



## Wednesday, September 12, 2012

7:00 am - 8:00 am

***Registration and Breakfast***

8:00 am - 8:15 am

***Welcome and Introduction***

8:15 am - 9:00 am

***Overview of FHWA Drilled Shaft Foundation Program***

Silas Nichols P.E., Federal Highway Administration

FHWA is currently working with the AASHTO T-15 committee to update relevant sections of the LRFD design and construction specifications to better align with the industry standard of practice. In addition, FHWA is working to address gaps in recommended guidance for drilled shaft foundations. This presentation will discuss big picture items currently being worked on as part of the continued improvement of the Drilled Shaft Foundation Program.

9:00 am - 9:45 am

***Techniques for Drilled Shaft Construction***

John Turner Ph.D., P.E., Dan Brown & Associates, PC

This presentation will provide an introduction to drilled shaft construction, including dry, wet, and casing methods. In addition, recent developments in construction techniques, with emphasis on methods applicable to conditions in the Rocky Mountain area will be presented.

9:45 am - 10:15 am

***Networking Break and Exhibits***

10:15 am - 11:00 am

***Drilled Shaft Equipment and Tools for the Rocky Mountain Region***

Vincent Jue, Champion Equipment Company

Drilled shaft techniques and equipment are often dependent on the region's unique conditions. Commonly utilized equipment for lightly loaded and larger static structures, bridge and infrastructure, and power line and wind tower foundations will be reviewed. Drilled shaft tooling with applications used in the region will be discussed.

11:00 am - 11:45 am

***Concrete Used in Drilled Shaft Construction***

Dan Brown Ph.D.P.E., D.GE, Dan Brown and Associates, PC

A drilled shaft is a reinforced concrete structural component that is constructed under conditions that are often quite challenging. This presentation will describe key components to achieving quality in drilled shaft construction practice with respect to structural integrity of the completed structure. The key factors include attention to details in completing the excavation, in the concrete placement operations, and in the mix design.

11:45 am - 12:45 pm

***Lunch and Exhibits***

12:45 pm - 1:30 pm

***Analysis & Design of Drilled Shafts***

John Turner Ph.D, P.E., Dan Brown & Associates, PC

This presentation will provide a primer on LRFD design of drilled shafts, including an overall approach to the design of drilled shafts using LRFD methodology; methods for computing axial resistance; and design for lateral loading. Design of drilled shafts in weak

rock formations of the Colorado Front Range will be reviewed. Examples will be used to illustrate design methods.

1:30 pm - 2:15 pm

***Base Grouting and Apple Testing Experience on Colorado Drilled Shafts***

Paul R. Macklin P.E., Yeh and Associates, Inc.

Two separate Colorado projects will be presented. One project involves the construction of drilled shafts using a post-construction, pressure-grouting method in an attempt to increase end-bearing resistance. The second project uses a high strain, dynamic load test to evaluate side shear and end-bearing resistance of one sacrificial and three production drilled shafts. The presentation will describe the local subsurface conditions, the general design approach of the drilled shafts, the base grouting and dynamic testing procedures, measurements, and analysis of the results. Comparison of the test results with the design will also be discussed as well as the use of the data with AASHTO's Load-Resistance Factor Design (LRFD) methodology.

2:15 pm - 3:00 pm

***ADSC-FHWA Base Grouting Research Project***

Antonio Marinucci Ph.D., P.E., M.E., ADSC

The presentation will summarize the research effort being funded by FHWA to synthesize the state-of-the-practice, and to investigate issues and conditions that most affect the performance of postgrouted drilled shafts used in transportation applications. Moreover, the current state-of-the-practice for the post-grouting of drilled shafts will be presented; gaps in current recommended technical guidance will be highlighted; and areas where the application of this technology will benefit from the proposed research will be identified.

3:00 pm - 3:30 pm

***Networking Break and Exhibits***

3:30 pm - 4:15 pm

***O-Cell Testing***

Jack Hayes P.E., Loadtest, Inc.

Extensive testing and analysis of the performance of deep foundations in general, and bored piles in particular, has confirmed that engineers have difficulty in coming to grips with the many risks and uncertainties that exist when designing and constructing such foundations. This presentation will illustrate how we, as engineers and constructors, can improve the quality of deep foundations, while mitigating risk and lowering their overall cost by focusing on certainty.

4:15 pm - 5:00 pm

***Stanamic Testing***

Mike Muchard, Applied Foundation Testing

Load testing technology has been taken to a new level with the advent of more contemporary methods. As a result, more testing is being performed. Huge volumes of test data have led to improvements in design and construction techniques. On occasion, though, the benefits of a load testing program can be quite surprising. The presentation will include some brief case histories demonstrating the ever present need for load testing. The case histories revolve around: 1) design; 2) variable soil conditions; 3) construction methods; and 4) materials quality control.

5:00 pm - 5:45 pm

***Geotechnical Capacity and Structural Integrity Assessments by APPLE Testing***

Frank Rausche Ph.D., P.E., D.GE, Pile Dynamics, Inc. Cleveland, OH

Dynamic testing of drilled shafts under the controlled impacts of a falling mass (e.g., the APPLE system) provides information regarding structural integrity and geotechnical load bearing capacity. The test can be engineered so that the loading subjects both the shaft and the geo-material to what is expected under service and required ultimate conditions, and, therefore, provides economical, reliable, and quick quality assurance for acceptable foundation performance.

