

Dam repair evaluation with GPR non-destructive testing



In the field of dam safety, non-destructive testing (NDT) methods can help accurately determine what can be repaired and what needs to be replaced. Ground penetrating radar (GPR) can be used for NDT for dam evaluation applications. When it comes to dam safety, the benefits of NDT, and GPR more specifically, include a reduction in work and an increase in accurate data.

Dam safety inspections require detecting and analyzing the deterioration of concrete slabs. GPR can determine the type and location of concrete reinforcement and detect slab deterioration with ease. The technology is particularly well suited to establishing budgetary priorities by identifying the portion of the concrete containing the most concrete deterioration and/or rebar corrosion. GPR's ability to determine the areas of the dam most in need of repair reduces work without compromising safety.



Scanning for voids within the Hanna Basin at the Indianapolis International Airport.

(Image courtesy of Resource International, Inc.)

To accomplish this, GPR uses radar (radio detection and ranging) to transmit and receive high frequency electromagnetic waves to image the subsurface. The wave is transmitted into the concrete, soil or subsurface and reflects off the different materials with which it interacts. The reflected signals are used to detect objects, changes in material, and voids and cracks.

High frequency antennas provide sharp vertical resolution for imaging rebar, small voids and fissures as well as enabling useful slab analysis. This information will be useful to pinpoint questionable locations within the concrete slab or other shallow areas to prevent catastrophic failures. Low frequency antennas can help to identify stratigraphic changes, lithological discontinuities, and sub bottom structures in the dam and reservoir.

GSSI customers have been using ground penetrating radar systems for decades to conduct non-destructive dam investigations that provide information on sediment build up and leak or void detection. GPR systems are ideal for locating problem areas which may develop over the lifetime of a dam. GSSI's low frequency antennas can show the interior of large and/or very deep structures to locate large voids, fractures, or leaks. The ability to collect large amounts of data that can be difficult to obtain using invasive methods makes low frequency GPR the go-to for a quick geophysical analysis. Identifying these remediation and repair locations early on means issues can be addressed before they develop into serious problems which could jeopardize the entire structure.

GSSI's GPR technology can be rapidly deployed, provides an effective means to evaluate subsurface information, and contributes to continuous monitoring and condition assessment throughout a structure's life. GPR can be cost-effectively integrated with other types of ground surveys to build a visual understanding of the overall subsurface of the site.

Improved GPR technology has substantially enhanced dam inspection results. GPR is one of the main non-destructive technologies used to assess the structural integrity and physical condition of dams. Understanding the true physical condition of a dam allows maintenance and repairs to be made to ensure the physical safety of the surrounding community.

