US Army Corps of Engineers®
Engineer Research and Development Center

Geophysical Site Assessment

Description

Construction Engineering Research Laboratory (CERL) researchers conduct geophysical surveys of prehistoric and historic archaeological sites on Government land to reduce the chances that construction projects, military training, or other undertakings will have an adverse impact on sensitive cultural resources. Geophysical survey techniques can improve the reliability, and reduce the invasiveness and costs associated with determining if a site is eligible for the National Register of Historic Places.

Capabilities

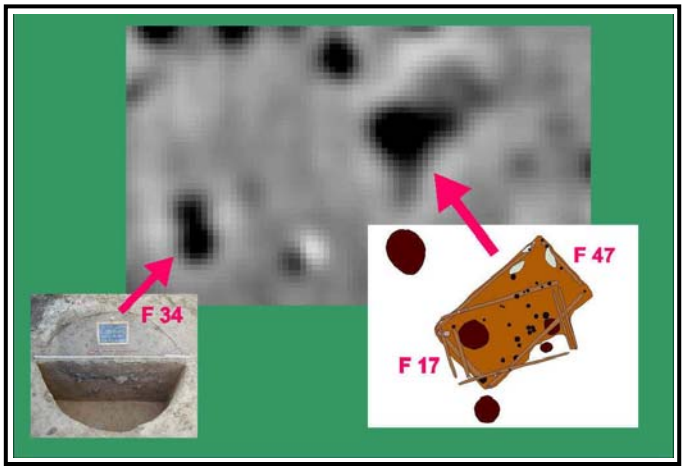
CERL researchers conduct geophysical surveys, then "ground truth" (validate survey results and carefully excavate) targeted areas to identify and evaluate archaeological deposits. They interpret and present their findings and recommendations to Cultural Resource Managers (CRMs), who can then make appropriate decisions about site treatment. Geophysical surveys can, for example, allow a CRM to identify locations for new buildings, roads, or pipelines in a way that minimizes impacts to the site and costs associated with future cultural resources work.

Supporting Technology

CERL researchers use a Geoscan RM15 electrical resistance meter and a FM36 fluxgate gradiometer to identify subsurface cultural resources. Researchers at CERL have developed the ATAGS (Automated Tool for Archaeo-Geophysical Survey) software tool that helps users develop an effective survey design for a geophysical survey at particular sites. The current version of ATAGS is designed for use in the Mid-continent and Plains regions of the United States and is also useful for many sites in the interior South.

Benefits

Geophysical surveys improve the reliability of site assessments by increasing the likelihood of identifying discrete archaeological features such as hearths, storage pits, and architectural remains. Improved detection of subsurface features can reduce the risk of inadvertent discoveries of human remains or culturally significant materials during excavation, military training, or construction. Targeting excavation units on geophysical anomalies can reduce the amount of excavation needed, thereby reducing costs associated with site evaluations and long-term curation of excavated materials. Geophysical surveys minimize the need to disturb sites that may contain the ancestral remains of Native American groups.



This geophysical map clearly shows prehistoric pits and structures.

Success Stories

CERL has conducted successful geophysical site assessments at Fort Riley, KS, Fort Leonard Wood, MO, Fort Bragg, NC, and Fort Campbell, KY. Geophysical surveys at Fort Riley include a number of historic farmsteads and a large WWI-era site known as "Army City." A large-scale resistance survey of Army City yielded a detailed map of buildings, streets, and residential areas that were present between 1917 and the early 1920s. The geophysical map will allow Fort Riley to site new infrastructure where costs associated with archaeological investigation will be minimal.

At Fort Leonard Wood, subsurface features such as pits and hearths have rarely been encountered at prehistoric open-air sites. Resistance and magnetic surveys have identified such features at several sites, characterizing the nature of prehistoric occupations, and providing important information needed to evaluate the sites' eligibility for inclusion on the National Register of Historic Places (NRHP).

Geophysical surveys were conducted at a late prehistoric "stone box" cemetery and an associated habitation site at Fort Campbell. The survey helped identify site limits, located several potentially intact mortuary features in an area that had been extensively looted, and indicated that the habitation site contains rich cultural deposits.

In cooperation with the Center for Advanced Spatial Technologies (CAST) at the University of Arkansas-Fayetteville, CERL is participating in a Strategic Environmental Research and Development Program (SERDP) sponsored study focused on developing methods to integrate data collected by multiple sensors. The objective of this work is to optimize the potential for geophysics to detect a wide range of subsurface archaeological features. Multi-sensor surveys at Escondida Pueblo, Fort Bliss, NM have revealed with great clarity a number of prehistoric adobe multi-room structures. Surveys at Kasita Town (a historic Creek settlement at Fort Benning, GA) identified a sinuous anomaly that may represent a defensive ditch, as well as possible domestic structures. SERDP-sponsored surveys at Silver Bluff Plantation, SC have revealed buildings surrounded by a palisade that were associated with the 18th century Galphin's trading post. CERL researchers will play a lead role in a program of ground truthing excavations designed to objectively test interpretations of the geophysical survey results at Escondida Pueblo, Kasita Town, and Silver Bluff Plantation.

CERL is presently executing an Environmental Security Technology Certification Program (ESTCP) project to demonstrate and validate the cost and reliability advantages of a multi-sensor approach to the use of geophysical techniques to investigate archaeological sites. The Center for Advanced Spatial Technologies at University of Arkansas-Fayetteville is developing user-friendly software that will make that approach (including data fusion) far more accessible to non-specialists.

ERDC POC

Dr. Michael L. Hargrave, archaeologist, Principal Investigator, 2902 Newmark Drive, PO Box 9005, Champaign, IL, 61826-9005; Phone: 217-373-5858; Fax: 217-373-7222; e-mail: Michael.L.Hargrave@erdc.usace.army.mil