



Thank you for your support in 2009.
May 2010 bring peace to the world
and health, happiness and prosperity
to you and your family.



Remote Dynamic Foundation Testing

Edited by Gina Beim from contributions from Casey Jones (FTC) and from GRL Engineers.

Remote PDA Testing – more formally known as Remote Dynamic Foundation Testing – is popular around the world. In Sweden and Australia, most foundation tests are now performed without an on-site engineer, eliminating testing delays and scheduling the testing at the convenience of the contractor. Australian testers have reported Remote PDA Testing costs four times lower than those of tests with an engineer on site, a result attributed to better time management of the test engineer and avoidance of unproductive time spent on travel and on-site construction delays. In the United Kingdom, Remote PDA Testing has enabled one consultant to test up to 10 piles per hour. This testing method may also avoid the need for a test engineer to undergo safety or hazardous materials training.¹

Remote PDA Testing consists of equipping job sites with a Pile Driving Analyzer® (PDA) model PAX. Job site personnel attach the necessary sensors to the foundation to be tested. The PDA model PAX then transmits the dynamic test data over the Internet during the test, in real time, to a PDA engineer stationed anywhere in the world.

In the USA, where Departments of Transportation struggle to reconcile reduced budgets with increased testing requirements resulting from FHWA Load Resistance Factor Design (LRFD), Remote PDA Testing is emerging as the solution of choice. Its inherent lower costs allow for an increased number of foundation load tests, yielding in turn a less costly foundation design under LRFD.

For some time GRL Engineers has encouraged its clients to adopt this approach. The Cleveland office of GRL has recently cooperated with PDA owners in Michigan to provide remote testing services for the Hammond-Keystone Connector in Traverse City, MI and for the Hawkins Rd over I-94 project in Jackson County, MI, both MDOT projects. The GRL Chicago office has completed seven bridge projects using remote PDA testing. On these projects, Wisconsin DOT personnel attached their remote PDA system on HP 12x53 H-piles with ultimate pile capacities of up to 215 tons, and the dynamic test data was transmitted in real time to GRL. Fifty-nine piles were tested during initial driving and thirty-seven during restrike. The North Carolina office of GRL performed remote testing on 14 inch square concrete piles supporting the Isle of Wight Water Tank for ECS Mid-Atlantic. The piles, driven by Northstar Contractor, were designed for a load of 70 tons, with an ultimate capacity of 140 tons. GRL will perform a restrike on the test pile to confirm soil setup conditions.

GRL has been conducting Remote PDA Tests for Chris-Hill Construction Company of Memphis, TN routinely for several years. Craig Christenbury and Jon Hill, the owners of the company, have made it clear that “we will not fly in an engineer for testing”. A recent project required that 350 mm (14 inch) concrete piles, driven with a D19-42 diesel hammer, be monitored for tension stresses during driving. Long term bearing capacity also had to be assessed, since it was suspected that soil setup would have a significant effect. A PDA Model PAX was shipped to Chris-Hill a few days before the test. Jon Hill operated this equipment while his crew attached the sensors to the pile. When refusal occurred at a shallower than expected penetration, the ultimate capacity was only 75% of the required value. Six days later,



Concrete Cylinder Piles form the New Orleans IHNC Floodwall; Work Trestle in foreground. Photo courtesy of Foundation Testing and Consulting.

however, a restrike test confirmed that sufficient soil setup had generated an ultimate capacity of slightly more than the required 200 tons. Without any time delay, these capacity values were calculated by CAPWAP® analysis and a preliminary report was issued less than two hours after the actual test. Compared to traditional testing, a saving of almost 50% was realized due to reduced engineering time and travel costs.

