



GEOMETRICS

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Using Geometrics Equipment in Dam Placement and Integrity

Near-surface geophysical seismic investigation is a critical component for new dam construction and monitoring existing dam structures.

In the earliest stages of planning and design, engineers rely on geophysical data to help assess the geotechnical conditions of a potential dam site. Seismic surveys provide important information on hazards such as faults, landslides, and Karst terrain. They may provide information useful to dam construction, such as bedrock depth and topography, rippability, and soil classifications. Geophysical data is also useful in assessing the integrity of existing dams and levees. Earthen dams and levees in particular benefit from geophysical investigation, as zones of weakened soils can create a significant hazard to those living downstream. Seismic investigation provides insight into the geological suitability of a potential dam site as well as the integrity of existing earthen dams and levees.

Geometrics began manufacturing geophysical instruments in 1969 and have continued to do so for over 50 years. The equipment is an essential part of any geotechnical investigation, and designed for reliability, sensitivity, and ease of use. Geometrics products result from the work of a dedicated team of engineers, scientists and technicians for research, design, and manufacture of equipment. Licensed geologists and geophysicists who understand geotechnical field work and the necessary requirements for acquisition of the most accurate cost-effective data and with the most reliable instrumentation.

Geometrics seismographs are highly versatile and can be used in many ways to investigate geotechnical and structural properties for characterising geologic hazards and engineering characteristics.

Seismic Tomography

- *Characterize ground conditions in terms of shear wave velocity, rippability, bedrock mapping and soil condition*
- *Identify faults and related structures*
- *Soil type in levees*
- *Active and Passive Surface Wave Techniques*





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- *Acquire data in multiple environments - Geometrics manufacture equipment for both marine and terrestrial applications so that you may perform refraction or reflection surveys anywhere necessary.*
- *May perform custom surveys without typical limitations - The expandable wireless system can be used in any geometry and with any sensor spacing. You are no longer constrained the pre-set spacing and geometries of your spread cable, or by site conditions such as high traffic areas, roadways, driveways or difficult to access terrain.*
- *Useful for evaluating seismic properties down to 1.5 km*
- *Software licenses don't expire and don't require renewal*

Geometrics instruments can be rented or purchased internationally through our network of representatives or by contacting us directly via www.geometrics.com

Geometrics Seismographs and Dam Safety

Dam safety begins with feasibility studies and continues throughout the life cycle of the dam, including post-construction monitoring and evaluation. A Geometrics seismograph will provide value in several key areas.

Hazard Assessment: Feasibility studies include performing geophysical surveys to evaluate potential sites for hazards such as the presence and locations of and landslides. These surveys generally involve either or both seismic refraction and reflection surveys, both of which may be performed with the same Geometrics seismograph system. Acquiring quality data at this stage is essential for minimizing hazard and to ensure that geological conditions do not negatively impact the working life

Design: Engineers require specific information about ground conditions before making foundation and structural design decisions. This information includes information about depth to bedrock, bedrock topography, and soil properties, all of which are obtainable from seismic surveys. Surveys such as this can provide data for large areas. As the project evolves, this broad-scale investigation can be used to guide more detailed investigation. Construction: Ground conditions can change abruptly, so having the tools available to perform an

immediate evaluation can be crucial for keeping the project on schedule.

Working Life: An operational dam requires regular assessment to ensure that it remains functional and safe. Dam safety can be affected by something as simple as a strong storm, so having methods to non-destructively, quickly, and effectively evaluate the structural integrity of a dam can add much value to any safety program. Physical changes such as slumping, leaking, piping, cracking, scouring, or even rodent activity can severely impact a dam. Stability failures within the dam may not be visible to inspectors and may only be determined using a geophysical method. For earthen levees, active and passive seismic methods allow engineers to identify low-density zones within the dam. Having this information early, before a failure occurs, could mean the difference between making a simple repair and having a catastrophic failure.

Upgrade/Replacement: The earlier an engineer recognizes a change in a dam's integrity, the easier, safer, and less expensive it will be to fix the problem. Geophysical techniques can be used in a variety of ways to provide information useful for repairing, upgrading, or replacing a dam before failure occurs.