



GRL NEWSLETTER No. 21

INFORMATION GATHERED BY THE ENGINEERS OF
GOBLE RAUSCHE LIKINS AND ASSOCIATES, INC. SEPTEMBER 1993

GRL ENGINEERS TEST MODIFIED SPT

As part of an ongoing study on the prediction of driveability and bearing capacity of impact driven piles from penetration testing, GRL's *Dr. Hasan Abou-matar* and *Gabriel Thendean* have been performing in-situ tests using SPT techniques at a variety of sites during the past several months. The purpose of these tests was an assessment of a soil's static and rate dependent pile resistance properties. Thus, static loading and dynamic PDA tests were performed both during the normal driving of the sampler and while a special tip was attached to the drive rod. Static tests included uplift load and torque on the sampler and compression load on the special tip. Special fixtures were machined for these measurements allowing for automated force, displacement and/or twist measurements (*photo*). The Pile Driving Analyzer™, Model PAK was programmed to collect the data.

GRL SLATES SEMINARS, USERS DAYS

GRL's engineers will offer an extensive seminar and PDA Users Days program. Because of the many dates and topics, the Calendar of Events of this GRL Newsletter issue has been expanded. Either the seminar organizers or GRL Cleveland may be contacted for further information.

GRL TESTS OFFSHORE

Bert Miner (GRL Seattle) and *Scott Webster* (GRL Chicago) recently monitored installations and restrikes on three piles of a North Sea oil platform. Excellent measurements were made with the Model PAK, Pile Driving Analyzer under an IHC S-500 hydraulic hammer with 500 kN-m (368 kip-ft) rated energy. (For further information on offshore dynamic pile testing, please note the Calendar of Events, New Orleans, November 1993.)

INDIANA DOT TESTS - DEMONSTRATES

Pat Hannigan, GRL Chicago, has just completed the first two projects in a series of six demonstrations on dynamic and static pile testing which are being conducted by the Indiana Department of Transportation. Based upon the test results, shorter pile lengths were used on the first site and fewer piles on the second project.

GRLWEAP NEWS

Beth Richardson currently combines the input, output and main analysis modules into one program whose new menus and help bars outline the direction that future updates of this popular program will take. A sizeable increase in the number of stored hammer files is also expected for the next (October 1993) program release.

Bert Miner advises that he successfully used the GRLWEAP 2-Pile option for predicting driveability of a mandrel driven pipe. In the case under study, direct top driving of 24-inch diameter pipes caused excessive compressive stresses.

NEWS FROM PILE DYNAMICS, INC.

PDI has developed a successor model of the popular P.I.T. Collector for integrity testing using hand held hammers. The unit now has an expanded touch screen with 5x6 fields, offering a complete alphabetic keyboard. Data transfer and result plotting can now automatically be accomplished in large blocks.

BBS AVAILABLE AT GRL/PDI

Our Cleveland office has installed a computer Bulletin Board System (BBS) open to all customers. The computer is available 24 hours a day. It is possible to send data to GRL for CAPWAP analysis or to send mail to other BBS users. There is also an area reserved as a "soapbox" where you can post messages or questions for all to read. The first time you use the system your privileges may be limited to sending data. Within two days you will be able to access other parts of the BBS. Please have your modem call the system at 216-831-6127, use up to 2400 baud - 8N1 (8 data, no parity, 1 stop). If you have any questions or comments, contact *Dean Cotton* at PDI.

Hasan Abou-matar torques on an SPT sampler for friction measurements.

Test locations were selected based on certain performance characteristics of full scale piles earlier subjected to both static and dynamic tests. Locations visited to date include Cleveland, OH, Portland, ME, C&D Canal, DE, White City, FL and Apalachicola, FL. Soil types included clays, silts and sands and pile types encompassed H-Piles and large displacement concrete piles. It is hoped that the information gained with the modified SPT will shed light on parameters to be used in improved wave equation analyses.

SPT ENERGY MEASUREMENTS

GRL founder *Dr. George Goble* had an opportunity to test four different drill rods and/or drill rigs. Sections of these rods were fitted with strain gages in GRL's lab and then subjected to a dynamic calibration using a 30 ft long Hopkinson's bar and instrumented at several sections. High quality measurements were obtained with these strain gages and piezoresistive accelerometers. In the field, substantial differences in energy transfer between the different rig models were noted, explaining earlier observed differences in SPT N-values.

CALENDAR OF EVENTS WITH GRL PARTICIPATION 1993-1994

U.S.A.

