



# GRL NEWSLETTER

No. 11

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

**AUGUST 1989**

## NEW REPRESENTATIVES IN EUROPE, FAR EAST

As of July 1, 1989, **Pile Dynamics Europe (PDE)** will be the representative for Pile Dynamics, Inc. (PDI) and GRL products in Europe. PDE has its headquarters in London, UK. The new firm can be contacted for the time being through PDI Cleveland or *C.-J. Grävare* at Europile, Gothenburg, Sweden Tel: 031-450260, Fax: 031-477533.

Since July 1, 1989, **HERCULES Grundläggning AB of Stockholm, Sweden** is the PDI and GRL representative for several countries in the Far East. HERCULES is based in Sweden and has a subsidiary, **ABV-LCM**, in Singapore. ABV-LCM will represent our firms in Indonesia, Malaysia, Thailand, and Singapore. They can be contacted in Singapore at Tel: 7476288, Fax: 7469934.

## 1989 PDA USERS DAYS HELD

On May 22 and 23 in London, following the DFI Symposium, a PDA Users Day was held as well. The 1989 North American PDA Users' Day followed soon thereafter at the GRL headquarters in Cleveland, Ohio on June 16 and 17, 1989.

A total of 70 PDA testers and Capwappers from around the world listened and learned of the theoretical and practical aspects of their field. Indeed, once again the PDA Users Day seminars were a resounding success assisting engineers in their understanding of pile dynamic testing methods of the past, present and future. With the list of attendees including representatives from five continents and fifteen nations, PDA users are becoming a part of an elite yet growing division of engineers on the cutting edge of geotechnical science.

The PDA Users Days provided the engineers involved in dynamic pile testing with

- Continued education and proficiency in the application of wave mechanics and Wave Equation concepts.
- Review of recommended testing and analysis procedures.
- Familiarity with newly developed methods and equipment.
- An opportunity for the exchange of ideas and experiences.
- Assistance with any particular technical problems.
- A certificate of Users' Days attendance after taking a challenging test.

The 1989 Users' Days included presentations dealing with Case Method, CAPWAPC, PDA, P.I.T. and general measurement techniques. Lectures and demonstrations were given by *George G. Goble*, *Frank Rausche*, *Garland Likins*, *Mohamad Hussein*, *C. Michael Morgano*, and *Steve Abe* from GRL, *Dean Cotton* of PDI, *Mike Kightley* and *Simon Pryor* of Testing and Analysis Ltd., *Carl-John Grävare* of Pile Dynamics Europe, *Jan Romell* of Skanska, *S. Ronning* of Noteby, *Jorge Beim* of PDI Engenharia, *Julian Seidel* of Piletest, and *Jon Cannon* of Maunsell & Partners Ltd.

## GRLWEAP NEWS

The question of GRL's recommendations for hammer efficiencies has repeatedly been raised. First, we recommend the use of the HAMMER.ALT file which was part of the 1987 release and which has been augmented with new hammer models during the past year. The "ALT" file includes the following efficiencies:

- 0.72 for all diesels with impact atomization.
- 0.80 for all diesels with atomized fuel injection.
- 0.67 for conventional, single acting ECH (external combustion hammers), including rope driven hammers.
- 0.50 for conventional double acting ECH.
- 0.95 for free fall rams or hammers with internally measured impact velocities.

**NOTE:** The hydraulic HBM hammers (primarily used offshore) cannot be analyzed by GRLWEAP. GRL has a special program available for that hammer model.

## WAVE EQUATION WORKSHOP SERIES SCHEDULED

GRL is pleased to announce hands-on wave equation workshops in several cities during the 1989-1990 winter season. A basic and an advanced course will be offered. The basic will cover the fundamentals of wave equation theory and how to prepare input data for commonly encountered problems. Advanced classes will deal with more complex situations. Instructors will be anyone of GRL's principals. Scheduled dates are:

Oct. 27, 1989	Cleveland, OH
Nov. 3, 1989	Cleveland, OH
Jan. 12, 1990	New York, NY
Jan. 15, 1990	Philadelphia, PA
Feb. 9, 1990	Boulder, CO

Please call immediately for further information; registration is limited to fifteen people per course.

## NEWS FROM PILE DYNAMICS (PDI)

PDI has just recently released a new model of the venerable PDA. The new version is called the **GCPC Pile Driving Analyzer™ (PDA)** whose unique feature is that it does not require an extra tape recorder or scope due to its self-contained design. It also has a 12V DC power option, a built-in graphics printer, printer/plotter capability, and can perform both PDA and CAPWAPC among its many other capacities.

Earlier in the year, PDI announced the release of the **GCS Pile Driving Analyzer™ (PDA)** which is a much more simplified model of the GCX type. Even though the GCS is simpler to use it still is a fully functional PDA, the main difference being that many functions of the PDA are carried out automatically by the system's software. Therefore, the GCS is strongly recommended for Analyzer users with limited expertise and training.



