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WORKSHOPS

TUESDAY A.M.

8:30-12:00, Salon G, H

Applied Geophysics for Site Characterization and Non-Destructive Testing For Highway Engineers

Presented by Richard C. Benson, Technos, Inc. and Larry Olson, Olson Engineering, Inc.

Presenter's Biography

Mr. Benson is a registered geologist with more than 30 years of experience in site characterization. He works with a broad range of non-invasive and minimally invasive methods, including remote sensing, surface geophysics, downhole geophysical logging and in-situ measurements. He has pioneered the applications of many of the contemporary geophysical methods in use today. Mr. Benson is contributing author to three books and author or co-author of over 70 technical publications. He has taught a number of short-courses and has served a principal role in the development of ASTM guidelines for surface geophysics.

Larry Olson of Olson Engineering, Inc. and Olson Instruments, Inc. is a registered professional engineer with more than 21 years experience in non-destructive testing of engineered structures. He has broad experience in geotechnical and materials engineering with emphasis on NDE of civil structures. He is currently an instructor in the ASCE Structural Condition Assessment of Existing Structures course. He is a member of ACI committees on Nondestructive Testing, Consolidation and Research and is Chairman of the Evaluation Committee and a Director of the International Concrete Repair Institute. He has also been the principal investigator on two recently completed foundation research projects for NCHRP and FHWA.

Workshop Synopsis

This workshop will provide an overview of both surface and borehole geophysical methods for site characterization, as well as non-destructive testing (NDT) of engineered structures. The workshop will begin with a brief review of site characterization concepts leading to a systematic strategy with which we can approach the geotechnical site characterization problem. This will be followed by a review of the various geophysical methods available, including their advantages, limitations and their selection, including ground penetrating radar, electromagnetic and resistivity measurements, seismic refraction and reflection and gravity, along with a wide range of borehole logging and hole to hole measurements. NDT methods will include: spectral analysis of surface waves (SASW) for determination of shear and Young's modulus, impact echo and slab impulse response measurements to evaluate flat surfaces, sonic echo impulse response to determine the length and integration of deep foundations, crosshole sonic logging and tomography for assessment of drilled shafts and foundation walls, and parallel seismic and ultraseismic methods for determining unknown bridge foundation depths for scour safety studies.

Mini-case histories will be used to illustrate the various applications. Case histories will include examples of geotechnical site characterization on land and water, as well as NDT of structures.

8:30-11:00, Salon I, J

Automated Seismic Refraction Inversion

Presented by Craig Lippus, Geometrics Inc.

Presenter's Biography

Craig Lippus has a B.S. in Geology/Geophysics from Bowling Green State University, and an M.S. in Geophysics from Purdue University. Craig has been with Geometrics since 1994 and has 15 years' experience in the areas of field geophysics and geophysical instrumentation.

Workshop Synopsis

Seismic refraction has historically had two inherent levels of subjectivity: picking first breaks and assigning those first breaks to specific layers. The latter is the most difficult and requires a deep understanding of wave propagation through layered media. This tends to limit the appeal of the method and instrumentation to trained geophysicists.

Advances in first-break picking technology, tomographic imaging, and CPU technology have greatly increased the efficacy of refraction methods for application to engineering problems. Tomographic solutions do not assume layered media, thereby obviating the need for layer assignments. There are disadvantages and advantages, but in many cases a purely tomographic inversion can yield an acceptable model of the subsurface velocity structure, with little subjective bias. The method will be demonstrated with real and model seismic data, followed by discussion, questions, and answers.

TUESDAY, P.M.

1:30-5:00, Salon G, H

Use of Seismic and Sonic Methods in Nondestructive Evaluation of Transportation Infrastructure

Presented by Dr. Soheil Nazarian

Workshop Synopsis

Currently, a major focus in transportation engineering involves preventive maintenance and rehabilitation of existing facilities. Non-destructive testing (NDT) can assist in identification of pavement and structure problems at an early stage, resulting in reduced cost of repair and rehabilitation. Another important issue is control of the quality of emplaced material. Both contractors and oversight agencies involved in construction can benefit if material problems can be detected early. Sonic and seismic methods have proven to be quite suitable to address some of these issues.

In this short course, the theoretical and experimental aspects of existing sonic and seismic methods are described. The theoretical and experimental limitations of each method are discussed. An approach to judging the appropriateness of a given test for solving typical infrastructure management problems will be presented. A number of case studies that show the advantages and limitations of the methods are also included. Some of the existing equipment for rapid data collection and analysis will also be demonstrated.

