

# Real-Time Monitoring Sensors

### Rain Gauge Sensors:

- Tipping Bucket
- Measures Accumulation and Rainfall Rate
- Accuracy 0.01"
- Price Range \$400 - \$1000

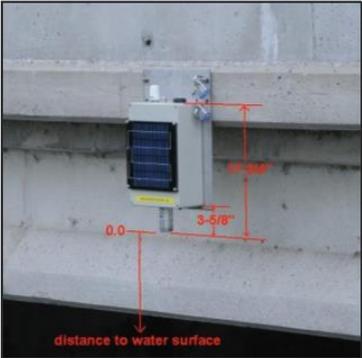


### Water Level Sensors:

- Above Water - Radar, Ultrasonic
- Submersible – Pressure Transducer, Contact Wet/Dry
- Measures change in water level
- Price Range \$500 - \$3000



Pressure Transducer



Ultrasonic Water Level Sensor



Radar Water Level Sensor



Water Level Contact Sensor

### Other Sensors:

- Soil Moisture Sensor
- Camera Sensor



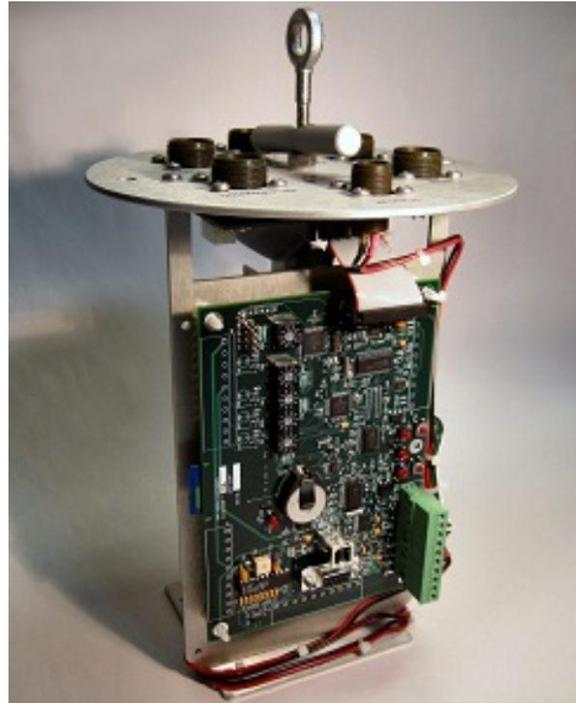
Soil Moisture Sensor



Camera Sensor

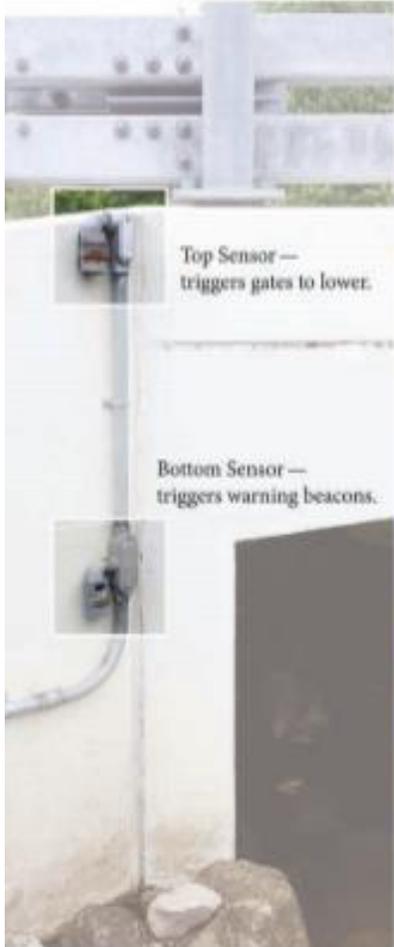
# Real-Time Monitoring Stations

- Communication – Cellular Modem, Radio or Satellite
- Data Logger and Transmitter
- Sensor Ports
- Battery / Solar Powered
- Packaged Stations – Companies sell stations packaged with sensors and accessories.

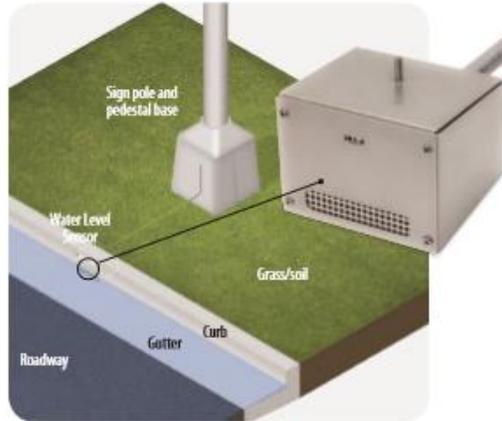


# Road-side Flood Warning Systems

- Alert Notification System
- Single or Multiple Flood Sensors can be installed
- Radar, Ultrasonic, or Contact Sensors are available
- Flashing Beacons or Sign and/or Traffic Guards can be used for warning
- Price Range \$10,000 - \$13,000



