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Engineer Research and Development Center

Levee Condition Assessment Technology (LevCAT)

Description

Researchers in ERDC's Geotechnical and Structures Laboratory have developed the capability to rapidly assess the condition of flood-protection levees. Levee Condition Assessment Technology (LevCAT) integrates information derived from airborne geophysics, high-resolution ground-surface geophysics, geologic studies, and a project-specific enterprise Geographic Information System (eGIS) into a tool to identify potential problems during noncrisis times.

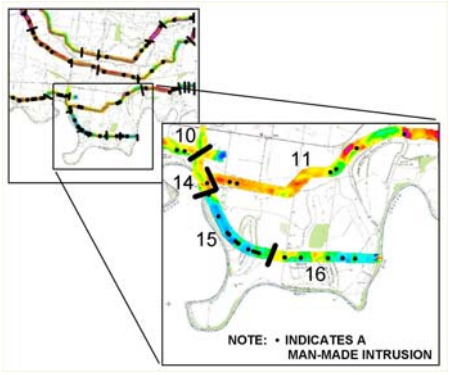
Airborne EM survey

Capabilities

Levees in south Texas and along the U.S./Mexico boundary have been investigated by airborne reconnaissance—helicopter-borne electromagnetic (EM) and magnetic sensors, digital video, and light detection and ranging (LiDAR)—followed by ground-surface geophysical surveys in areas where anomalous conditions were identified. LiDAR provides elevation data of the levee surface, accurate to within a few centimeters, followed by a variable-frequency EM survey that penetrates into the body of the levee and its foundation to depths of 30 meters or more. Properties of the materials beneath the surface and comprising levees are determined by the respective EM techniques and are related to critical properties such as material type (e.g., clay or sand) and moisture content. EM data, combined with a global positioning system, pinpoint locations of potential trouble spots, including subsurface abandoned river channels, angular substandard construction materials, and sublevee man-made features (culverts, drains, pipes, irrigation control, etc.).

Benefits

This technology provides the capability to assess levee conditions beneath the surface during noncrisis times—to establish baseline conditions for tracking future changes and for planning levee repairs pre-emptively before levees fail and flooding occurs.



Example of GIS layers, showing topography, levees, conductivities, segments, and man-made intrusions

Success Stories

Proof-of-principle application was completed along 270 miles of levees in a hurricane-protection system in the lower Rio Grande Valley. After that initial success, LevCAT was applied to over 600 miles of levee in south Texas, New Mexico, and California. EM and LiDAR data were gridded and displayed by color-coded conductivities in both map and profile views. Levees were then segmented by conductivity (related to material type), and a 10-point condition assessment criterion was applied for each segment. Factors included in the assessment were past performance, construction records, soils data, a geologic study to identify abandoned river channels, and locations of borrow pits.

Points of Contact

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