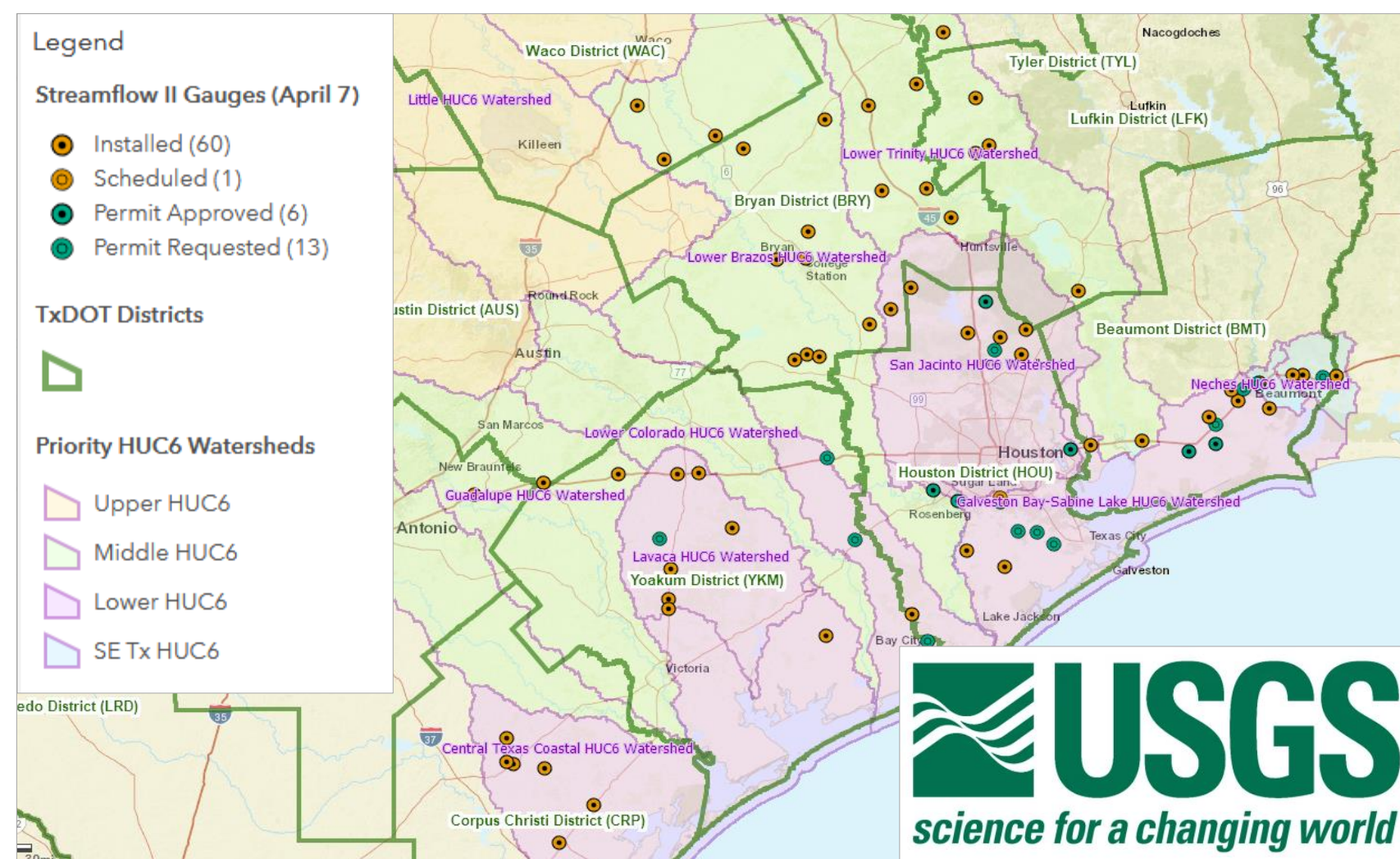
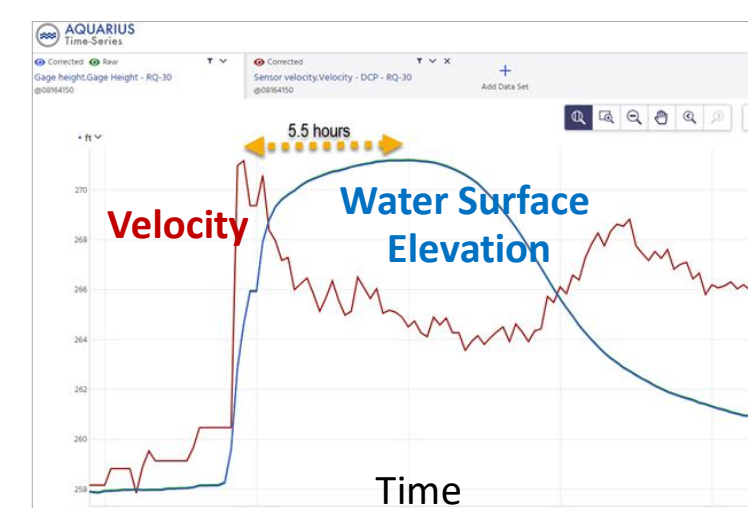


