GRL: A HISTORY AND CELEBRATION OF 40 YEARS OF TESTING DEEP FOUNDATIONS

Pile Buck felt privileged to be invited to GRL’s 40th anniversary celebration.

The GRL anniversary celebration was first class from start to finish. The entire event ran like clockwork and rivaled any put on by a top-tiered company.

The all-day event was meticulously planned and carried off with perfection.

The day started with a tour the GRL factory, which reflects their innovation, attention-to-detail and forward-thinking philosophy. Designed by architect Yolita Rausche, Frank Raucshe’s wife, the repurposed factory is LEED certified1 and allows ample light to lessen any dreary Cleveland day. Cleveland is a welcoming, warm city and GRL fits right into the hospitality it offers.

The day’s conclusion began with classical pianist Dimitrios Sellountos, who opened the evening at the Cleveland Institute of Music, followed by nationally-acclaimed speakers and ending with an exquisite formal dinner at the Cleveland Botanical Gardens. The dinner finale was a custom-designed cake supported by pile foundations. The family of GRL inspires!

It is obvious that the innovative team at GRL is a close-knit family. This was shown by the ease with which every detail was graciously granted to their employees, clients and guests to make it an affair to remember.

Thank you for inviting us to this memorable occasion!

Pile Buck

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1 Leadership in Energy and Environmental Design (LEED)-certified buildings are resource efficient. They use less water, energy and reduce greenhouse gas emissions.
Forty years ago, a new type of consulting firm was incorporated in Cleveland, Ohio. A company totally focused on providing the pile driving industry with dynamic testing and related services. Its mission was to support geotechnical firms, construction managers, pile driving contractors and owners with highly-specialized testing and monitoring services.

These services encompassed state-of-the-art technology originating from a late 1950s idea by Professor Harry Nara of Case Institute of Technology (now Case Western Reserve University). Nara’s idea was that each hammer blow applied to the pile represents a quick loading test. Measuring force and velocity near the pile top, under the hammer impacts, and analyzing this dynamic data should then yield the static soil resistance and a reliable means of construction control and quality assurance.

In the mid-1960s, Professor George G. Goble became the principal investigator of a research project at Case which was based on Nara’s idea and was titled “Dynamic Studies on the Bearing Capacity of Piles.” The project was funded by the Ohio Department of Transportation and the Federal Highway Administration (FHWA). My [Rausche] 1970 Ph.D. dissertation developed and tested the basic sensors to measure force and motion, derived the Case Method equation for real time capacity calculations, and developed the CAPWAP® computer code for more-detailed soil resistance evaluations.

A field computer that analyzed sensor measurements was also developed at the time. The research clearly
showed that the most successful computations involved the traveling wave concept, providing a true physical representation of what happens in a pile during the hammer impact.

In the early 1970s, Goble saw the potential benefit from the Case research to the driven pile industry and began to informally offer testing services for the private sector. In 1972, Goble founded Pile Dynamics, Inc. (PDI), a firm dedicated to building the necessary hardware to carry out dynamic load testing. This became known as the Pile Driving Analyzer® (PDA) system.

There were quite a few early champions who supported the implementation of this new breakthrough technology. Ray Grover, bridge foundation engineer with the Ohio Department of...
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- Optimized construction processes thanks to comprehensive consultation
Transportation, often attended demonstration tests for other state transportation departments such as Minnesota, New York, Pennsylvania, Georgia, Idaho and Florida.

Ken LaFond of Twin City Testing took advantage of dynamic testing on his many foundation projects around Minnesota and the upper Midwest. News of this practical approach to construction monitoring and pile load testing spread offshore and to other countries.

Engineers at Chevron Oil Company specified dynamic testing on large-diameter, open-ended pipe piles for platform installations in the Gulf of Mexico. Ing. Carlos Molina, construction manager at the Las Truchas Steel Plan construction site on the west coast of Mexico, scheduled a series of dynamic load tests.

Chris Thompson of Trow Consulting Engineers Limited in Canada requested tests at various construction sites in Ontario.

On March 17, 1976, Gobel, with two of his former graduate students, Frank Rausche and Garland Likins, incorporated his consulting practice as Goble and Associates, Inc. (later Goble Rausche Likins and Associates, Inc., and then GRL Engineers, Inc.).

The interest in dynamic pile measurements and analyses was so great that Goble, Likins and I logged frequent flyer miles, most of them unrewarded, traveling from one end of the country to the other. It got a little easier when Wondem Teferra joined the company and later became the Philadelphia GRL office manager.

Shortly thereafter, Goble accepted the position of chairman of the civil engineering department at the University of Colorado and opened the first GRL branch office in that state. Rausche took over as GRL president and Likins
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directed PDI. Both were also active in the GRL day-to-day consulting work.

After joining the team in 1982, Mohamad Hussein, P.E. opened the Florida branch office.

Pile driving hammer manufacturers and their representatives were instrumental in the development of GRL. An intimate knowledge of the working principles of pile driving hammers is invaluable when analyzing measured data or predicting drivability. In the early 70s, a close cooperation with Al McKinnon of the Foundation Equipment Company (FEC) in Newcomerstown (Ohio) helped both GRL and FEC better comprehend and model diesel hammers.

Orto Kammerer of Pileco in Houston (TX) frequently asked GRL to test new diesel hammer models on their test stand.

In the mid-1970s, GRL was entrusted by the Federal Highway Administration to write a computer program based on the approach to model pile driving behavior developed in the

Pile Installation Recorder (PIR) Testing and Repair station at Pile Dynamics, Inc.
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1950s by E.A.L. Smith of Raymond International. The program would include a thermodynamic model for diesel hammers.

