MARCH 24, 2004 - Ground Penetrating Radar for Concrete Evaluation Studies

Speaker: Michael Gehrig of Bryant Consultants, Inc., Carrollton TX, Tel. 972-713-9109.

PRESENTATION SUMMARY

Mr. Gehrig, a civil engineering graduate of Texas A&M that primarily works with geophysical data at Bryant Consultants gave a presentation to an audience of about 40 on his firm's use of Ground Penetrating Radar (GPR) in concrete evaluation studies.

Mr. Gehrig defined GPR as a wave, generated by electromagnetic energy with a frequency of 1.0 - 1.5 Gigahertz (GHz) and a cone angle of 60 - 90 degrees. The equipment for generating and recording GPR data for foundations costs as little as $20,000 and is compact enough to use inside homes around furnishings. The main supplier is GSSI in the US, but it is also marketed by Synthesis Software in Canada. Field data is obtained by running an antenna over the floor, much in the same manner as a vacuum, on a grid of about 36 x 36 inches.

GPR is limited in the depth it can reach. The usual antenna used by Bryant Consultants is a 1.5 GHz model which has high resolution but only reaches to about 16 - 18 inches. With another antenna, they can scan down to 28 - 30".

Bryant Consulting uses GPR for determining thickness of concrete slabs and grade beams, reinforcing locations and approximate sizes, voids below slabs, utility lines, etc. Though not in Bryant Consultants' capabilities, others advertise they have software that can determine moisture contents of soil and concrete, whether the below-slab voids are water or air-filled, and soil densities.

Mr. Gehrig said that because the dielectric constants of wet clay (8-15) and concrete (6-12) overlap, occasionally they have combinations of clay and concrete with the same dielectric constants, which does not allow the retrieval of usable data. The data they handle is voluminous and time-consuming to digest. 10 hours of real-time data retrieval means about 40 hours of data processing back at the office. Usually it takes about a half day to retrieve the data on a typical house slab.

With the exception of having to drill a 5/8 inch hole through the slabs to obtain dielectric constants of the concrete, the tests are non-destructive. One drawback of the system is that slabs with welded wire fabrics less than 6x6 inch will shield the signal and may distort the data.

To read about a previously presented geophysical testing method (called GMMIR) by Bryant Consultants, click here.

To download the slide presentation given by Mr. Gehrig, click here. (Size:6405 KB). To download the paper on which Mr. Gehrig's presentation was based, click here (1,274 KB).

PAST PRESENTATIONS (click here)