Streamflow Measurement ...

Radar gauges measure both water surface elevation and velocity

- Discharge = velocity * cross-section area
- Install on bridge in 3 hours
- Solar power and cell phone communications



... using radar gauges on 80 TxDOT bridges

Emergency Response ...

Move from reactive to proactive response

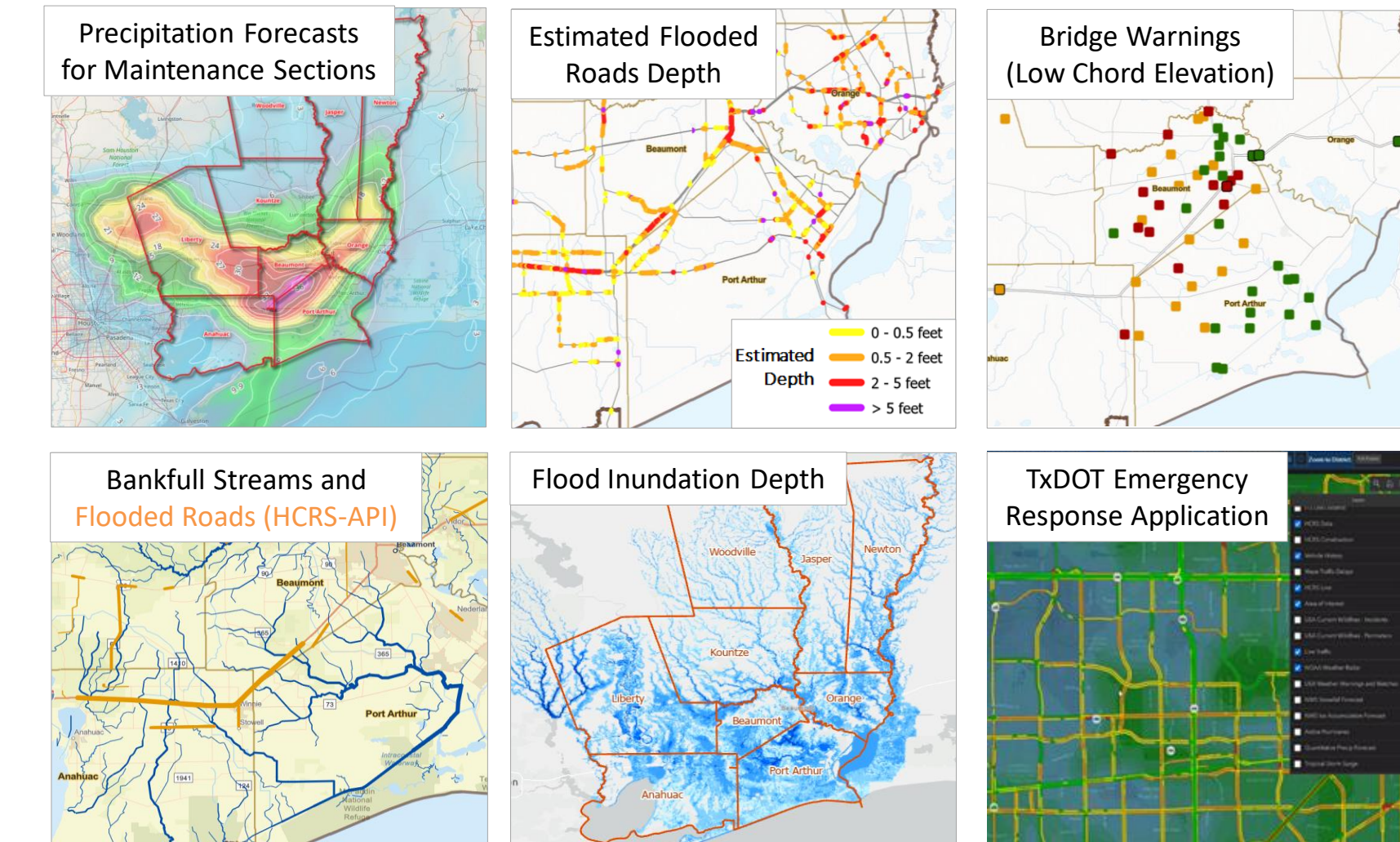
Infrastructure Investment and Jobs Act