Remote PDA testing was also used on the largest design-build project in the history of the U.S. Army Corps of Engineers, the Inner Harbor Navigation Canal Surge Barrier (IHNC). This floodwall extending from the Gulf Intracoastal Waterway to the Mississippi River Gulf Outlet is being constructed in New Orleans, LA by the joint venture team of Traylor-Massman-Weeks since April, 2009. A part of post-Hurricane Katrina improvements, the 2.3 km (1.4 mile) long wall consists of 43 m (140 ft) long concrete cylinder piles with a diameter of 1,680 mm (66 inch) and smaller concrete piles driven in gaps between the cylinder piles. Lateral support on the protected side of the barrier wall is provided by 910 mm (36 inch) diameter steel pipe batter piles. A temporary work trestle permits pile installation. Genesis Structures of Kansas City, Missouri designed the trestle and retained Foundation Testing and Consulting (FTC) of Overland Park, Kansas, to provide the geotechnical foundation design for this work trestle. The trestle bridge foundation design required pile capacity to be achieved within 7 days of pile installation to support the aggressive schedule of the project, while the soils typically require setup time periods of up to 6 weeks to develop full capacity. FTC's Casey Jones, P.E. used his PDA model PAX to perform extensive Remote Dynamic Testing and confirm installation requirements for the 36-inch diameter steel pipe trestle piles. The PDA was on site for the complete project duration. The project Quality Control staff, from Volkert and Associates, was trained to properly attach the required sensors to the pile and make the Internet connection of the PAX to the FTC Kansas office. Later, the Remote PDA Testing scope expanded to the concrete cylinder piles on an on-call basis during both day and night-time shifts. FTC stated that “...the remote PDA system was a huge success by extending our service capabilities and providing great value to the project. We are looking forward to using the remote system on our next large project.”

[1] Likins, Hermansson, Kightley, Cannon, and Klingberg, March, 2009. *Advances in Dynamic Foundation Testing Technology. Contemporary Topics in Deep Foundations; 2009 International Foundation Congress and Equipment Exposition, GSP No. 185. ASCE. This paper can be retrieved from PDI's web site: www.pile.com.*

What's happening in 2010 - more info at www.pile.com/events

February 20-24, West Palm Beach, FL: Geo-Florida 2010. Sponsored by the Geo-Institute of ASCE. **Garland Likins will present. Visit the PDI exhibit booth.** Info: content.asce.org/conferences/geoflorida2010

March 12, Baltimore, MD: Joint Conference on Driven Pile. Sponsored by DFI and PDCA. Info: www.piledrivers.org

March 17-19, Orlando, FL: Dynamic Foundation Testing Seminar and Workshop. Sponsored by Pile Dynamics, Inc. and PDCA. **Frank Rausche, Garland Likins, Mohamad Hussein and Jorge Beim will present.** Foundation QA High Strain Dynamic Pile Testing Examination will be offered on March 20. Contact PDI for additional details.

March 18-19, Pittsburgh, PA: Deep Foundations: Design, Construction and Quality Control. Sponsored by ASCE. **Mohamad Hussein will present.** Info: www.asce.org

March 25, Hamburg, Germany: GRLWEAP Workshop (in English). Sponsored by GSP and Pile Dynamics, Inc. **Frank Rausche and Oswald Klingmüller will present.** Info: www.gsp-mannheim.de

April 8-9, Orlando, FL: 2010 FHWA Bridge Engineering Conference - Highways for LIFE and Accelerated Bridge Construction. Sponsored by FHWA and various DOTs. **Visit the PDI/GRL exhibit booth.** Info: www.highwayforlife.com or contact Dr. Atorod Azizinamini at azizi@highwayforlife.com.

April 26, noon: Installation, Verification and Application of Driven Piles. An ASCE Webinar. **Garland Likins will present.** Info: www.asce.org

May 6-8, Coeur d' Alene, ID: PDCA Annual Conference. Info: www.piledrivers.org

May 26-28, London, UK: 11th Geotechnical Conference - Geotechnical Challenges in Urban Regeneration. Sponsored by DFI-Europe and EFCF. Info: www.geotechnicalconference.com/ **Meet several PDI representatives at Booth Number 4.**

EVENTS IN PLANNING:

International Dynamic Foundation Testing Seminars

Following the success of Dynamic Foundation Testing Seminars offered in the Fall of 2009 in Brazil, Italy, UAE and Chile, Pile Dynamics is actively planning the next series of international educational events. Tentative dates and locations include:

Spring 2010: India, Colombia, Peru and Mexico

Fall 2010: Poland, Spain and Vietnam

Our next USA Seminar will take place in March, see above.

Webinars

GRLWEAP: tentatively planned for February.

Pile Integrity Testing: tentatively planned for April.

Watch our website for upcoming details. Email announcements will be sent when registration opens - keep your contact information current on www.pile.com/brochure

SMALLER, WIRELESS PILE INTEGRITY TESTER UNVEILED - PIT-X

Pile Dynamics has launched a Pile Integrity Tester that fits in the palm of your hand, and works with a wireless accelerometer. PIT-X will initially be available with one channel of data acquisition (velocity). All functions available on the latest edition of the PIT-V model have been preserved, including a built-in FFT feature. PDI has also updated the PIT analysis software, having recently launched PIT-W 2009 in both Standard and Professional versions.