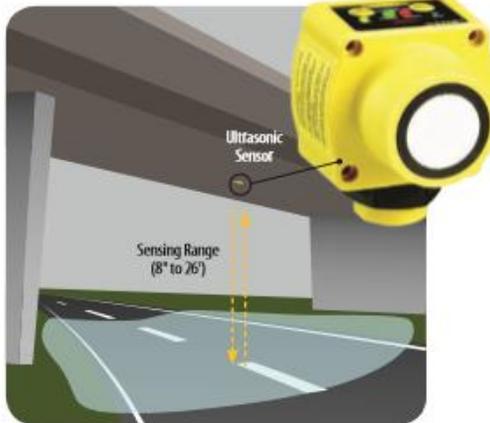
Flood sensor mounted on bridge.



Three sensors trigger separate functions.



Sensor mounted at underpass.



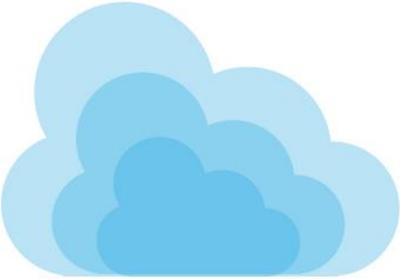
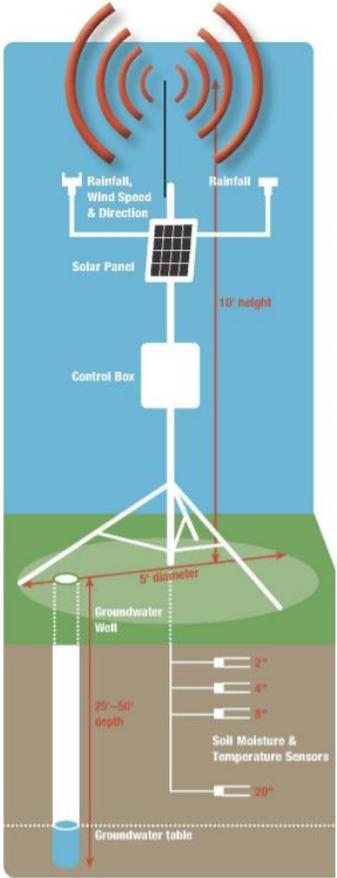
Dual or Single BlinkerBeacon™

# Data Platform and Information System Management

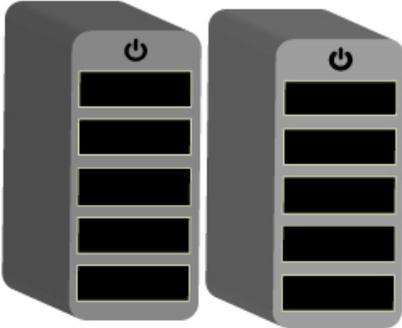
Stations / Sensors  
Cellular or Wi-Fi Transmission

Data Storage and Processing

User Interface  
Internet Web or Mobile Applications



Cloud Server  
OR  
Local In-House Servers



# Real-time Monitoring Sensors and Station

## Things to Consider

### **Communication:** How will sensors and stations transmit data?

- Cellular Network – Verizon and AT&T FirstNet in Monroe County
- Radio Antennae
- Satellite

### **Data Management Services:** How will Data be stored and served? What are data management capabilities?

- Mobile Application and/or Software Platform – Data Dashboard
- Third-Party Services (NWS, Datawise, Weather Underground etc.)
- Alert Notification Capability

### **Sensor / Station Setup:** Which sensors should be used and where should they be established? Compatibility issues?

- Weather Station (Wind, Rain, Temp, Humidity)
- Rain Gauge Sensor
- Water Level Sensors (Radar, Ultrasonic, Pressure Transducers)
- Camera
- “Packaged” stations allow for multiple sensors to interchangeably connect to station

### **Installation:**

- Shallow streams – determine best installation for submersible water level sensors
- Permanent installation vs. Portability – determine best option and associated costs
- Public vs. Private land – work out agreements with landowners or choose public right-of-ways or easements
- Security – determine best practice to deter theft or vandalism, especially for road-side stations

