MAY 2005 MEETING

Wednesday, May 11, 2005

TECHNICAL PROGRAM

Subsurface Void Detection and Sizing for The Houston Area

Speaker: Todd Allen with Radarview LLC, Structural and Underground Inspection Services. Tel. 800-557-3134.

Mr. Todd Allen has spent over 10 years in the inspection and testing industry. He has earned a degree in Marine Technology from the College of Oceaneering in Los Angeles, CA. He has worked with various Non-Destructive Testing methods, particularly in the area of structural concrete evaluation and repair. Mr. Allen is board member of the Houston chapter of the International Concrete Repair Institute (ICRI) and is an active participant in the American Society for Non-Destructive Testing (ASNT) and the Houston chapter of the Structural Engineering Association of Texas (SEAoT). In May 2002, Mr. Allen formed Radarview LLC to provide advanced testing methods for the condition assessment of structures, foundations, and roadways.

PRESENTATION SUMMARY

To an audience of about 60, Mr. Allen gave a PowerPoint presentation entitled, "Subsurface Void Detection." He discussed two non-destructive test methods his company uses to detect voids: a) Subsurface Interference Radar (SIR, but also called Ground Penetrating Radar, or GPR), and b) Impact Echo (IE). GPR is more cost effective and more commonly used. Impact Echo is used when more detail is needed. GPR has no ASTM standard for void detection under foundation slabs and has been used in geotechnical work since the early 1970's. IE came from a thesis at Cornell University and follows ASTM C1383-98a. Since antennae are used, the company must be licensed by with the FCC.

Mr. Allen said that both methods can detect voids, grade beam locations and depth. GPR can map out steel in foundations, but not Impact-Echo. 6x6 wire mesh in the slab slows the data analysis and 4x4 wire mesh makes it almost impossible to see through. Output is real time, but reporting can be done in 2D and 3D using proprietary software supplied from the equipment manufacturer. Radarview uses Geophysical Survey Systems, Inc. for its equipment and software.

Mr. Allen said the usual causes of subsurface voids are a) poor compaction that later settles, and b) leaking utilities which carry soil away. He said that void detection and quantification is straight forward for an experience radar data analyst since the Dielectric Constant (DC) to look for is that of air (DC = 1). Other DC values he uses are 81 for water and an average of 9 for concrete. Knowing these DC values, they can determine void thicknesses below grade beams as well as slabs. They do not need to know the concrete thickness in order to determine void locations and depths. Sometimes they find voids down as far as 15 feet. In a furnished home, detection is normally done in lines around the furniture.

Mr. Allen showed several case studies that included a chemical plant, wharf, and a home in River Oaks. In the case of the chemical plant, a truck had fallen into a large void when the pavement above gave way. In the case of the wharf, they pulled the equipment along the bulkhead using a boat. For the home foundation (which was under construction), they found up to 18" thick voids due to poor compaction of 5 to 6 ft of fill.

For a copy of Mr. Allen's slide presentation, click here

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