The course should be of particularly useful to engineers, managers and professionals involved in design, construction and rehabilitation of transportation infrastructure that are interested in an overview of the growing field of nondestructive testing and evaluation.

1:30-5:00, Salon I, J

AGI Resistivity Imaging Workshop

Presented by: Mats Lagmanson, President, Advanced Geosciences, Inc.

Presenter's Biography

Mats Lagmanson is the owner and chief Geophysicist of Advanced Geosciences, Inc., headquartered in Austin, Texas. He earned his B.Sc. and M.Sc. from the University of Stockholm in 1969 and 1970, respectively. With 30 years of experience in the geophysical field and one of the principals behind the development of the Sting R1/IP, Super Sting R8/IP, and the Swift automatic dual mode multi-electrode system, he is well respected in his field. Mats is a member of the Society of Exploration Geophysicists (SEG), European Association of Exploration Geophysicists (EAEG), and the Northern Association for Applied Geophysics (NOFTIG).

Workshop Synopsis

A short-course designed for engineers, geologists, and other professionals looking to acquire the practical operating knowledge of imaging surveys, those currently involved in conducting imaging surveys, or those involved in the management, oversight, and review of imaging surveys. Topics covered include: basic theory, planning of a field survey, field procedures, data acquisition, data processing, and data interpretation and presentation. This hands-on workshop will answer: why and when to use resistivity over other methods. Using the Super Sting R8 automatic system, we'll discuss practical applications and provide relevant industry case histories.

WEDNESDAY, A.M.

8:30-12:00, Salon G, H

Understanding The Capabilities And Limitations Of NDT For Deep Foundations

Presented by Bernie Hertlein, STS Consultants

Presenter's Biography

Bernie Hertlein is an Associate scientist with STS Consultants, in Vernon Hills, Illinois. He has over 20 years experience in the development of test methods and the application of nondestructive testing to concrete structures, ranging from deep foundations and high-rise buildings to large dams and tall chimneys. He has published several papers and articles on the use of NDT methods for integrity testing and quality control of deep foundations, and has applied those methods on projects throughout Europe, Algeria, Hong Kong, Venezuela, and many parts of the United States. He is Chairman of ASTM Committee C09-64 - Nondestructive and In-place Testing, Chairman of the Deep Foundations Institute Testing and Implementation Committee, and a member of ACI Committee No. 228 - Nondestructive Testing.

Workshop Synopsis

There are several different types of deep foundation, and many proprietary variations of each type or construction method, each of which has distinct advantages and disadvantages, depending on location, purpose, soil conditions and budget.

At the same time there are also several different nondestructive (NDT) or non-invasive methods available for quality control and integrity assessment of deep foundations, and each method also has distinct advantages and limitations. As long as an appropriate method is used for the particular foundation type being tested, NDT methods have proven to be fast, cost-effective and reliable. Where the test method is inappropriate for the foundation type or site conditions, however, the results are, at best, inconclusive, and at worst can be actively misleading.

This workshop reviews the currently available NDT methods, analyses their respective strengths and limitations with respect to foundation types and site conditions, and provides the participants with the knowledge needed to be able to select an appropriate method, or recognize an inappropriate specification.

8:30-12:00, Salon I, J

Ground Penetrating Radar For Infrastructure Evaluation

Presented by Dr. Peter Annan, Sensors and Software, Inc.

Presenter's Biography

Dr. Annan holds B.A.Sc. and M.Sc. degrees from the University of Toronto, and a Ph.D. from Memorial University. As a graduate student, he participated in the Apollo lunar program. The results of his research during this period led to the development of Ground Penetrating Radar for geotechnical engineering applications. He is the founder and President of Sensors & Software Inc. and multiVIEW Geoservices Inc., and is concurrently a Research Professor at the University of Waterloo and a Research Consultant for GEOTEM AEM developments with Fugro Airborne Surveys.

Dr. Annan has authored numerous scientific publications and technical reports, has served on several government and professional scientific boards, and is a member of many professional associations, such as ACI, CGU, CIM, CSNDT, EAGE, EEGS, KEGS, NSG and PEO. He is the recipient of the 1996 Hal Mooney award for scientific excellence and technical innovation and was made an honorary member of the SEG in 2000 for his contributions to the advancement of GPR.