# Kickapoo River Watershed – Monitoring Station Planning

Site 1. Village of Norwalk – Railroad St. Crossing

Station Setup: Water Level Sensor

Site 2. Village of Wilton – St. Hwy 71

Station Setup: Water Level Sensor

**Note: Establish rain gauge in Village of Wilton**

Site 3. County Road Z

Station Setup: Water level sensor, rain gauge sensor

Site 4. County Road T Crossing

Station Setup: Water Level Sensor

Site 5. Village of Ontario

USGS Gage Station – data sharing

Site 6. St. Mary's Ridge

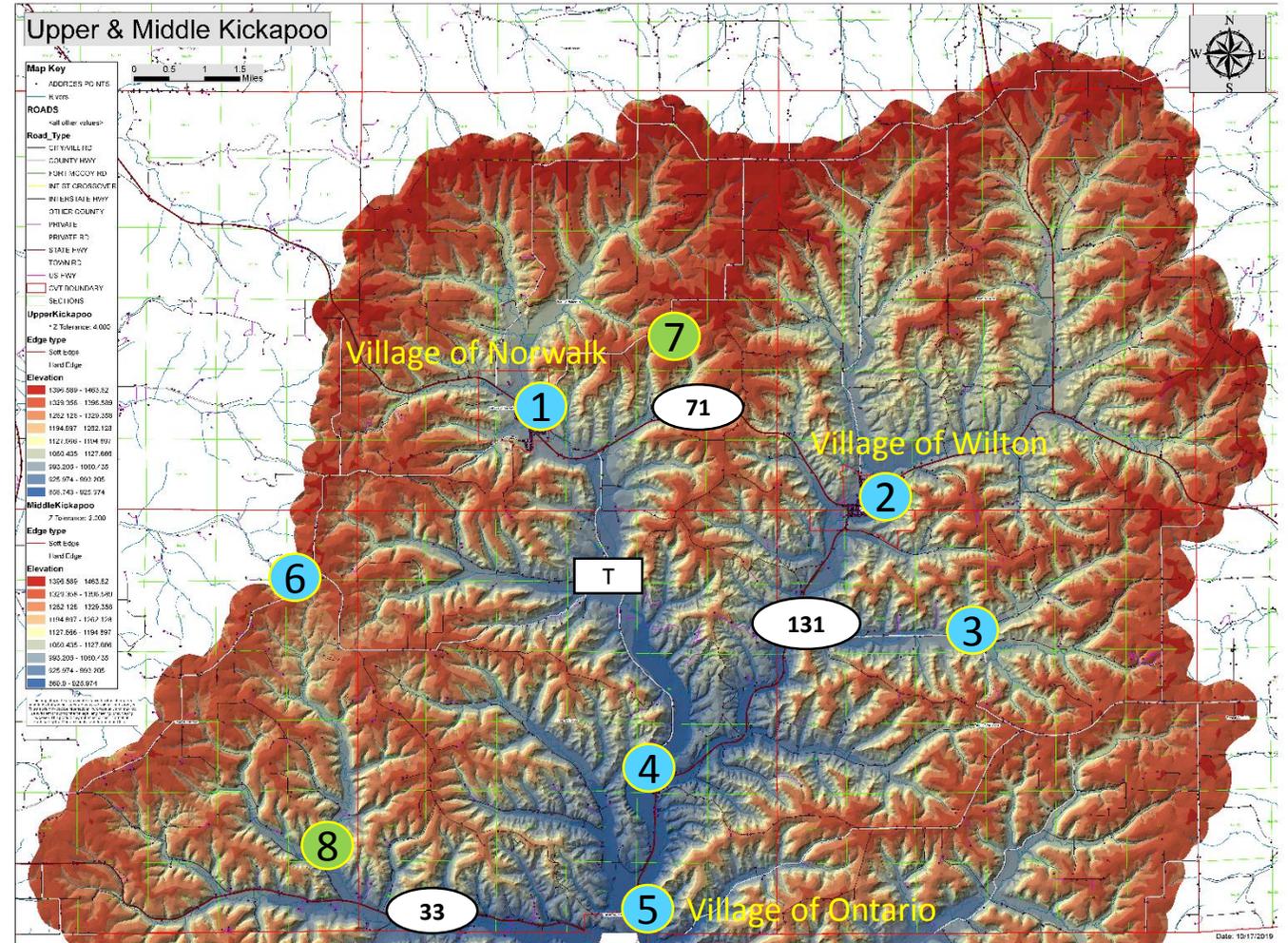
Station Setup: Rain Gauge Sensor

Site 7. County Road U – Helgren Farm

Weather Underground Registered Personal Weather Station

Site 8. Nevada Rd. – Firefly Ranch

Weather Underground Registered Personal Weather Station



**All sites had good coverage on both Verizon and AT&T's FirstNet (first responders) Networks.**

## Price Quotes

Description	Davis Instruments	Intellisense	High Sierra Electronics
Station – Receiver/Transmitter with Cellular Modem	\$1,300	\$2,500	\$1,500
Rain Gauge Sensor	\$400	\$800	\$1,000
Water Level Sensor	\$600	\$500	\$1,300
Software / Dashboard Service / Alert Notifications	Free	Currently Free	\$250/yr
Cellular Plan Service Per Year (dependent on data plans)	\$300/yr	\$300/yr	\$100/yr
Misc – Mounting Equipment, Encasements, Cables, etc.	\$200	Included	\$1,200
<b>Cost Estimate</b>	<b>\$2,800</b>	<b>\$4,100</b>	<b>\$5,350</b>

**NOTE: These are initial price quotes. Additional accessories, installation, shipping, taxes and technical support that may be needed are not included.**