



# RESEARCH PROJECT CAPSULE [13-9GT]

June 2013

TECHNOLOGY TRANSFER PROGRAM

## CORS 911: Continuously Operating Reference Stations for the Bayou Corne Sinkhole

### JUST THE FACTS:

*Start Date:*  
March 18, 2013

*Duration:*  
12 months

*End Date:*  
March 17, 2014

*Funding:*  
State – Emergency Fund

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### POINTS OF INTEREST:

*Problem Addressed / Objective of  
Research / Methodology Used  
Implementation Potential*

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### PROBLEM

The sinkhole located near the Napoleonville Salt Dome in Assumption Parish, Louisiana threatens the stability of LA 70 – a state maintained route. In order to mitigate the possible damaging effects of the sinkhole to the route and address public safety concerns, the Louisiana Department of Transportation and Development (LADOTD) requires continuous, long-term measurements of the infrastructure assets (road surfaces and bridges) located within the vicinity of the sinkhole.

### OBJECTIVE

This research aims to provide long-term monitoring for the portion of the highway potentially vulnerable to the sinkhole. The Center for Geoinformatics (C4G) at Louisiana State University (LSU) was tasked to fabricate, deploy, and maintain a network of five continuously operating reference stations (CORS) of global positioning system (GPS) receivers and antennas. Each station has been designed to actively monitor and measure the horizontal and vertical surface motions of the route and its bridges.

### METHODOLOGY

CORS911 stations will be deployed at select locations within the servitude along LA 70 between Bayou Corne (in the west) and Bayou Choupique (in the east). Three stations have been installed and are operational (see Figure 1): CORS<sub>1</sub>, CORS<sub>3</sub>, and CORS<sub>4</sub>. The CORS<sub>2</sub> installation is pending right-of-way access. The location of a fifth CORS has yet to be defined.

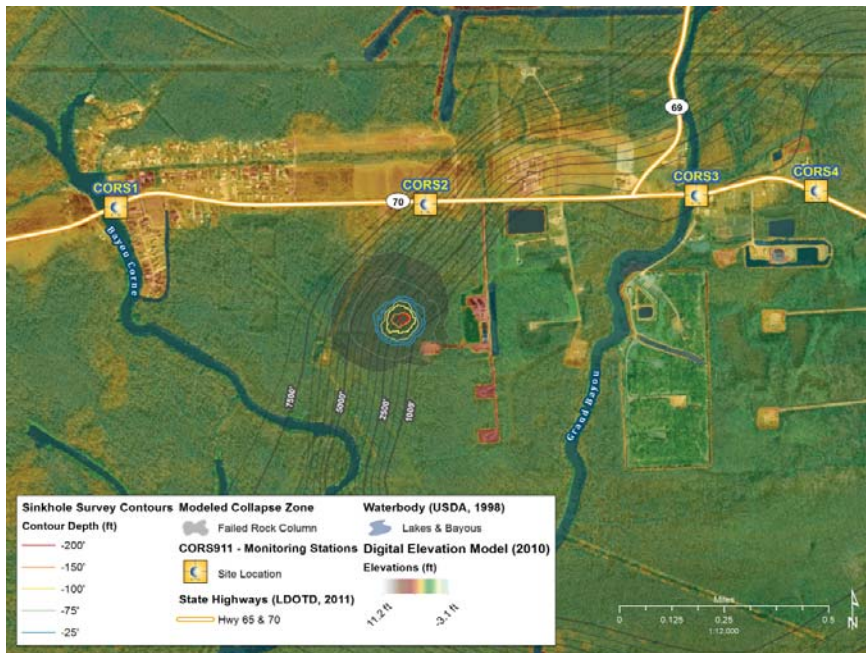
Stations will be networked together using cellular modems and software maintained by the C4G. Station positions measured to millimeter precision will be monitored and recorded 24-hours per day. Once integrated within the C4G Real Time Network (RTN), the horizontal and vertical motions detected by the sites will be measured relative to a constrained reference point beyond the influence of the sinkhole's subsidence zone (e.g., the North American continent).

### IMPLEMENTATION POTENTIAL

Continuous measurements from the CORS sites will be available to the LADOTD staff responsible for assessing the stability of LA 70 within the vicinity of the sinkhole. All data will be accessed via the Internet through Web and FTP services maintained by the Center.

C4G will coordinate with LADOTD to operationalize an alert system that will notify LADOTD personnel should motions exceed pre-defined thresholds.

Each CORS site has been co-located with other sensors and relays deployed by the LADOTD (Figure 2). Correlating GPS positions with LADOTD sensor readings may further enhance road monitoring. Data transmitted from the CORS will be made available to stakeholders and decision makers in accordance with the response activities initiated by the Department.



**Figure 1**  
*Sinkhole in Assumption Parish, Louisiana  
LA 70, District 61: Control Section 232-01*



**Figure 2**  
*CORS3 at Grand Bayou*