5:45 pm - 7:00 pm

7:00 pm - 10:00 pm

***Reception***

***Osterberg Dinner & Memorial Lecture \*\*\*You Must Purchase a Ticket to Attend\*\*\****

This lecture has been established in honor of Dr. Jorj Osterberg, inventor of the Osterberg Cell, through the support of Loadtest Inc. The title of the lecture and honored presenter will be announced via email and on DFI's website, [www.dfi.org](http://www.dfi.org). Dinner sponsorships are 100% tax deductible and tickets are deductible less fair market value. If you would like to sponsor this dinner please contact DFI headquarters at 973-423-4030 or [staff@dfi.org](mailto:staff@dfi.org) or complete the sponsorship section of the invitation and return to DFI.

[Click Here](#) for Invitation and Sponsorship Information

**Thursday, September 13, 2012**

7:00 am - 7:45 am

7:45 am - 8:30 am

***Registration and Breakfast***

***Condition Assessment of Drilled Shaft Foundations***

Yajai Tinkey Ph.D., P.E., Olson Engineering

This presentation focuses on downhole and surface techniques used for condition assessment of drilled shaft foundations. These techniques include Crosshole Sonic Logging (CSL), Crosshole Tomography (CT) and Sonic Echo/Impulse Response (SE/IR) methods. Using the CSL method, the velocity of the sound wave, which travels from source to receiver in a horizontal plane, determines the presence of anomalous regions and, therefore, the quality of the concrete. For added higher resolution of shaft integrity and defects, the CT velocity imaging method is used, which accurately and precisely defines the size, shape, severity, depth, and location of potential defects by determining the

spatial velocity distribution of shaft concrete through analysis of numerous sound wave ray paths.

8:30 am - 9:15 am

***Large Diameter Drilled Shafts Under Soft Artesian Conditions in the Salt Lake Valley***

Thomas P. Hart, Black & Veatch Corporation

The construction of a 136-mile long monopole transmission project between Downey, Idaho and Salt Lake City, Utah included the construction of more than 900 large diameter drilled shafts. The alignment went through some of the most challenging ground conditions in North America, with extensive deep, soft clays and high artesian pressures. This case study presentation will include problems and defects that occurred, destructive and non-destructive testing and evaluation, and corrective actions.

9:15 am - 9:45 am

***Networking Break and Exhibits***

9:45 am - 10:30 am

***Drilled Shafts in Ground-Source Heat Pump Systems***

John S. McCartney Ph.D., P.E., University of Colorado Boulder

Drilled shaft foundations with embedded heat exchangers (i.e., energy foundations) have gained attention by employing materials to not only provide structural support but also improve the energy efficiency of heat pump systems. Data on the thermal and mechanical performance of energy foundations obtained through analysis, field-testing, and centrifuge modeling will be summarized in this presentation. Focus will be provided on the modification and validation of soil-structure interaction analyses needed to predict thermally-induced movements and changes in ultimate capacity. Relevant issues to consider in the design and construction of energy foundations will also be discussed, along with methods to define material properties for analysis.

10:30 am - 11:15 am

***Use of Drilled Shafts with Light Weight Cellular Concrete to Mitigate Roadway Settlement***

Mark Vessely P.E., Shannon & Wilson, Inc.

At mile marker 212, the pavement for I-70 in Colorado exhibits several inches of settlement on an annual basis, which has continued for more than 20 years, and is related to a large landslide. Geotechnical explorations within the slide mass have identified loose soils and potential voids below the asphalt roadway. Until funds for the permanent repair are available (likely cost over \$10M), CDOT developed an interim low cost approach that also minimizes disturbance to traffic. In 2010, CDOT drilled 135 shafts to a maximum depth of 20 feet in the westbound lanes and placed lightweight cellular concrete. The cellular concrete also provided a means to fill void spaces below the asphalt. Presently, a similar project is in progress for the eastbound lanes. This presentation will review the use of lightweight cellular concrete in drilled shafts to mitigate roadway settlement at this location.

11:15 am - 12:00 pm

***Shirrtail Gulch Road - Landslide Stabilization Utilizing Drilled Shafts***

John Hart P.E., D.GE, CTL | Thompson, Inc.

Analyses of the landslide incorporating resistance provided by the drilled shafts will be discussed. Specific attention will focus on determining drilled shaft loading, resolving forces in the drilled shafts, and sizing of the drilled shafts. Further, the construction and performance of the system will be presented.

12:15 pm

***Depart for Field Day***

12:30 pm - 4:00 pm

***Lunch & Field Day at Host Facility (Williams Form Engineering)***

Field Demo at Host Facility – Williams Form Engineering

The Field Day will consist of lectures and demonstrations regarding geo-exploration, drilled shaft tooling & installation, and nondestructive testing. A prediction contest with cash prize will be held using small diameter shafts to determine skin friction. The winner will be announced by the end of the day as well as published in Foundation Drilling magazine.

4:15 pm

***Return to Hotel***