Workshop Synopsis

Ground penetrating radar (GPR) has been used for infrastructure investigations for some time, including highway and airport runway pavement thickness and quality, railway ballast and sub-grade condition, and concrete building and bridge integrity. Widespread adoption of the technology has been limited, however, because the GPR tools have been in the development phase. Over the last few years, the advent of high-speed computers and improvements in instrumentation have lead to more effective imaging that addresses infrastructure application demand.

The purpose of this short course it to introduce the concepts and principles involved and to show the current state of practice for GPR. The topics addressed will include basic GPR concepts and physical principles, instrumentation and survey procedures, and
data processing and interpretation using specific, case-history examples. Emphasis will be placed on defining the practical steps needed to reliably acquire engineering information from GPR observations.

WEDNESDAY, P.M.

1:30-5:00, Salon G, H

High Resolution, Shear-Wave Seismic Reflection For Structure Foundations

Presented by John Diehl, GEOVision

Presenter's Biography

Mr. Diehl is Vice President of Blackhawk Geometrics and GEOVision. Mr. Diehl has spent more than 24 years working in the field of geophysical instrumentation and geophysical data acquisition. He has written numerous technical papers and articles on the subject of seismic instrumentation, vibration and earthquake data processing, and real-time data acquisition. Mr. Diehl's experience includes borehole geophysical survey design and borehole seismic data acquisition, vibration instrumentation and data interpretation, and application of geophysical methods to engineering problems.

Workshop Synopsis

Shear wave reflection techniques can provide accurate soil stratigraphy, near-surface faulting, void detection, bedrock topography and channel identification. Shear waves offer many advantages over traditional primary (P) wave reflections, including better resolution, lack of effect from water table, lack of influence from most noise sources and better amplitude spectrum control, in addition to being non-destructive and non-invasive. The key to the application is an ultra-high frequency, shear wave vibrator system and advanced processing and interpretation methods. The results are near radar-image accuracy and quality, but with deeper investigation depth.

1:30-3:30, Salon I, J

Electromagnetic Geophysical Instrumentation for Environmental, Engineering and Geotechnical Applications

Presented by Mike Catalano, Geonics Inc.

Presenter's Biography

Mike has a bachelor of science specialist degree in geophysics from the University of Toronto. He has worked for the Ministry of Transportation of Ontario, Canada in the geotechnical road division and has been with Geonics Limited since 1993. Presently responsible for the North American market, his duties include instrument training, technical and software support, as well as general sales and marketing for the company. He has conducted training sessions for the FBI, EPA, U.S. Navy & Military and various educational institutions around the world. .

Workshop Synopsis

This presentation will discuss the principles of operation and the practical applications of electromagnetic (EM) systems for near-surface environmental and geotechnical investigations. This includes frequency domain soil conductivity meters for the assessment of road materials (i.e. borrow sites, road subsidence and fracture detection), as well as rapid mapping of subsurface contamination plumes such as those generated from road salt application; borehole induction loggers for subsurface plume monitoring; and shallow time domain systems for both the direct detection of buried metallic objects, such as pipelines and waste containers, and conventional geoelectric soundings. The presentation will conclude with a hands-on demo of some of this equipment.

3:30-5:30, Salon I, J

Capacity-Coupled Resistivity: Theory And Practice

Presented by Douglas Groom, Geometrics, Inc.

Presenter's Biography

Mr. Groom is the Geoelectrical Products Manager for Geometrics, Inc., a manufacturer of geophysical instruments for 33 years.

Workshop Synopsis

Capacitively-coupled resistivity measurements use coaxial cables dragged along the ground, instead of metal or porous-pot ground stakes, to measure ground resistivity. This workshop will provide information about the theory of operation for capacitivity-coupled resistivity measurements, and show results of past capacitively coupled resistivity surveys in engineering and environmental applications. A new dual-receiver capacitively coupled resistivity instrument will also be introduced. A real-time demonstration of instrumentation, data processing and editing will be presented, including inversion of capacitively coupled resistivity data with commercially available inversion software.

THURSDAY, A.M.

8:30-10:30, Salon G, H

Optim MS Noise Analysis

Presented by Bill Honjas, Satish Pullamanappallil and John Louie, Optim LLC

Presenter's Biography

Workshop Synopsis

8:30-10:30, Salon I, J

A Short Introduction To Tomography

Presented by Steve Cardimona

Presenter's Biography

Steve Cardimona received a Bachelor of Science degree in Applied Math and Physics from the University of Wisconsin-Milwaukee, and his Ph.D. in Geological Sciences from the University of Texas at Austin. Having worked in industry, for the US Air Force, and in academia, he has coordinated many independent and multidisciplinary research projects, utilizing classical methods of analysis and developing innovative techniques for filtering, modeling, and visualizing geophysical data. His current areas of research interest are geophysical signal analysis and integrated geophysical experiments related to environmental and engineering problems.