PIT-X with wireless accelerometer and handheld hammer.

GRL IN LOUISIANA

GRL has opened a new office in New Orleans. This office will serve the needs of the entire State of Louisiana and surrounding area. GRL Louisiana is headed by GRL Florida's Mohamad Hussein, P.E. and staffed locally by Matt Nagy, who was formerly with the GRL Main Office in Cleveland. The Louisiana office is located at 2931 Layton Lane, Slidell, LA 70458. You may reach this office by emailing GRL-LA@PILE.COM or calling (985) 640-7961.

GRL ILLINOIS WELCOMES NEW ENGINEER

Joey Link, PE, has joined the Illinois office of GRL. Joey brings several years of experience as a senior staff engineer with Schnabel Engineering in Richmond, Virginia, where he conducted high and low-strain dynamic pile tests and analyses for deep foundations.

WE NOTE WITH SADNESS THE PASSING OF

Fritz Koltermann. Fritz had been an engineer with DELMAG and Pileco and eventually Foundation Equipment Company (FEC) of Dover, OH, which he managed until his retirement. During the past 8 years, Fritz engineered GRL's APPLE systems and generously helped GRL with his well reasoned advice, knowledge and experience.

Jose Antonio Mendez Lecanda. Antonio headed Pruebas Dinamicas en Pilotes SA in Mexico, a company that only in March saw the passing of its founder Ing. Carlos Molina. Antonio worked very hard, often in close cooperation with GRL, and enjoyed the many facets of dynamic pile testing. He had recently visited PDI to stay abreast of recent software and hardware developments and helped GRL with an offshore assignment in the Gulf of Mexico.

All of us at GRL and PDI will very much miss these two outstanding engineers.

GRL ENGINEERS DAYS

In keeping with its mission of delivering exceptional dynamic testing and analysis services to its clients, GRL held its annual in-house 2 day long training. 40 engineers - from GRL and from sister company Pile Dynamics - attended and shared their job site experiences, research efforts and testing systems recent developments. Topics included wireless high strain dynamic testing on an offshore oil platform in the Caspian Sea, remote dynamic foundation testing, recent developments of dynamic testing of drilled shafts with GRL's various APPLES, and preview of the wireless PIT-X among many others.

Visit us at WWW.PILE.COM



GRL Engineers, Inc.
Main Office: 4535 Renaissance Parkway
Cleveland, Ohio 44128 USA
E-mail: info@pile.com

Phone: +1-216-831-6131
Fax: +1-216-831-0916

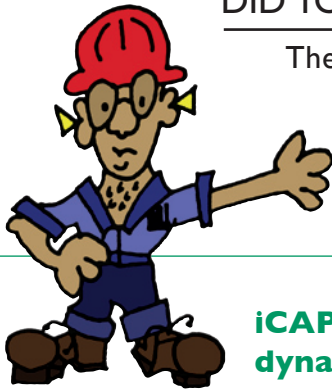


Pile Dynamics, Inc.
4535 Renaissance Parkway
Cleveland, Ohio 44128 USA
E-mail: info@pile.com

Phone: +1-216-831-6131
Fax: +1-216-831-0916

DID YOU KNOW?

The CASE METHOD just turned 40!



iCAP™ - A new wave for dynamic testing

Garland Likins and Frank Rausche

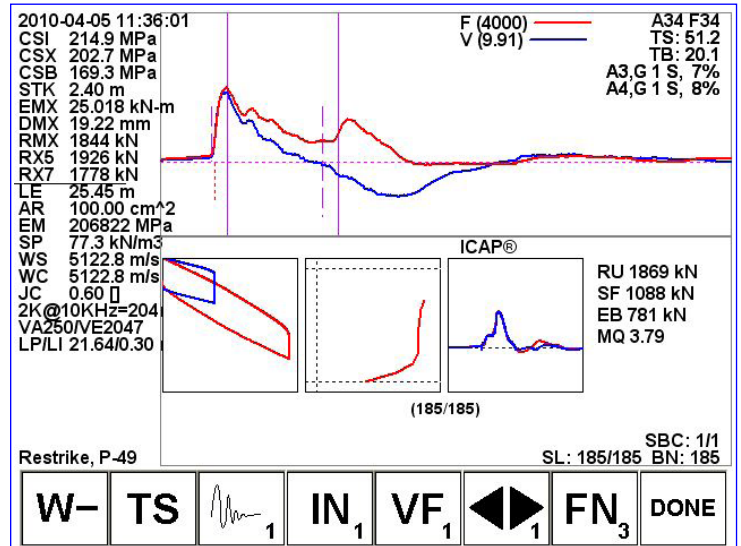
Dynamic testing with the Pile Driving Analyzer® (PDA) is state-of-the-practice to assess deep foundation capacity. Its widespread use underscores the importance of having a system that reduces turnaround time for issuing recommendations, contains testing costs and outputs dependable results.