Definition of Resilience

“Ability to anticipate, prepare for, and adapt to changing conditions, and to withstand, respond to, and recover quickly from disruptions.”



Maps from an emergency response exercise in Beaumont District for Tropical Storm Imelda

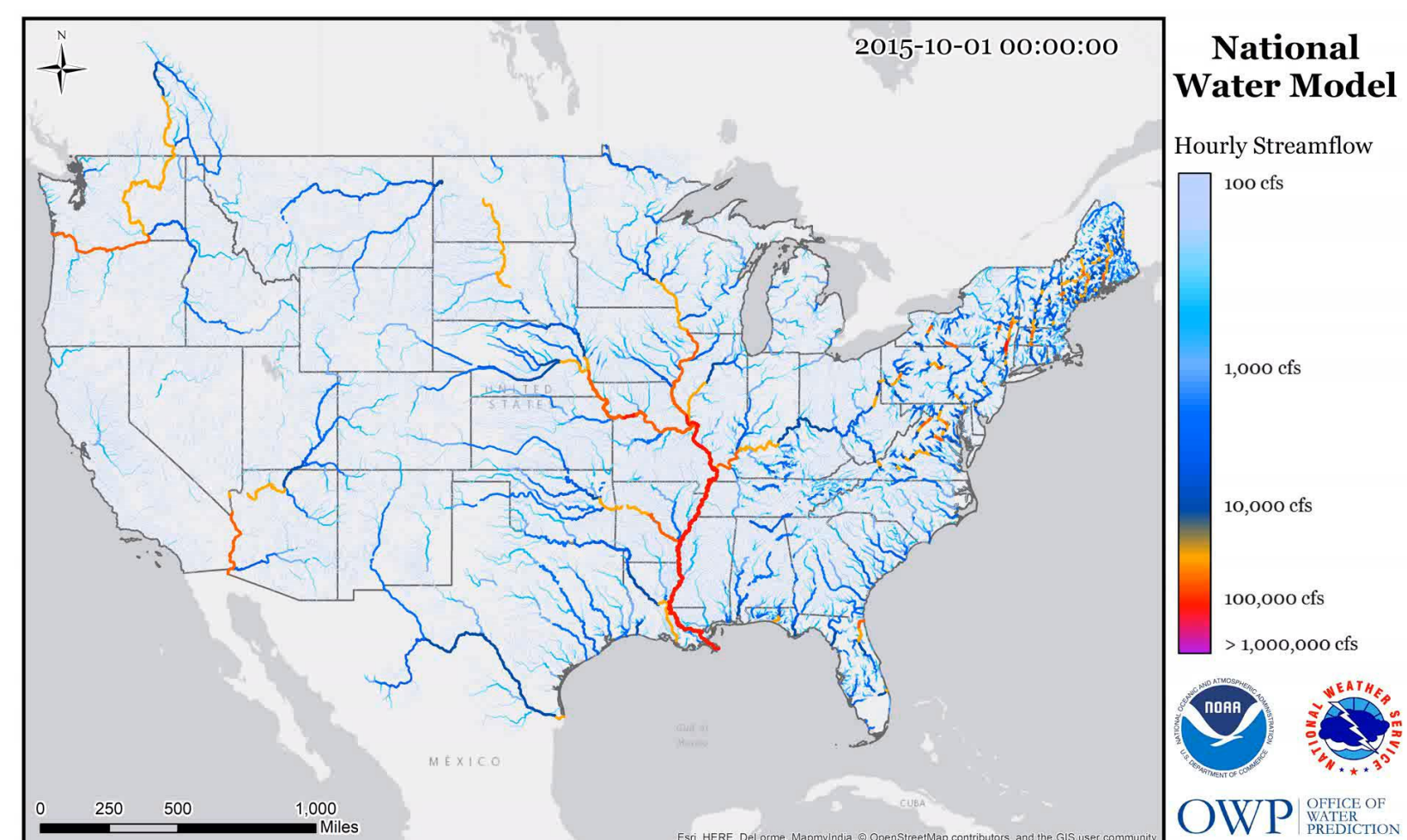
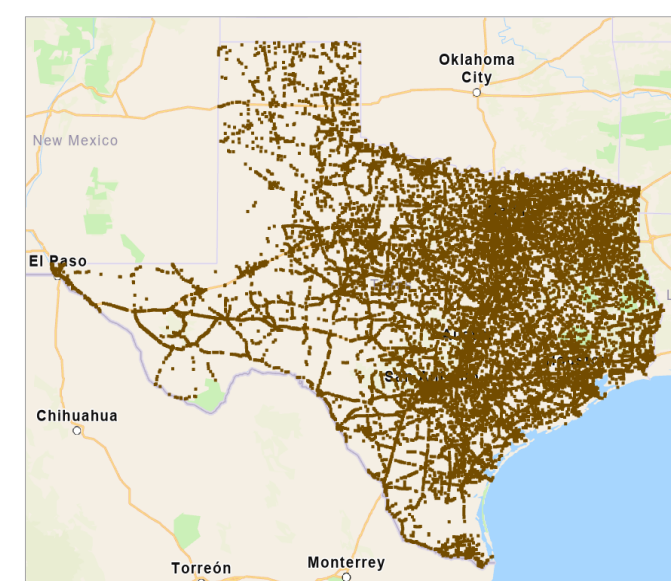
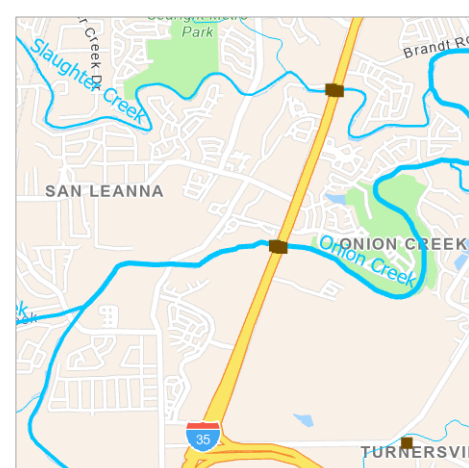