Workshop Synopsis

In this workshop, the basic principles of tomography will be outlined, with primary examples from acoustic subsurface tomography. We will start with setting up the numerical problem and designing an experiment. Then, in the context of inverse theory, we will discuss the tomographic inversion results we might obtain,

given different starting conditions and experimental designs. Through discussion of some simple examples, the basic issues and limitations regarding tomographic experiments will be summarized.

10:30-12:30, Salon I, J

Panel Discussion: Seismic Methods for Foundation Investigations: Selection and Efficacy

Moderator, Phil Sirles

Panel Members

Discussion Synopsis

THURSDAY, P.M.

1:30-5:00, Salon G, H

Assessment Of Karst, Psuedokarst And Its Remediation

Presented by Richard C. Benson, Technos, Inc., and James Jussin, Hayward Baker, Inc.

Presenter's Biography

Mr. Benson is a registered geologist with more than 30 years of experience in site characterization. He works with a broad range of non-invasive and minimally invasive methods, including remote sensing, surface geophysics, downhole geophysical logging and in-situ measurements. He has pioneered the applications of many of the contemporary geophysical methods in use today. Mr. Benson is contributing author to three books and author or co-author of over 70 technical publications. He has taught a number of short-courses and has served a principal role in the development of ASTM guidelines for surface geophysics.

James Hussin, P.E., is Director of Engineering & Business Development of Hayward Baker. Jim has 23 years of geotechnical construction experience and is responsible for management of engineering activities in Hayward Barker's Southern Region, including design and technical advancements. Jim is also Chairman of the National ASCE Ground Improvement, Reinforcement and Treatment Committee. He has a number of publications on grouting and foundation improvement and is a member of various engineering organizations.

Workshop Synopsis

This workshop will provide an overview of karst and pseudokarst and its remediation. Karst are those surface and subsurface conditions (e.g. sinkholes and cavities) which develop from the dissolution of soluble rock. Pseudokarst are those conditions which create problems similar to karst (e.g. subsidence due to abandoned mines, or due to ground water withdrawal. Karst and pseudokarst problems involve up to 75% of the land surface of the United States. When subsidence and collapse problems occur along our highways, they can lead to major damage and loss of life. Characterizing karst and pseudokarst conditions prior to collapse to assess risk is a needle in the haystack problem. Even after initial collapse, it is one of the most difficult site characterization problems.

This workshop will start with definitions of karst and pseudokarst problems, including photographic examples. We then develop a strategy for characterization of these conditions, followed by a few case histories. Finally, we will discuss various methods of remediation, including filling and stabilizing the sinkhole, use of bridging and piles, grouting and dynamic deep compaction.

1:30-5:00, Salon I, J

Recent Developments In Ground Penetrating Radar For Pavement And Bridge Deck Evaluation

Presented by Francisco A. Romero, Geophysical Survey Systems, Inc. (GSSI)
Presenter's Biography

Mr. Romero holds a B. S. in Petroleum Engineering from the New Mexico Institute of Mining & Technology (1984) and a M. S. in Civil (Structural) Engineering from the University of Kansas (1995). He has been with GSSI for 6 years and is currently GSSI's Manager of Civil Engineering Infrastructure Products. A specialist in GPR analysis of roadways, pavements, bridge decks and other concrete structures, his focus is on development, data collection and interpretation of ground-penetrating radar systems and software specifically oriented toward transportation and infrastructure evaluation.

Workshop Synopsis

This workshop will focus on providing information on the latest developments in GPR analysis of roadways, pavements, bridge decks and other concrete structures. Topics for discussion will include bridge deck deterioration-mapping using both air-launched and ground-coupled antennas and comparison with ground truth, use of GPR for roadway and pavement surveys (both concrete and asphalt) and use of pavement database integration software, and application of GPR for concrete structure retrofitting and rehabilitation.

FRIDAY, A.M.

8:30-10:00, Salon I, J

Panel Discussion: Non-Destructive Evaluation of Drilled Shafts

Moderator, Brian Liebich

Panel Members

Discussion Synopsis

10:30-12:00

Panel Discussion: Ground Penetrating Radar For Geotechnical Investigation: Current Issues

Moderator, Phil Sirles

Panel Members

Discussion Synopsis