

WE GET THE BIG PICTURE

HGI is an innovative, solution-oriented geophysical consulting company and service provider to the environmental, engineering, ground water, mining, oil & gas, and natural resource exploration industries. We specialize in the application of 3D geophysical methods for time lapse subsurface characterization and monitoring of fluid flow through geologic materials.

Innovation, quality of work, detailed focus, and flexibility are hallmarks of HGI's service. Our ability to create custom-fit solutions based on individual client needs makes us an industry leader in the field of geophysics and geosciences.

For more information on HGI's products and services, please visit us at HGIworld.com or call us at: 1-866-647-3315



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Dam Assessment Surveys

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hydroGEOPHYSICS

Dam Safety

Earthen dams, levees, and impoundments are a dynamic slice of our national infrastructure and provide power, water, recreation, irrigation, flood protection, and many other advantages to a growing population. Maintaining and assessing the integrity of these structures is a critical component of sustained operations. Structural, hydrological, and hydrodynamic deficiencies left undetected can risk shutdowns, regulatory fines, staggering reconstruction costs, and in the worst case, loss of life.

Many dams throughout North America are deteriorating, and the risk of breach for downstream communities continues to increase. Thus, having the capability to understand the integrity and locating each structure's potential point of failure remains a core objective to protecting these critical assets. Facing this challenge head-on, HGI developed electrically-based geophysical methods with innovative cabling systems, GPS, and unique data analysis methods to investigate and assess the reliability of earthen dams and levees. Our methods can locate and identify areas of concern related to abnormal seepage or piping, in order to aid in mitigating against failure.

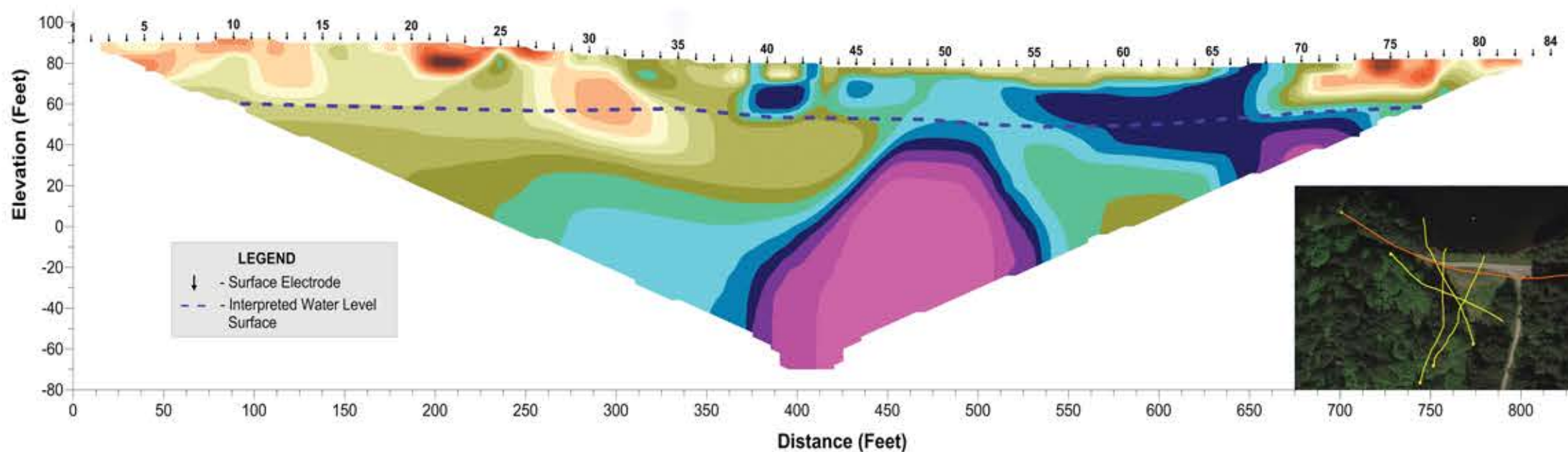
Locating Seepage

Every earthen containment system (dam, levee, impoundment) is unique in design, construction, and use. These properties present challenges in assessing reliability. Getting a holistic view of the entire structure in the context of its design and construction then becomes the ultimate goal of understanding its integrity. HGI has adapted geophysical characterization methods to offer such a view by using electrical resistivity profiling and streaming potential (SP) to create an internal picture of these complex structures. Resistivity and SP are easily some of the most versatile geophysical survey methods available today.

Resistivity profiling combined with SP are ideal and cost-effective geoelectrical methods for assessing the hydrodynamic character of earthen systems. The methods measure the electrical properties of the internal materials, which are influenced by soil type and saturation. Both have the distinct advantage of imaging through the entire dam or levee and contact with basement geology to understand how fluid movement is affecting structural integrity, seepage, and core strength. HGI's geophysical innovations provide data rich information creating a catalyst for conveying solutions that would be unrealized without it.

Problem

Seepage was noted emanating from the right abutment region of an earthen dam structure near the base of the downstream dam face. HGI proposed a series of electrical resistivity lines to detect and trace the seepage in the subsurface in order to determine if the seepage was coming through the dam structure or was associated with preferential flow off the adjoining hillslope.



Results

The example to the left is a resulting electrical resistivity profile across the crest of the dam (orange line in the survey layout inset). The conductive anomaly at depth is associated with the outlet pipe from the reservoir. The anomalies in the near-surface unsaturated zone could indicate preferential flow paths for seepage. The anomalies near 390 and 440 feet are located directly upstream of the noted seepage area. The anomalies between 550 and 650 feet also represent potential seepage pathway features.

Subsurface Imaging

Innovative Solutions

Method & Application

Fortunately, both resistivity profiling and SP methods employ the same network of electrodes placed on the exterior and, when feasible, in the interior of the structure. A remotely accessible data acquisition system is then used to collect images of earth materials at the electrode locations. Since it is reasonable to assume that the intrinsic resistivity of the construction materials and geologic formation will not vary appreciably over time, areas of lower resistivity and high potential will most likely be due to an increase in pore water content.

These methods have been successfully used to map subsurface geology such as fine grained versus coarse grained lithological units, relative spatial distribution of variations in pore water content above and below the water table, monitoring fluid infiltration through geologic materials, and delineating preferential groundwater flow pathways. In addition to earthen dams, these methods can be applied to levees and holding ponds to assess potential weak areas and loss of containment to aid in watershed management and flood protection.



Organized



Confident



Experienced

HGI professionals have the skills and experience to support every aspect of your project from concept and design to acquisition and interpretation.

Our Clients

- Clear Creek Consulting
- ARCADIS
- Freeport McMoRan
- MWH
- Cotter Corporation
- Brown & Caldwell
- SRK
- Los Alamos National Lab
- CH2M Hill
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- Tetra Tech
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