GROUND PENETRATING RADAR

What is Ground Penetrating Radar?

GPR has been used for many decades in the infrastructure industry as a valuable tool to locate defects and voids in concrete structures, and in determining embedded reinforcement and other sub-surface details. A typical GPR system comprises of an antenna emitting electromagnetic energy in the form of radio frequency pulses, and receiving the reflected energy from the surfaces as well as that from the inner layers, besides a processor. The energy reflected depends upon the type and nature of the antenna, and the materials involved. The energy reflected is transformed into visual images, which provide extensive data on the sub-surface materials, when interpreted properly. The system is helpful in locating the bars embedded in structural elements, sub-surface voids and delamination due to the changes in the electromagnetic properties of the medium of energy penetration. In recent decades, there have been many advances in GPR technology though advances in electronics and system design. One such advance is the advent of handheld GPR. GPR is ideal for locating the position and depth of rebar, tie bars, dowel bars, conduits, post-tension cables, voids and determining concrete slab thickness.

Features of Handheld GPR

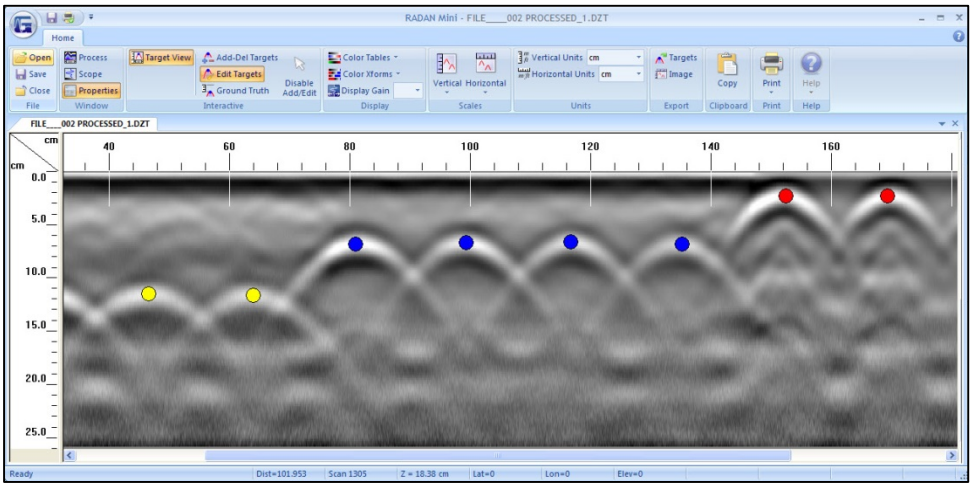
Weighing between 3-5 pounds, handheld GPRs offer light weight alternatives to other GPR systems for concrete inspection. The small size of the unit makes it easy to transport to the job site and once on site, convenient to scan around obstacles and into tight spaces. With a 1600 to 2000 MHz antenna, and depth penetration between 16-20 inches (50cm), the handheld GPRs offer a perfect blend of data resolution and depth. The biggest advantage of the hand held unit is it provides a detailed image of the subsurface structure in REAL TIME on a high resolution, LED backlit display. If post-processing is required, these systems have capability to store the data images for later playback and transfer to a computer. Most of the handheld GPRs are very easy to use with new users becoming proficient in its use in a few hours.

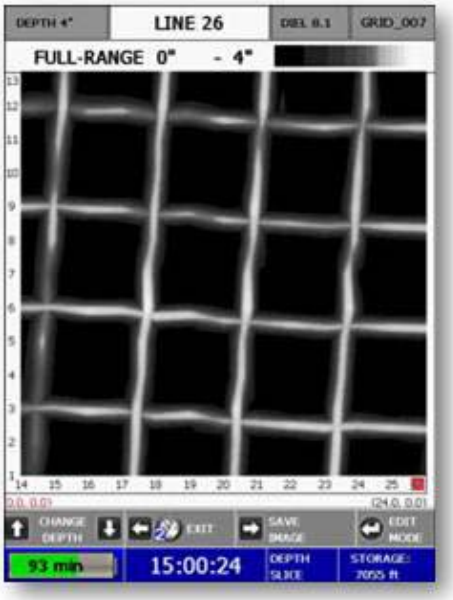
Features of Cart-Based GPR

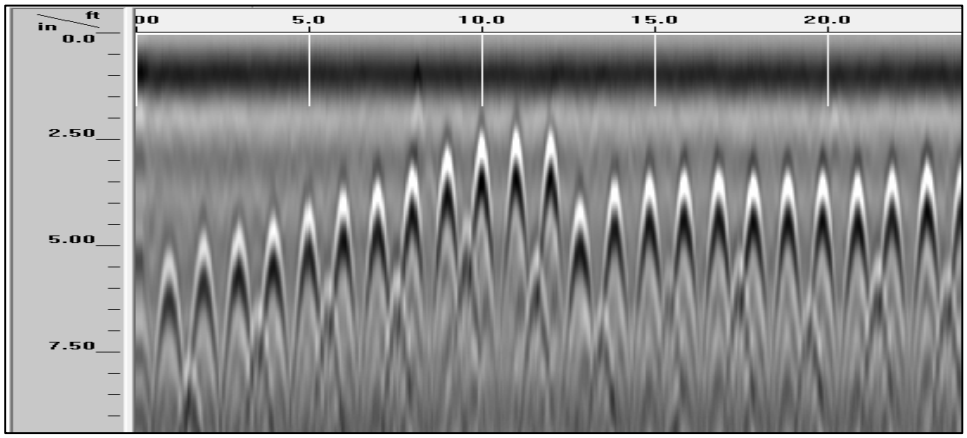
Cart-based GPR systems provide an effective tool for quickly determining the condition of aging bridge decks, parking structures, balconies and other concrete structures. The system is also used to obtain accurate concrete cover depth on new structures.

GPR Example Systems:

GPR Data Examples:







Top Image: GPR data represents concrete reinforcement at various depths, collected with a handheld GPR system. Right Image: 3D Data represents concrete reinforcement, collected with handheld GPR system. Bottom Image: GPR Data represents inconsistant placement of dowl baskets, data collected with cart-based GPR system.

Typical Uses of Ground Penetrating Radar

- Pavement and Bridge Analysis –obtain overlay thickness, location and depth of targets, deterioration
- Concrete inspection – locate metallic and non-metallic targets in walls, floors and ceilings
- Structure inspection – bridges, monuments, walls, towers, tunnels, balconies, garages, decks
- Condition assessment – map relative concrete condition for rehab planning
- Void location

Data Processing and Software

Post-processing software packages are designed to process, view, and document 2D and 3D data collected. The software features bold and intuitive menu screens and clear data views for easy interpretation and enhanced post-processing capabilities. The software can be used to customize size and color of targets in the 3D image and also to filter background and for contrast control. Data can be exported to any third-party software (i.e. CAD, GIS), using ASCII format.

Vendors

GSSI
12 Industrial Way
Salem, NH 03079
Phone: (603) 893 1109
www.geophysical.com
Price: $12,700- $21,900, software sold separately.

Document updated 3/26/13