It is often easier to take measurements during pile driving or restrrike testing than to analyze dynamic testing data with a reliable method. Measurement without analysis is, however, insufficient. For this reason, documents such as the American Association of State Highway and Transportation Officials Load and Resistance Factor Design (LRFD) Bridge Design Specifications (AASHTO 2010), Eurocode 7, the Australian Standard Piling Code AS2159 and the Brazilian Piling Code NBR 13208 either recommend signal matching, mandate it or allow for more favorable design parameters when it is performed. The only documented signal matching program with a significant database of correlations with static load tests is CAPWAP®, the “gold standard” of dynamic pile data analysis.

Decades ago, a highly specialized engineer traveled from the field to the office, then spent hours at a computer interacting with the CAPWAP program. The final report could take several days. As computers have become more powerful, the time required to complete the analysis has dramatically decreased. The CAPWAP software also has matured to the point where it offers the engineer a variety of automatic features that speed up the interactive analysis. This has encouraged many PDA engineers to perform CAPWAP signal matching on their laptops in the field, immediately following data acquisition.



PDA model PAX running SiteLink™



iCAP as seen on the screen of the PAX. Graphs, counterclockwise from top, are: Measured Signals; Simulated Static Load Test; Force in Pile Load Distribution and Signal Match

Pile Dynamics is now going a step further, and revolutionizing the data interpretation process with the introduction of iCAP. iCAP performs a fully automated signal matching analysis in real time, during pile driving.

iCAP instant signal matching leverages 40 years of continued improvement and development of the globally-accepted CAPWAP logic. With no user interaction, iCAP extracts the soil behavior from dynamic measurements, computes capacity at the time of the test, and produces a simulated static load test graph. All this is done in real time during testing.

iCAP provides reliable and instant capacity results. There is, however, a basic difference between the “gold standard” CAPWAP and iCAP. The interaction between the engineer and the CAPWAP software adds an often essential layer of engineering know-how to the analysis. On the other hand, the fully automated iCAP responds to researchers’ call for a unique solution, to the contractor’s need for immediate answers and to the specifications requirements for signal matching.

Wireless data transmission from the sensors to the PDA simplifies and speeds the testing process by allowing the sensors to be attached to the pile prior to lifting the pile into the leads. SiteLink technology saves time and money by enabling field personnel to operate a PDA model PAX while the testing engineer receives data in the office and controls the test in real time, through the internet. By combining the advantages of wireless data acquisition and SiteLink with iCAP’s instant answers, the user of a PDA model PAX is equipped to meet the ever increasing demands of quick turnaround and reliable pile load testing and monitoring results.

