



US Army Corps  
of Engineers®  
Engineer Research and  
Development Center

Capability/Service

# Geophysical Surveys for Rapid Assessment of Levees and Levee Foundation Conditions

## Description

Levees are a fundamental part of many flood-damage reduction projects that protect life and property. The condition and performance of levees in emergency flooding situations are of utmost importance. ERDC is conducting research related to levee condition evaluation and assessment under the Corps' Emergency Management Technologies focus area of the [Flood and Coastal Storm Damage Reduction](#) research program. As part of this research, ERDC has developed the capability to obtain information concerning levee conditions onsite using geophysical tools and to rapidly convey the data to decision-makers during emergency operations, particularly in cases where levee failure is possible.



Geophysical survey along levee toe,  
Feather River, California

## Capabilities

The ERDC uses a suite of nonintrusive, surface-based geophysical sensors to estimate levee and levee foundation soil properties. Geophysical sensors provide continuous soil data along survey paths. In some geologic settings, data can be collected to depths in excess of 50 meters. ERDC geophysicists have conducted surveys on several levee systems using combinations of ground penetrating radar, electromagnetic (EM) induction, dc electrical resistivity, capacitively coupled resistivity (CCR), and magnetic and seismic methods to rapidly interrogate subsurface conditions. Geophysical surveys can also be used in locating buried utilities or structures within or beneath levees, as these can provide a seepage path during flooding periods. Geophysical information collected along a levee can be electronically uploaded directly from the field site to a Web site for rapid and widespread access.

## Benefits

During times of crisis, emergency operations personnel can have near-real-time information regarding levees and levee foundation conditions, allowing for enhanced situational awareness and decision-making.

## Success Stories

A combination of EM and CCR surveys provided useful data for assessing foundation conditions along a 9-km stretch of the Feather River levees south of Marysville, CA. The data were transmitted to a Corps Web site where anomalous zones were delineated both laterally and vertically. The areas with anomalously low soil conductivity values were interpreted to consist chiefly of sands and gravels, and correlated with relatively high hydraulic conductivities. Borings confirmed the existence of sands and gravels in the low-conductivity zones. One of the geophysically identified anomalous low-conductivity zones had experienced underseepage and had failed during a past flooding event.

## ERDC POC(s)

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