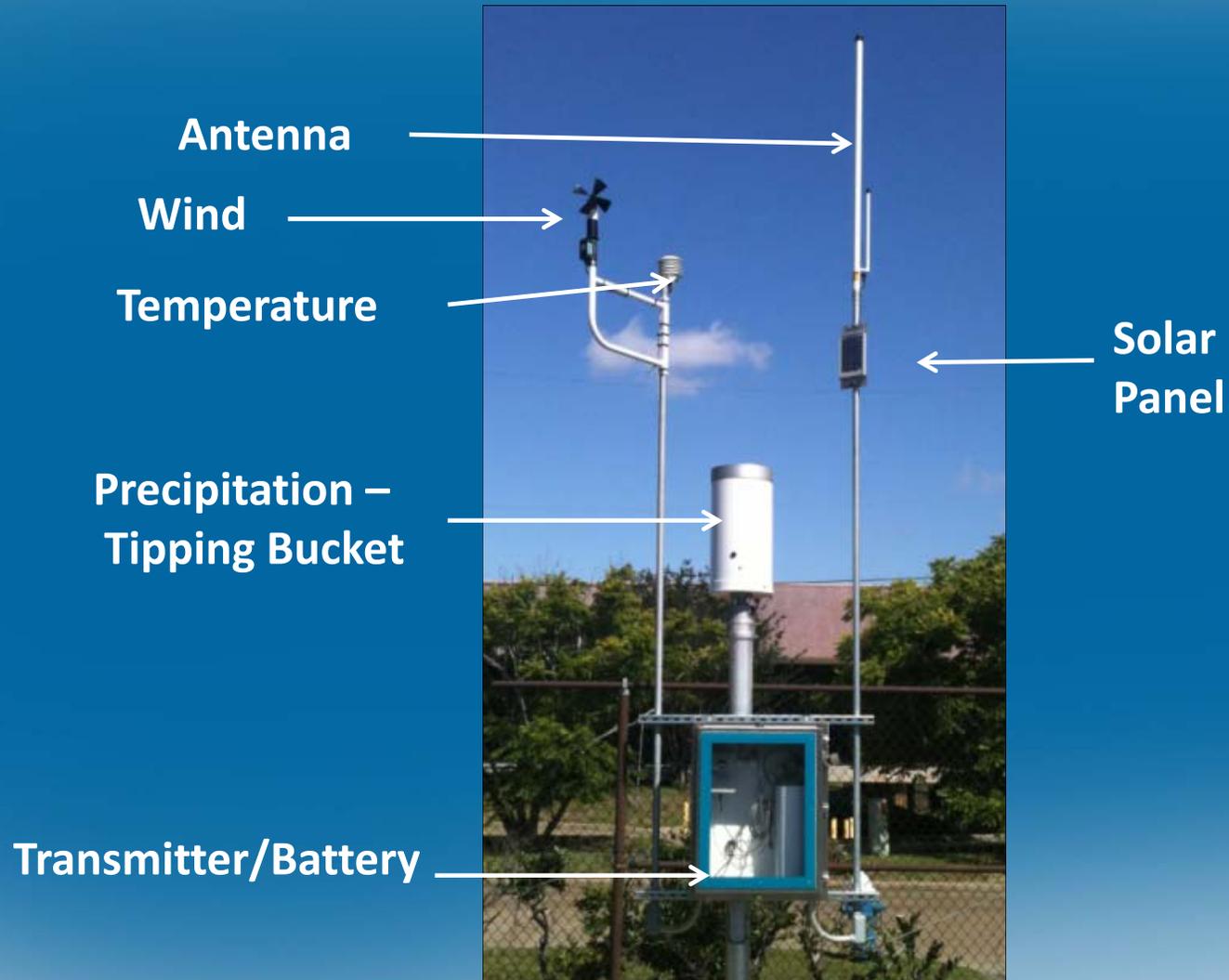
ALERT Before

ALERT2 USGS Tie-In Install

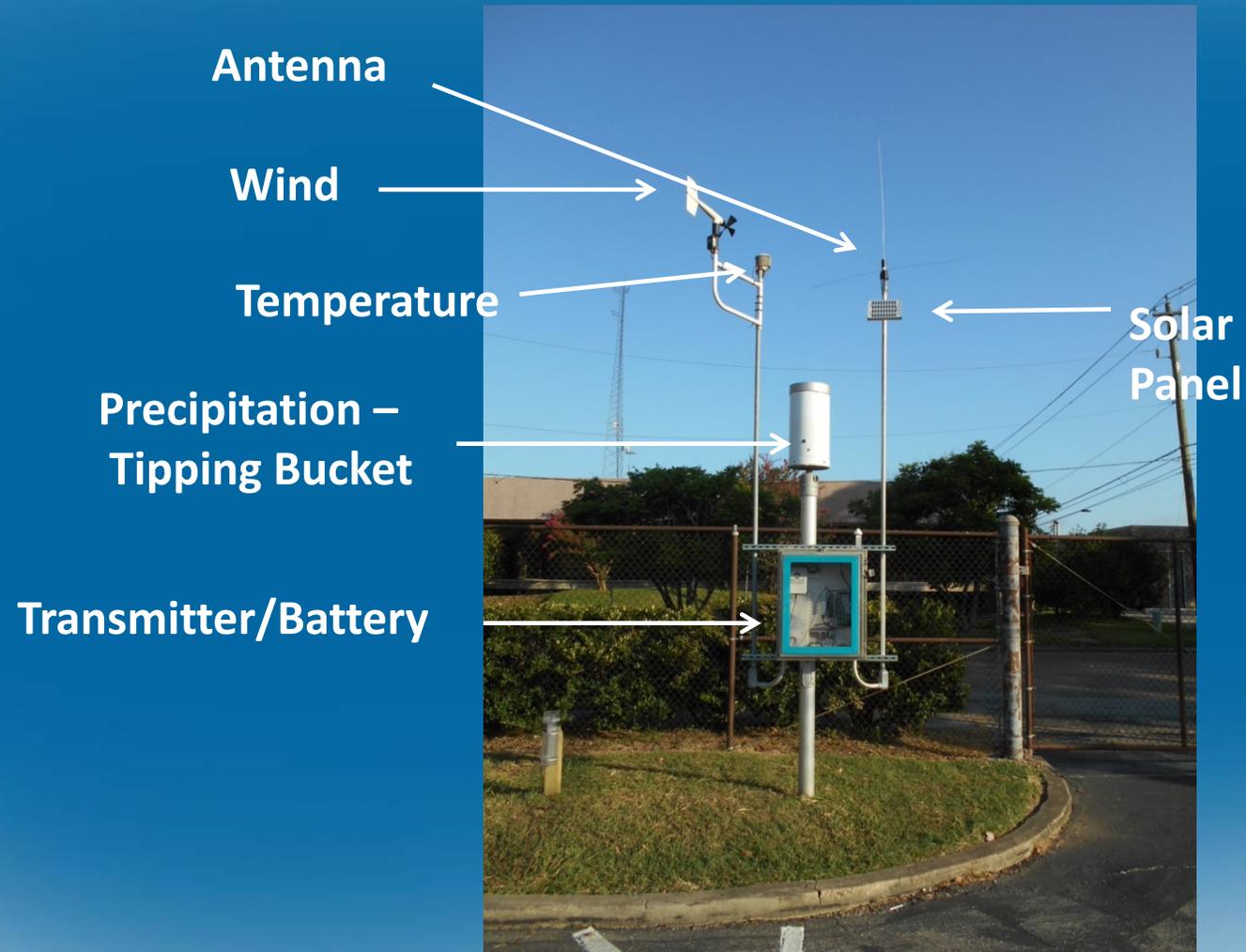


ALERT2 Upgrade

Brookhollow Parking Lot ALERT



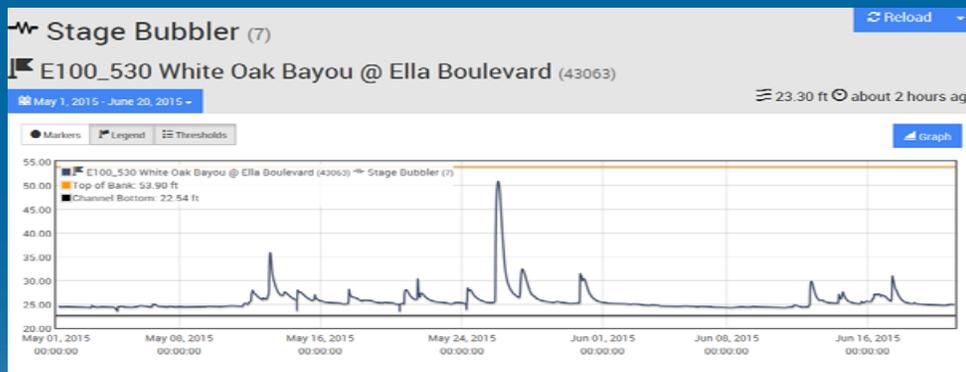
Brookhollow Parking Lot ALERT2



ALERT2 System Monitoring

Contrail Software

- Monitor Daily Sensor Reports
- Plot Graphs For Data Analysis
- Valuable Data During Flood Events



510 Harris County Flood Control @ Brookhollow (43091)

Sensors	Value	Unit
Air Temperature (1)	74.71	°C
Barometric Pressure (1)	30.15 in	in
Flowage (1)	0.00 cfs	cfs
Flowage (2)	11.17	cfs
Maximum Wind Speed (1)	12 mph	mph
Flow (1)	48.92 in	in
Flow Incentive (1)	0.00 in	in
Flow Incentive (2)	0.00 in	in
Flow Status (1)	Flow	
Flow Status (2)	Flow	
Flow Direction (1)	102 South	
Flow Direction (2)	Flow	
Flow Speed (1)	1 mph	mph
Flow Speed (2)	Flow	

ALERT 2 Install Issues Summary

Issues encountered

- 4 GPS antennas didn't operate
- 3 Radio's didn't function
- All sensors must be connected to the system before powering on transmitter.
- Replacing antenna connectors on older cables had issues with corrosion affecting transmissions.
- Transmitter program values had to be changed on some units while programming site during initial set-up.

Flood ALERT Team Members

- ◆ Steve Fitzgerald - Chief Engineer
- ◆ Jeff Lindner - Flood Watch Department Manager/Meteorologist
- ◆ Jim Greeson - Flood Warning System Supervisor
- ◆ Jeremy Justice - Hydrologic Analyst
- ◆ Valerie Lomas - ALERT Data Specialist
- ◆ Richard Velasco - Hydrologic Technician
- ◆ Ronald Havran - Hydrologic Technician
- ◆ Mark Moore - Hydrologic Technician

QUESTIONS???



Flooding of Buffalo Bayou at Milam St. May 26, 2015