... using web maps in TxERA

Flood Forecasting ...

Forecast the discharge on 190,000 miles of streams and rivers in Texas

- Impacts on 64,000 Texas bridges including 26,000 On-System bridges
- Operates 24/7/365
- Updated hourly

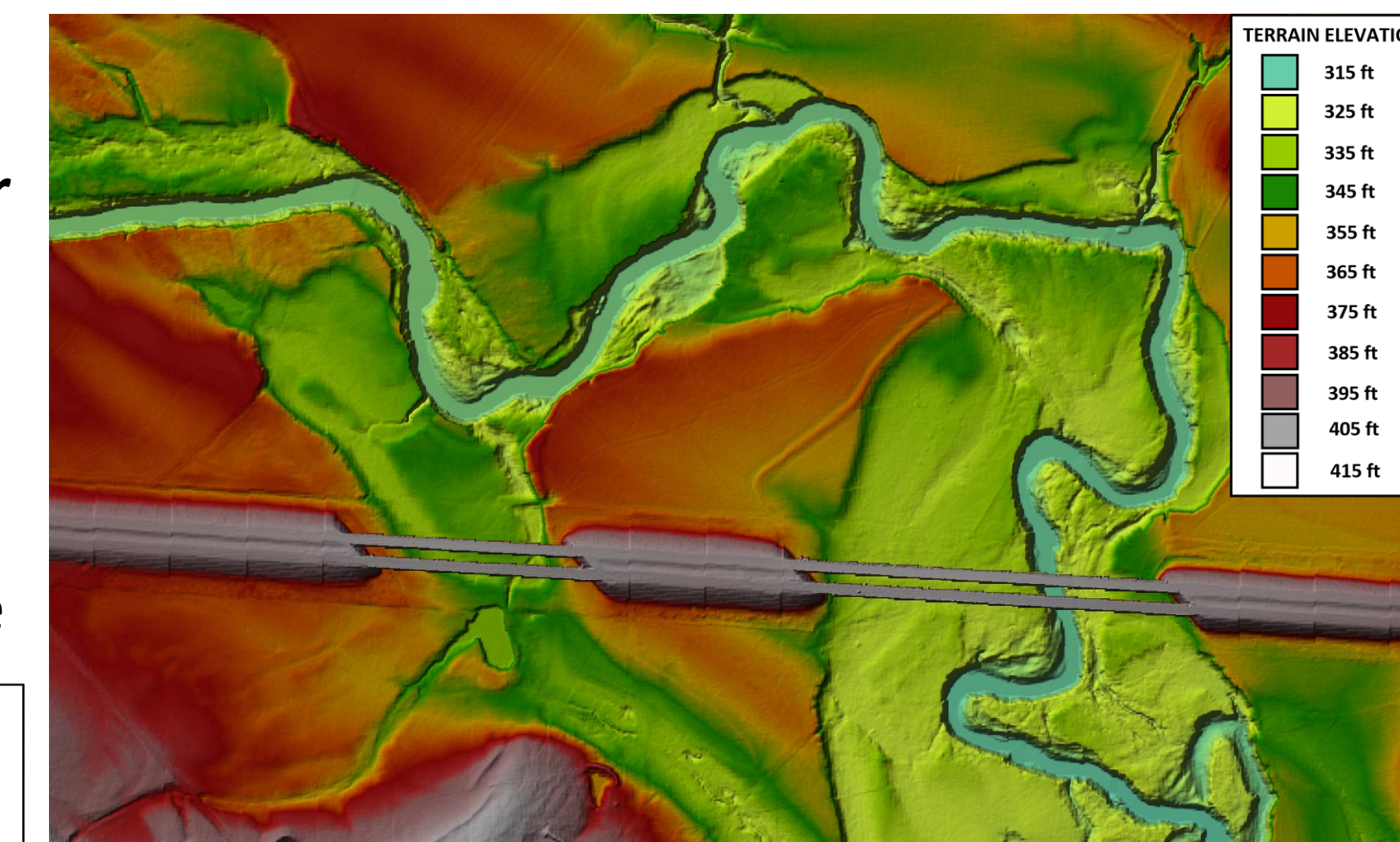
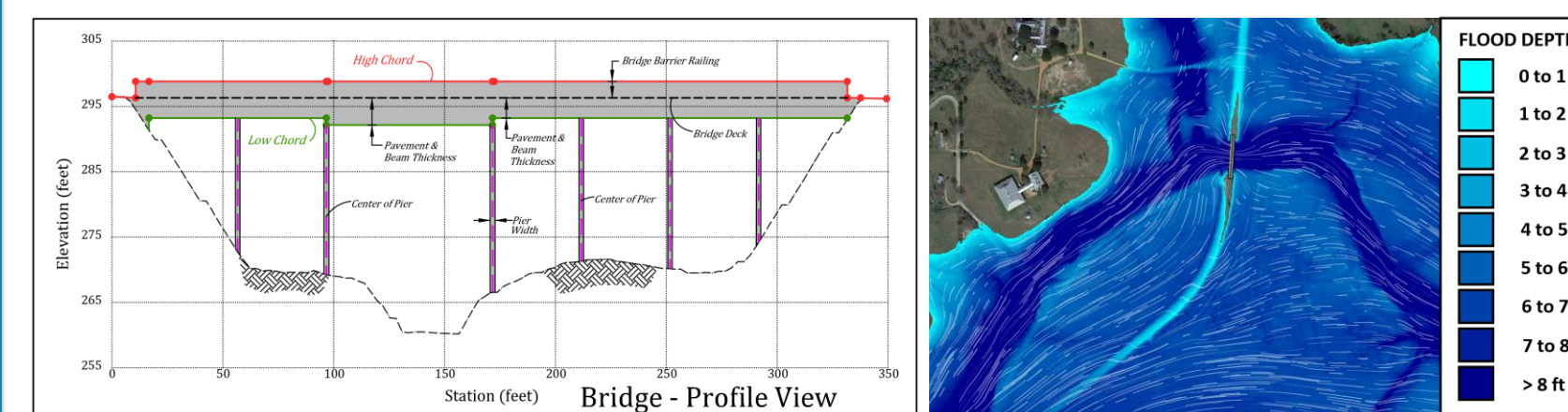


... using the National Water Model

Hydraulic Modeling ...

Use 2D HEC-RAS to convert discharge to water surface elevation

- Compute water surface elevation at bridges
- Map water depth over landscape and roads
- Detailed modeling from plans at key bridges
- Approximate modeling using LIDAR elsewhere



... using LIDAR data on bridges and roads