- 1993**
- Oct 1-2 Seattle, Washington, **Seminar on Dynamic Testing of Deep Foundations and Workshop on Wave Equation Analysis**, with *Dr. George Goble* and *Mr. Alex Sy*, Klohn-Crippen Consultants Ltd. Organized by *Bert Miner*, GRL Seattle (Ph: 206-624-0220, Fax: 206-871-5483). **Please see enclosure.**
- Oct 8-9 Napa, California, **Modern Pile Driving Practice**, with *Pat Hannigan*, GRL Chicago. Organized by *Dr. Michael Holloway*, Insitutech, Oakland, CA (Ph: 510-254-0460, Fax: 510-254-0461).
- Oct 18-20 Pittsburgh, Pennsylvania, **Annual Deep Foundations Institute Conference**. (Ph: 412-928-3841).
- Oct 25-26 Portland, Oregon, **Seminar on Dynamic Testing of Deep Foundations and Workshop on Wave Equation Analysis**, with *Dr. George Goble*. Organized by *Bert Miner*, GRL Seattle (Ph: 206-624-0220, Fax: 206-871-5483). **Please see enclosure.**
- Nov 4-5 New Orleans, Louisiana, **Offshore Applications of Dynamic Measurements and Analysis**, with *Dr. George Goble* and *Prof. Roy Olson*. Organized by *Jay Berger*, GRL Colorado (Ph: 303-494-0702, Fax: 303-494-5027). **Please see enclosure.**
- Nov 12-13 Orlando, Florida, **Deep Foundation Seminar on Design, Analysis and Testing of Piles and Drilled Shafts**, with *Dr. George Goble* and *Mohamad Hussein*, GRL Orlando. Organized by *Dr. Bengt Fellenius* University of Ottawa and Anna Geodynamics, Ottawa, Ontario, Canada, (Ph: 613-741-5071, Fax: 613-741-5594). **Please see enclosure.**

- 1994**
- Jan 94 Washington, D.C., **Transportation Research Board (TRB) Annual Meeting**.
- Feb 17 Orlando, Florida, **Introduction to Wave Equation Analysis and Dynamic Testing**, organized by GRL Cleveland (Ph: 216-831-6131, Fax: 216-831-0916) and GRL Orlando.
- Feb 18-19 Orlando, Florida, **PDA Users Days. ALL PDA AND CAPWAP USERS ARE CORDIALLY INVITED.** With the staff of GRL and PDI, organized by PDI, GRL Cleveland and GRL Orlando, (Ph: 216-831-6131, Fax: 216-831-0916 Cleveland).
- Dec 94 Orlando, Florida, **International Conference on Design and Construction of Deep Foundation**, organized by All American Soils, Inc., (Ph: 714-547-7178, Fax: 714-668-1050).

INTERNATIONAL

At the time of the mailing of this newsletter, *Garland Likins* and *Pat Hannigan* prepare their Sept. 13 through 30 seminar series and **PDA Users Days in China** (organized by Earth Products China Limited, Hong Kong) and **Singapore** (organized by ABV Technology Pte. Ltd.). Seminars are also planned during this time period in **Borneo** and **Japan**.

Oct/Nov 93 Seminars and wave equation workshops in **Stockholm, Sweden** and **London, UK** with the support of the Swedish Geotechnical Institute and Testing and Analysis, Ltd., respectively. Please contact *Mr. Carl-John Grävare*, Pile Dynamics Europe, Gothenburg, Sweden at Ph: 46-31-454307, Fax: 46-31-459908 or GRL Cleveland.

- 1994**
- Jan 5-10 New Delhi, India, **XIII International Conference on Soil Mechanics and Foundation Engineering**.
- Jun 13-15 Burges, Belgium, **Fifth International Conference and Exhibition on Piling and Deep Foundation**, organized by DFI (Fax: 201-729-0732).

CONCRETE SPECIFIC WEIGHT NOT A CONSTANT

GRL Cleveland's *Steve Abe* recently performed a high strain test on an auger-cast (also called CFA) pile in the Cleveland area (*photo*). For the calculation of an elastic modulus, E, from the observed wave speed, c, an accurate specific weight value, γ , was needed. A grout sample taken from the pile top yielded $\gamma = 20.4 \text{ kN/m}^3$ (.13 kips/ft³) not the usually assumed 24 kN/m^3 (.15 kips/ft³) value. The experience points out that grout (and maybe concrete) specific weights might be more variable than ordinarily assumed.

FLORIDA WIDENS FREEWAYS

Mark Johnson and *Allan Stegkamper*, both GRL Florida, have been testing piles for major freeway widening projects in Jacksonville, Gainesville and Orlando. These projects involve more than 40 bridges.

Steve Abe attaches transducers to an auger-cast pile at a site in Solon, OH. Client Joe Petraus, EDP Consultants, Inc., 3rd from the left, looks on.

GRL PERFORMS TRAINING - WORKSHOPS

Mohamad Hussein, GRL Florida provided dynamic testing and analysis training for engineers of the Florida DOT's Districts 2 (Lake City), 3 (Chipley), 4 (Ft. Lauderdale) and 6 (Miami) and for the Alabama DOT that also invited the Georgia DOT and the Department of Civil Engineering of Auburn University.

Frank Rausche explained theory and application of sonic pulse echo testing to engineers of Geotechnologies St. Louis; conducted a *Wave Equation seminar* and workshop at the premises of Mueser Rutledge, New York.

Jay Berger, GRL Colorado provided training programs to the Nebraska and Utah DOTs this summer. *Mark Traynowicz* now leads the PDA team at the Nebraska Dept. of Roads, inheriting a very active analysis and testing docket. At the Utah DOT, *Ed Kane* and his Geotechnical Group will now perform PDA services, replacing the testing team from the Structural Group.

GRL

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