**What's happening through
early Autumn 2010 -
more info at www.pile.com/events**

- May 24 (Lima, Peru), 26 (Bogota, Colombia) and 28 (Mexico City, Mexico): Dynamic Foundation Testing Seminar. Sponsored by PDI and local partners. **Camilo Alvarez will present.** Registration flyers at www.pile.com/events.
- May 26-28, London, UK: 11th Geotechnical Conference - Geotechnical Challenges in Urban Regeneration. Sponsored by DFI-Europe and EFFC. **Meet several PDI representatives at Booth Number 4.** Info: constructconferences@emap.com.
- June 6-9, Pittsburgh, Pennsylvania: 2010 International Bridge Conference®. Sponsored by Engineers' Society of Western Pennsylvania and ARTBA. **Michael Morgano will teach a Seminar on Deep Foundation Testing and Analysis on June 9 from 1 to 5 pm.** Info: www.eswp.com/bridge/index.htm.
- June 10-11, New Orleans, LA: DFI Superpile 2010. **Visit the PDI exhibit booth and listen to presentations by George Piscalko and Mohamad Hussein.** Info: www.dfi.org/update/SP2010CFP.pdf
- June 17-18, Phoenix, Arizona: ASCE Seminar: Deep Foundations: Design, Construction and Quality Control. **Mohamad Hussein will present.** Info: www.asce.org/conted/seminars
- July 21-25, Colorado Springs, CO :ADSC Summer Meeting. **Visit the GRL table.** Info: www.adsc-iafd.com.
- August 28-September 1, Little Rock, AR: SASHTO 2010. Sponsored by Southeastern Association of State Highway and Transportation. **Visit the PDI exhibit booth.** Info: www.sashto.org/sashto2010
- September 23-24, Miami, FL: ASCE Seminar: Deep Foundations: Design, Construction and Quality Control. **Mohamad Hussein will present.** Info: www.asce.org/conted/seminars
- October 10-13, Hollywood, CA: DFI 35th Annual Conference on Deep Foundations. **Visit the PDI exhibit booth.** Info: www.dfi.org.
- October 12-14, Chicago, IL: Roads & Bridges Live: 2010 - Bridge Infrastructure. **Pat Hannigan will present.** Info: www.roadsbridgeslive.com.

COMING UP IN FALL 2010

Seminars on Dynamic Foundation Testing and Analysis in Poland and Spain. Watch our web Calendar of Events, and keep your email up-to-date to receive a notice as soon as details are available (you can do that by emailing us at info@pile.com or visiting www.pile.com/brochure).

SITELINK™

Most readers of this Newsletter are familiar with Remote Dynamic Foundation Testing (featured in Newsletter 62, January of 2010). As more and more Pile Driving Analyzer® users adopt the technology, we gave it an aesthetic makeover: Watch for the SiteLink logo wherever dynamic testing is performed the cutting edge way. If you are serious about cutting the costs of dynamic testing, you need to look into SiteLink.



NEW VERSION OF ASTM STANDARD FOR SPT CALIBRATION

It is good engineering practice – and in many cases it is mandatory – to normalize Standard Penetration Test results based on the energy transferred by the SPT hammer to the rod. The energy should be obtained from force and velocity measurements as described in ASTM D4633-10 “Standard Test Method for Energy Measurement for Dynamic Penetrometers”. The 2010 document replaced the 2005 version and may be purchased from the ASTM website. Current Pile Dynamics models of the SPT Analyzer and of the Pile Driving Analyzer model PAX comply with D4633-10 and may be used to obtain the required measurements.

NEW AUGERED CAST-IN-PLACE PILE INSPECTOR'S GUIDE

The Deep Foundations Institute (DFI) has released the second edition of the Augered Cast-in-Place (ACIP) Pile Inspector's Guide. According to www.dfi.org, “The manual, updated from the original version published in 1994, summarizes the requirements expected of all parties concerned in the successful installation of these piles and now includes information on Automated Monitoring Equipment (AME) and Non-Destructive Testing (NDT)”. Pile Dynamics offers an AME device known as Pile Installation Recorder, as well as various NDT solutions for ACIP piles.

NOTABLE PROJECT: SR 46 OVER LAKE JESUP BRIDGE IN GENEVA, FLORIDA.

The State Route 46 Bridge over Lake Jesup is 3800 ft long, and crosses an environmentally sensitive water basin. The Florida Office of GRL provided dynamic pile testing and related services as a member of the design/build team for this US\$38 million project that was ranked number 6 in Roads and Bridges Magazine's Top 10 Bridges for 2009.



PDI WELCOMES NEW SALES TEAM MEMBERS AND INTERNATIONAL REPRESENTATIVES

In an effort to better service its clients, Pile Dynamics has expanded its sales team. Dana Shea and Sam Mangano have joined Bill Herman and Tony Barbieri as Client Account Managers and Nicole Angie as Sales and Marketing Administrator. They may be reached by emailing sales@pile.com.



PDI new team members received field training to better help clients

PDI has also added three new Representatives in the past year: Index SA represents PDI in Chile, PDPSA represents PDI in Mexico, and Arsen Makina represents PDI in Iraq, Jordan, Lebanon, and Libya.

