

2004 University of Kentucky/Kentucky Geotechnical Engineering Group Distinguished Lecture

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TOPIC: **New Developments in Time Domain Reflectometry for Soils and Concrete and Shear Wave Velocities from Standard Boring Log Information**

WHEN: **December 7, 2004**
Social Hour 5:30 - 6:30
Presentation 6:30 - 7:30

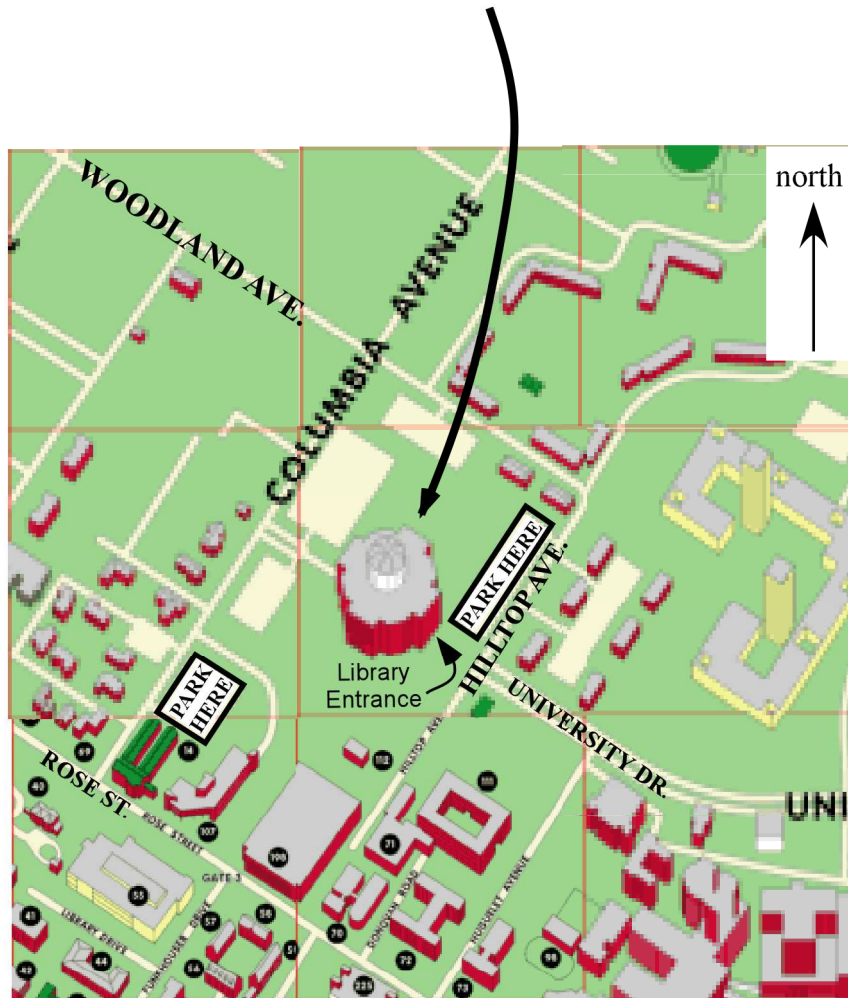
WHERE: William T. Young Library Auditorium

ABSTRACT: The speaker, along with colleagues and students began work on the topic of Time Domain Reflectometry in the early 1990's and developed theories, equipment, and software to estimate the water content and dry density of soil from measurements of electromagnetic wave velocities and amplitude attenuation. The work resulted in an ASTM Standard (D 6780-2002) and several patents. The equipment will soon be commercially available. More recent work developed a one-step method, which is faster and easier to use. Work also has begun on examining the use of TDR for chemically stabilized soils and for estimating the strength of concrete during the curing process. While more work is needed on these latter uses, both appear quite promising. Current work involves the use of dielectric mixture theory to generate a model that can be used to simulate the entire electromagnetic signature. Preliminary results indicate that it should be possible to extract not only dry density and water content, but other intrinsic properties that include for soils, key markers for identifying soil type. The presentation will provide an overview of these developments.

Finally, as a modest attempt of honoring Dr. Bobby O. Hardin (the speaker's mentor and colleague at UK for 24 years), the presentation will conclude with a brief discussion and demonstration of an Excel spreadsheet program recently developed to allow practicing engineers to estimate shear wave propagation velocities versus depth in soil with parameters obtained from conventional boring logs and soil tests. The program was developed for the Indiana Geologic Survey and is based on the Hardin Equation developed in the 1960's and conventional terms used in soil mechanics. It can be quite useful for estimating whether or not a site may require more extensive seismic investigations as required by newly revised codes.



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