## FUTURE EVENTS IN 1989 WITH GRL-PDI PARTICIPATION

- Aug. 3-5 Florida Engineering Society Exhibition, Marco Island, FA. *M. Hussein* will present PDA and CAPWAPC systems.
- Aug. 13-18 ICSMFE, XII International Conference On Soil Mechanics and Foundation Engineering, Rio de Janeiro. GRL and PDI will exhibit together with PDI Engenharia. *G. G. Goble* will be present.
- Aug. 21-25 International Symposium on Offshore Engineering-Brazil Offshore '89, Rio de Janeiro. A paper jointly authored by G. and J. Beim (both of PDI Engenharia, Brazil) and *M. Hussein* (GRL) will be presented.
- Oct. 9-11 Deep Foundations Institute (DFI) Annual Meeting, Baltimore. *G. G. Goble* and *Wondem Teferra* will represent GRL.
- Oct. 25-27 International Conference on Wood Poles and Piles, Fort Collins, Colorado. *M. Hussein* will present a paper on tests on existing timber piles.

## GRL PERSONNEL NEWS

Since April 1989, Shen Ren-Gong of Nanjing Hydraulic Research Institute, Nanjing, China has been undergoing training at the GRL headquarters in Cleveland. After a comprehensive and extensive review of GRL manuals, *Shen* has worked with CAPWAPC and P.I.T. He also submitted a paper to the 1989 Cleveland User's Day entitled "P.I.T. Matching, Chinese Practice."

Following the 1989 Cleveland User's Day, GRL training was held by *M. Hussein* for Paul Johnston of Jacques, Whitford and Associates, Jeremy Chie-Yang Wu of Taiwan Power Company, and *Shen. Wu* left Cleveland July 5 to begin field training in GRL's Orlando office.

GRL-PDI welcomed for the summer *Paul Kicher*, *Adrian Rausche* and *Mark Vargo*. *P. Kicher* is working on the new underwater gages, *A. Rausche* on various GRL-PDI projects, and *M. Vargo* on the Mini-Saximeter.

### P.I.T.-CAPWAPC DEMONSTRATIONS

Between the DFI Conference and the PDA Users' Day in London, P.I.T. was demonstrated on 25 specially prepared drilled shafts at the University of Newcastle (UN), UK. The work was done in cooperation with STS consultant Pat Hannigan. Thanks are due to (UN) researchers D. Lilley and W. M. Vilkenny for their support. During the 1989 ASCE Foundation Congress in Illinois PDI and GRL participated in the Capacity Prediction event. GRL demonstrated P.I.T. on two cast *in situ* piles. The PDA and CAPWAPC high strain tests were made in cooperation with STS.

## AUSTRALIA

In June following the Cleveland User's Day, Julian Seidel of Piletest took with him a new GCXS Pile Driving Analyzer. GRL-PDI have been in cooperation with Piletest since 1984. This is their third PDA system.

## JAPAN

Recently, GRL-PDI sold a new GCS Pile Driving Analyzer to the Kawasaki Steel Corporation. Involved in this recent initiative were *G. G. Goble* and *M. Hussein* with *G. G. Goble* providing one week of training in Japan.

## VENEZUELA

INTEVEP, S.A. of Venezuela acquired a GCXS Pile Driving Analyzer in early June. A training session is scheduled for September.

## UNDERWATER TESTING

PDI in cooperation with Maunsell and Partner, Ltd., provided underwater strain transducers, accelerometers, and cabling for an offshore construction project. *G. Likins* was on location during testing. Underwater gages and sensors for considerable depths are now available from PDI.

### ASTM STANDARD D-4945-89 APPROVED!!

GRL was recently informed by Chris D. Thompson of Trow Geotechnical Ltd. that the ASTM Standard D-4945-89 was finally ratified. In his letter of notification *Chris* wrote that:

"...the document should be available as a Separate Standard in mid-August 1989, and it will be published in ASTM Standards Volume 04.08 in March 1990...I believe Standard D 4945-89 is a well written and useful procedure that can be readily implemented and will allow us to obtain comparable high quality information."

The Standard is intended to regulate the application of high-strain dynamic testing for pile bearing capacity. Readers are urged to order a copy. GRL wishes also to express their thanks to *C. D. Thompson* and his task group for their patience and perseverance in working for the acceptance of the Standard.

## PDA SURVEY RESULTS

PDI received 48 responses from about half of the world's PDA owners with a combined 240 years of experience. Based on the results it was concluded that the PDA is used on 1500 projects per year involving mostly concrete and steel pile types but also timber and bored piles depending on local construction practices. Typically 5 piles are tested per day with a maximum of 40. Most tests are done during restrike which is the correct method for capacity testing. Generally, 5 to 10% of the piles of a site are tested with some local requirements demanding 25%. Almost all PDA operators include in their reports data on bearing capacity, while about two-thirds of all reports also contain information on driving stresses, hammer performance, and pile integrity. The accuracy of the PDA is perceived to be within 20% of the true load of the pile; if used in conjunction with CAPWAPC, accuracy improves to 12%. Static tests have a perceived accuracy of 15%. Problems with the static test were suggested as being measurement errors (few tests use a calibrated load cell) or failure definition (Davisson method was considered the best). Therefore, it was not surprising that PDA operators felt that the same safety factor is appropriate for both static tests and PDA/CAPWAPC dynamic tests.

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