GRL NEWSLETTER

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BY THE DEEP FOUNDATION ENGINEERS AND PILING EXPERTS
OF GOBLE RAUSCHE LIKINS AND ASSOCIATES, INC.

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ROUTINE TESTING OR A PROFESSIONAL SERVICE?

by Frank Rausche

GRL's engineers have heard it all:

"I've driven piling for 50 years, I know what I'm doing!"

"When that hammer strokes that high it's a good pile."

However, we also hear many comments like:

"They sure saved my behind."

"That's the way to go: test and then drive with no interruptions."

Or, better yet, a question is asked:

"Do you think we can hit it harder now?"

GRL engineers like to work with contractors. With the best available testing equipment, they quickly compute the necessary parameters and then make recommendations based on experience, observations and analyses. But often pile drivers do not like to listen to theoreticians. In fact, it already happened that the GRL professional engineer warned the contractor: *"Five more blows like that and your pile is gone"*. That warning, unfortunately, made a reduction of ram energy psychologically unattractive and five blows later the pile indeed disintegrated.

Let's go back a few decades: the contractor with 50 years of experience remembers jobs with ram strokes less than one meter and required pile capacities of typically 40 tons. The piles were overdriven as capacities were quickly and easily exceeded and stresses were modest. Then came high capacity piles and hammers with much larger strokes and engineers squeezed more economy into their designs. Piles started to bend, buckle, chip, crack, crumble, crush, curl, rupture, rip, slab, snap, ... Specifications required driving a skinny pile with high blow counts to some deep penetration in hard soil with a big hammer and without predrilling or other installation aids. Capacities were to be achieved that required end-of-driving stresses which were about equal to the pile strength.

Dynamic pile testing along with wave equation analyses have made installation of high capacity piling possible. Therefore, unreasonable specifications have been replaced by the requirement that the contractor hires a testing firm. There is, however, a troubling development: the benefits of the testing service are sacrificed for some relatively minor savings by replacing the professional expert with a poorly trained, less costly technician.

It is not enough to put sensors on the pile and check that data is recorded. The information gathered during the pile installation must be **immediately interpreted** allowing for real time feedback and decision. A modern Pile Driving Analyzer® (PDA), such as the model PAK, provides a vast array of results for each hammer blow, giving the experienced engineer information that answers most installation questions.

However, the engineer must be capable of

- continuously monitoring compression, tension, and bending stresses, cushion condition, hammer behavior, pile alignment *etc.* to prevent pile damage during installation. The engineer should not only consider axial stresses but also additive bending and local stresses.

- recognizing whether or not damage has occurred, judging its seriousness and finding its cause by checking hammer, driving system, alignment, obstructions, pile quality, and other effects.

- evaluating the efficiency of the driving system, recognizing areas where reasonable improvements are possible and, if necessary, making recommendations for potentially more economical equipment.

- distinguishing between spurious vibrations and truly important record features and thus avoiding wrong decisions based on uneducated or inexperienced data interpretation.

- making recommendations as to time and frequency of restrike testing for optimal economy and evaluating potential benefits and shortcomings of such tests based on local geotechnical experience.

- using data and observations with common sense. For example, a small hammer having driven a pile to hard rock may not be able to activate the required ultimate capacity, but common sense tells us that the well seated pile will provide plenty of capacity. The engineer only has to assure the pile is on hard rock.

Yes, as an alternative, a less experienced person could take the measurements. Then, however, the experienced professional must thoroughly review all records and results. This is a process that often takes as much time as the actual field measurements since a huge amount of data must be explained to the professional and then examined.

In summary, the PDA is a valuable tool only in the hands of well trained personnel. Used with skill and experience, it can help save time and money through the improved use of equipment and material■

Dr. George Goble
Recipient G. Brooks Earnest Award

The Cleveland, OH section of the ***American Society of Civil Engineers*** *has bestowed upon George Goble their highest honor. On October 12, the awardee will present a lecture to the section entitled: "From Research at Case Institute of Technology to Actual Field Applications."*

Dr. Goble was also invited to lecture undergraduate students of his Alma Mater by the Dean of the College of Engineering of the University of Idaho.

SOON TO COME
1995 PDA USERS' DAYS/SEMINARS

Whether in romantic **Heidelberg, Germany** - or in fast-paced **Cleveland, OH, USA**, the September 1995 Users' Days promise to bring much new information and a review of time proven methods. In light of this Newsletter's main article, we hope to meet with many testers from around the world.

Those frequently involved with specifying and using PDA, P.I.T. or CAPWAP® should consider attending our seminar and wave equation workshop preceding the Users Days. This will be an excellent learning opportunity for persons less familiar with pile dynamic methods.

STRESSWAVE '96
The Fifth International Conference for the Application of Stress-Wave Theory to Piles
Sept. 11, 12, 13 1996
Contact: M. Hussein 407-826-4747

The Organizing Committee has accepted more than 100 papers for presentation and publication in the proceedings volume. A bulletin will be issued shortly.

Are you interested in continuing to receive this Newsletter? If yes, please fill in and return the enclosed card to GRL.