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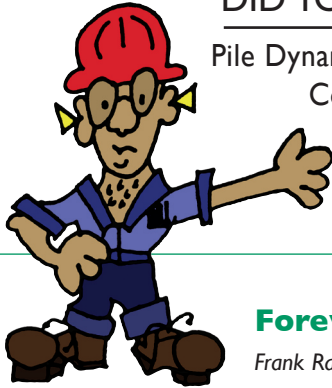
GRL Engineers, Inc.
Main Office: 4535 Renaissance Parkway
Cleveland, Ohio 44128 USA
E-mail: info@pile.com
Phone: +1-216-831-6131
Fax: +1-216-831-0916



Pile Dynamics, Inc.
4535 Renaissance Parkway
Cleveland, Ohio 44128 USA
E-mail: info@pile.com
Phone: +1-216-831-6131
Fax: +1-216-831-0916

DID YOU KNOW?

Pile Dynamics and GRL Engineers
Corporate & Ohio offices
have moved!



Forever Wave Equation

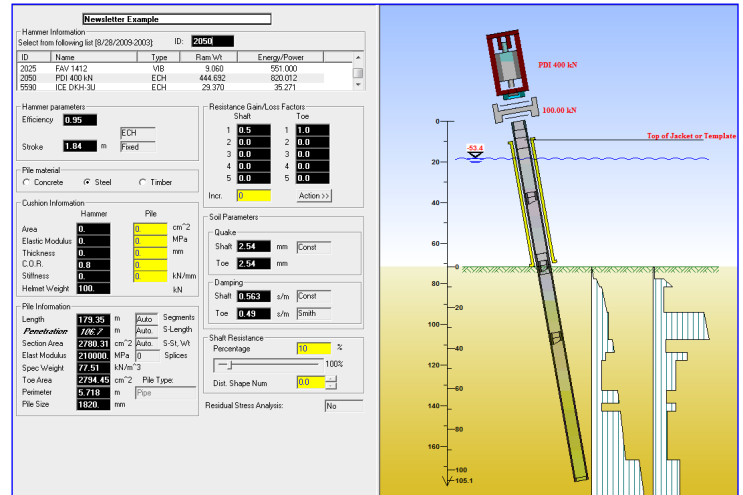
Frank Rausche and Liqun Liang

Good things - not just wine - get better and better with age. GRLWEAP is one of these things although, admittedly, we don't let nature just take its course - Pile Dynamics continuously helps this computer program get more and more refined as the years go by. Constant improvements are possible because of the dedicated field testing and analysis work of GRL Engineers, offshore and on land. They share the insights gained through their daily use of the Pile Driving Analyzer®, CAPWAP® and other hardware and software with the engineers whose mission is to keep GRLWEAP a forever young and useful tool.

Initially written by GRL in the 1970s for the US Federal Highway Administration (FHWA), GRLWEAP is based on the concepts developed by E.A.L. Smith¹ of Raymond International. It simulates the pile driving process and, for each assumed pile capacity, calculates driving resistance (blow count) and dynamic stresses. The program helps check on the adequacy of pile driving equipment, the bearing capacity of an installed pile and it is also helpful when selecting ram weight, drop height and cushion thickness for dynamic load tests on drilled foundations. GRLWEAP is now used all over the world, and has become a standard tool for contractors (particularly for their estimators), construction managers and civil engineers. Our website - www.pile.com/references - contains 20 or more papers describing the basic approach of the program and the solutions it provides.

GRLWEAP 2010, currently in final beta testing phase, takes this software package to a whole new level. As a result of ongoing research efforts, GRLWEAP has evolved from Smith's original approach that calculated a simple Bearing Graph (relationship between blow count and bearing capacity, driving stresses and hammer stroke) to where it is now possible to calculate the soil resistance along shaft and toe as a function of depth, and then estimate a realistic driving time. This driveability analysis option allows the user to input soil type or SPT (Standard Penetration Test) data or - new for 2010 - standard soil strength parameters or results from CPT (Cone Penetration Test). GRLWEAP then performs both static soil analysis and dynamic pile driving simulation, yielding an estimate of SRD (Static Resistance to Driving), long term static capacity, blow count and driving stresses versus depth. Total number of blows and thus driving time estimates are then based on the calculated blow count.

GRLWEAP 2010 also includes powerful new analysis options alongside with simplified input and enhanced interfaces with widely used office software. It more easily accounts for battered piles that do not reach the same depth as a vertical pile of the same length, have reduced hammer energy output, and may experience static bending stresses in addition to the axial dynamic stresses caused by driving. GRLWEAP 2010 also handles analyses for a wide range of driven pile applications, from planning a dynamic load test on a 15 cm



GRLWEAP input screen with a graphical summary of the main input quantities

micropile to simulating the installation of a 4 m diameter monopile designed for lateral loads and driven into extremely dense soils, as is often the situation on offshore wind farms. The number and range of stress cycles caused by the pile driving must be accounted for on offshore wind farms and other large piling projects, and that is easily accomplished with Offshore Wave, a version of GRLWEAP 2010 designed specifically for these situations.

