

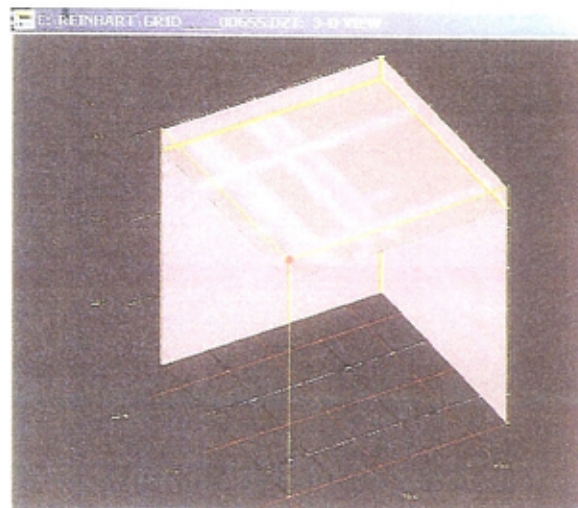
IMAGING OF STRUCTURES USING 3-D GROUND PENETRATING RADAR

Ground Penetrating Radar (GPR) can provide three dimensional (3-D) imaging of structures such as concrete foundations, floors and walls to determine the spatial location of rebar, cables, conduit, etc. for selection of areas for coring. GPR can also be used to determine internal composition of concrete structure where as-built drawings or information on existing conditions are unknown, as in the modification or restoration of historic and very old buildings and structures.

GPR works by sending a pulse of electromagnetic energy into a material, such as concrete, and recording the strength and the time required for the return of any signals reflected from objects inside the material, such as metal rebar, cables, etc. A computer program is used to analyze the returned signals and produces on-site, two-dimensional (2-D) and three-dimensional (3-D) images of the area scanned. The images show the location of objects within the material and allow for coring and/or verification of the presence of rebar, cable, conduit, etc.



Reinhart & Associates, Inc. inspector scanning a concrete floor using GPR to locate rebar, cables and conduit prior to performing coring.



24' x 24' 3-D image of a 6" thick concrete floor showing rebar and conduit prior to Coring, Austin, Texas, 8/1/04.

GPR of concrete structures for determining locations for coring has the following advantages over film radiography (RT) using IR-192 or Cobalt 60 radioactive sources:

- Safety – GPR can be used without roping off large areas of the facility as required by RT. GPR imaging can be used during a normal workday and will not conflict with other work conducted in the immediate area.
- Time – In most cases, GPR can produce location results in one-half to one-fifth the time required by RT, therefore, for similar costs per day the cost per core location would be considerably lower.
- Mobilization – The complete GPR system can be carried within a passenger car or minivan, shipped via FedEx, or checked as excess baggage on an airplane. Scans can be performed by one or two persons depending upon production required and access conditions.
- Depth of Penetration – For imaging of concrete over eight inches in thickness, the film development time for RT becomes prohibitive while GPR only requires a few minutes to scan a location, no matter what depth. Also, at depths beyond eight inches, RT may not be feasible at all.
- Applications – GPR can image grade level foundations with access to only one side, but RT cannot. The only limitation of GPR would be access limiting the scan of the antenna. In this case RT would be needed.

GPR combined with the RT imaging methods offered by Reinhart & Associates, Inc. results in a comprehensive on-site capability to determine the internal composition of a wide range of structural sizes, configurations and access conditions. In most cases, an inspection team can mobilize and complete the imaging of a structure in less than 24 hours from receiving a call.

Besides imaging of concrete, GPR can be used to locate underground utility systems, evaluate bridge decks, aid in forensic investigations, and as a QA/QC method for infrastructures such as roads.

For further information contact:

REINHART & ASSOCIATES, INC.
STRUCTURAL INSPECTION DEPARTMENT

Locations:



2032 Centimeter Circle
Austin, TX 78758
Phone: (512) 834-8911
Fax: (512) 834-1266

5291 Industrial Way Blvd.
Buda, TX 78610
Phone: (512) 295-4705
Fax: (512) 295-4709

E-mail: mail@reinhartassoc.com ♦ Website: <http://www.reinhartassoc.com>