Pile driving optimization should not, however, be exclusive to offshore wind turbines and other large, complex projects. Even piles driven as a foundation for a one or two story building should be analyzed to find an optimal installation method. Engineers who are new to wave equation analysis need not be deterred, as PDI regularly offers workshops and training webinars and offers users significant and helpful support. For those who only occasionally need to analyze the pile driving process, GRL offers GRLWEAP analyses services with a quick turnaround.

Whatever the application, GRLWEAP looks forward to supporting the deep foundations industry with the wave equation -forever.

¹Smith, E.A.L., (1960), "Pile Driving Analysis by the Wave Equation," *Journal of the Soil Mechanics and Foundations Division, ASCE, Volume 86*

WE'VE MOVED

Pile Dynamics, Inc., the Corporate and Ohio offices of
GRL Engineers, Inc. and Inspection Instruments, Inc.

have moved to:

30725 Aurora Road, Cleveland, OH 44139, USA

Our phone and fax numbers remain the same.

If visiting our offices please refer to our website for directions.

Please remember to use the new address when
mailing or shipping to PDI or GRL!

Fall 2010 Calendar of Events – See more at www.pile.com/events

- October 4-7, Charleston, WV: 42nd Annual Southeastern Transportation Geotechnical Engineering Conference. **Visit the PDI/GRL booth.** Info: www.stgcec.org.
- October 10-13, Hollywood, CA: Deep Foundations Institute 35th Annual Conference on Deep Foundations. **Visit the PDI booth.** Info: www.dfi.org.
- October 12-14, Chicago, IL: Roads & Bridges Live: 2010 - Bridge Infrastructure. **Pat Hannigan will present.** Info: www.roadsbridgeslive.com.
- October 15, 11:30 am to 1:00 pm Eastern Time: ASCE Webinar on Installation, Verification and Application of Driven Piles. **Garland Likins will present.** Info: <https://secure.asce.org/ASCEWebsite/WEBINAR/LISTWEBINAR.aspx>.
- October 19-20, Columbus, OH: Ohio Transportation Engineering Conference. **Visit the GRL booth.** Info: www.otecohio.org.
- **October 18-20, Madrid, Spain: Dynamic Foundation Testing Seminar, GRLWEAP Workshop and PDA and CAPWAP Workshop. Presented by PDI and G-Octopus. Frank Rausche and Jorge Beim will present. Visit www.pile.com/events for registration flyer.**
- **October 21, Ecuador: Dynamic Foundation Testing Seminar. Presented by PDI and Sociedad Ecuatoriana de Mecánica de Suelos y Roca. Camilo Alvarez will present. Visit www.pile.com/events for registration flyer.**
- **October 22, Warsaw, Poland: Dynamic Foundation Testing Seminar. Presented by PDI and Pile Dynamics Europe. Frank Rausche and Jorge Beim will present. Visit www.pile.com/events for registration flyer.**
- **November 3, Seoul, South Korea : PDA and CAPWAP Workshop. Presented by PDI and the Korean Geotechnical Society. Garland Likins will present. Visit www.pile.com/events for registration flyer.**
- November 4, 2010, Charleston, SC: 11th Annual Design and Installation of Cost-Efficient Piles Conference. Presented by PDCA. **Mohamad Hussein will present.** Info: www.piledrivers.org
- November 8-12, New Delhi, India: Sixth International Congress on Environmental Geotechnics. Presented by The Indian Geotechnical Society (IGS) and International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). Info: www.6icg.org. **Visit the booth of PDI representative AE&C.**
- **November 10-12, Jakarta, Indonesia: Dynamic Foundation Testing Seminar and PDA and CAPWAP Workshop. Presented by PDI and the Indonesian Society for Geotechnical Engineering. Garland Likins and Jorge Beim will present. Visit www.pile.com/events for registration flyer.**
- **November 15, Da Nang, Vietnam: Dynamic Foundation Testing Seminar. Presented by PDI and the Nguyen Cao Company Limited. Jorge Beim will present. Visit www.pile.com/events for registration flyer.**
- **November 17, Hanoi, Vietnam: Dynamic Foundation Testing Seminar. Presented by PDI and Inotech JSC. Jorge Beim will present. Visit www.pile.com/events for registration flyer.**
- November 23-26, 2010, Shanghai, China: Bauma China 2010. Info: www.bauma-china.com. **Visit the booth of PDI representative Earth Products China.**
- December 1-3, San Antonio, TX: 7th International Bridge Engineering Conference - Improving Reliability and Safety - Restoration, Renewal and Replacement. Presented by TRB, FHWA and Texas DOT. **Visit the PDI booth.** Info: www.TRB.org/Conferences/2010/IBEC.

NEW AND REVISED AASHTO SPECIFICATIONS

The 3rd Edition of the American Association of State Highway and Transportation Officials "LRFD Bridge Construction Specifications", as well as the 5th edition of the "LRFD Bridge Design Specifications", were released in the first half of 2010. Both may be purchased from the AASHTO online bookstore. The Bridge Construction Specifications require the contractor to submit a Wave Equation Analysis to the engineer, showing that the piles are drivable. It also specifies that hydraulic hammers be equipped with a system for measurement of ram energy (the E-Saximeter meets those specifications), and requires that dynamic testing with "signal matching" (e.g. PDA with CAPWAP®) be conducted according to ASTM D4945. Garland Likins reviews how the new Bridge Design Specifications reward enhanced foundation testing by allowing the use of more favorable factors in the Q2 issue of PDCA's PILEDRIVER Magazine. Read the article at www.pile.com/reference.

FHWA DRILLED SHAFTS PUBLICATION

The US Federal Highway Administration has released GEC10, "Drilled Shafts: Construction Procedures and LRFD Design Methods", available at www.fhwa.dot.gov/engineering/geotech/index.cfm or in hard copy from www.nhi.fhwa.dot.gov or www.adsc-iafd.com. GEC10 recommends that, when Standard Penetration Test results are to be used for foundation design, the SPT equipment used for the test be calibrated according to ASTM D4633 (the SPT Analyzer or the PDA may be used for the calibration). It also includes a comprehensive chapter on load testing of drilled shafts, with a section on High Strain Dynamic Load Test that recognizes that it "has been used for many years with driven pile foundations" and "can be applied to drilled shaft foundations with some considerations for the different nature of a drilled foundation". (GRL Engineers performs such tests with its APPLE load testing system.) Lastly, it highlights the importance of integrity testing as part of the QA/QC program of drilled shaft construction. Among the various integrity methods mentioned, Cross-Hole Sonic Logging (CSL) performed according to ASTM D6760 is the preferred one (the CHAMP performs this test). It is recognized, however, that Sonic Echo or Impulse Response methods (both can be performed with the Pile Integrity Tester and are standardized by ASTM D5882) may be the best option for shafts not built with the access tubes required for CSL.

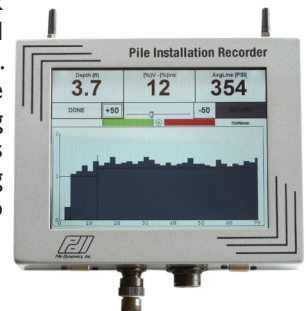
GRL WELCOMES NEW ENGINEERS

Dr. Yan Liu has just completed his PhD in Geotechnical Engineering from Case Western Reserve University and has joined the Corporate Office of GRL. Alex Ryberg has just completed his Master's in Civil Engineering from Drexel University and has joined the PA office.

PDI HAS RELEASED A NEW MODEL OF PIR

(Automated Monitoring Equipment for augered cast-in-place, continuous flight auger and drilled displacement piles)

The new model of the PIR has a larger back lit color screen that is much easier to read in bright sunlight and low light conditions. The color display makes it very clear to the pile installer if adjustments to the grouting process are needed – an indicator turns from green to red if targets are not being met. Read about other enhancements to the PIR at www.pile.com/pdi/products/pir.



Visit us at WWW.PILE.COM



GRL Engineers, Inc.
Corporate Office: 30725 Aurora Road
Cleveland, Ohio 44139 USA
info@pile.com
Tel: +1-216-831-6131
Fax: +1-216-831-0916



Pile Dynamics, Inc.
30725 Aurora Road
Cleveland, Ohio 44139 USA
info@pile.com
Tel: +1-216-831-6131
Fax: +1-216-831-0916