The FHWA felt that incorporating the monitoring experiences GRL had gathered on hundreds of driven piles would make the wave equation method more realistic. Indeed, the resulting code, which is now called GRLWEAP, has achieved worldwide acceptance and is used by engineers and contractors. Performing drivability analyses for its clients remains an important part of GRL’s work.

Occasionally, a standard pile driving hammer was either not available, or the available pile driving hammer was not large enough to provide the necessary energy for full-capacity mobilization. Finding a suitable loading device within a short time period was often impossible.

To meet GRL’s promise of providing immediate service when needed, the company built a fleet of nine modular drop hammers strategically located in Cleveland, Honolulu, Houston, Los Angeles and Tampa. With weights between one and 80 tons, these units can mobilize pile capacities as high as 8,000 tons under favorable conditions. Obviously, these hammers are not only suitable for testing driven piles, but can test any type of deep foundation.

Like other members of the deep foundation industry, GRL had to diversify and not only work with the PDA, but also with various other devices to test the integrity of both drilled and driven concrete piles.

One of the reasons for GRL’s successful growth was the experience of its engineers and their dedication to providing quality work to their clients, regardless of how tough the schedule or the project requirements and conditions. Today, 35 engineers in 10 offices around the country, all fully equipped with testing equipment, are managed by Patrick Hannigan, P.E., GRL president, and Mohamad Hussein, P.E., board chairman and manager of the Florida office.
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Other long-time senior engineers include Michael Morgano, P.E., manager of the Ohio and Pennsylvania offices; Scott Webster, P.E., who oversees and participates in offshore monitoring jobs from his North Carolina office; Camilo Alvarez, P.E., located in California, frequently takes advantage of the SiteLink® technology, allowing him to monitor pile driving in South America, Central America and the Middle East while simultaneously working on local projects in California.

Similarly, Travis Coleman, P.E. and the other Illinois office engineers work onsite or remotely in nearby states and offshore. GRL has opened additional offices in Denver, New Orleans, Houston and Seattle to better serve clients in those regions.

It is that kind of flexibility that makes it possible to effectively be available on short notice practically anywhere in the U.S. or worldwide.

Today, many GRL engineers are dedicating much of their free time to professional services and activities. Likins expertly and reliably contributed to PDCA’s technical committee during the development of AASHTO’s LRFD code and most recently to their review of the IBC code, while also serving on ASTM committees and serving as an associate editor for both ASCE and ASTM geotechnical journals.

Hussein has been co-editor of several ASCE special geotechnical publications and teaches the ASCE deep foundations continuing education class.

Hannigan has completed the updating work for the FHWA manual, Design and Construction of Driven Pile Foundations, available for free at www.grlengineers.com. Most of the senior personnel, now including Brent Robinson Ph.D., P.E. and Ryan Allin, P.E., reach all around the world in workshops, seminars, webinars and training sessions, and prepare the participants for and sometimes help administer PDCA’s Dynamic Measurement and Analysis Proficiency tests.

Goble retired from GRL in 2000, and Likins and Rausche are now slowly reducing their workload. They still help with internal training, lecturing, analysis and report review, and most importantly, client support.

A succession plan devised and executed by CFO Adrian Rausche has assured a seamless transition of duties and transfer of knowledge from senior to junior engineers. This assures that GRL’s tradition of providing the best possible service and highest quality product to its clients continues to be fulfilled in the future as it has in the past. GRL started out as a company focused on providing dynamic pile testing services and now continues to be dedicated to serving the deep foundations industry with specialty testing and analyses services.
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On Friday, September 30, 2016, over 100 GRL engineers guests and employees joined in to celebrate their 40th Anniversary in Cleveland, OH. The day began at the Cleveland Institute of Music’s Mixon Hall, where attendees were greeted with a musical arrival by pianist Dimitrios Sellountos. Mohamad Hussein, P.E., board chairman and GRL Florida manager, began with an introduction of the day’s events.

Founding member, Dr. Frank Rausche, P.E., president emeritus of GRL Engineers, shared his journey over the past 40-plus years in the deep foundations industry. As a graduate student from Germany, Rausche was instrumental in launching the GRL dynamic testing services and developing the Wave Equation and CAPWAP® signal matching software, which has become today’s industry standard.

Following Dr. Rausche was Dr. Bengt H. Fellenius, “Dr. Tech,” P. E., a former professor of civil engineering at the University of Ottawa and internationally recognized in the field of soil mechanics and deep foundation engineering. Dr. Fellenius provided an educational view with case studies, test results and soil statistics on the history of the driven pile and dynamic measurements, from stress waves to wave equation to CAPWAP® to the Pile Driving Analyzer®.

Two broad themes of the deep foundations industry trends were presented by Dr. Dan Brown, president and principal of Dan Brown & Associates, Inc. They were: Increasing Sophistication/Complexity, and Risk Allocation Contract Delivery. Dr. Brown is recognized as one of America’s leading authorities on the design and construction of deep foundations for transportation.
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Dr. Brown explained the foundation demands in continuous flight auger piles, drilled displacement piles, and bearing tests, through real-life project examples in Oregon, Connecticut, Mississippi, Minnesota and Kentucky. He also discussed the risks associated with foundation engineering associated with timelines, budgeting and performance.

One of GRL’s longtime clients, Buck Darling, president and co-owner of Herbert F. Darling, Inc., a pile driving and shoring organization specializing in driven deep foundations, spoke of the many experiences he has had working with various GRL engineers on jobsites. He noted, “no matter the time of day, the weather condition or in what location, GRL could always be counted on.”

GRL’s president, Patrick Hannigan, P.E., followed Mr. Darling’s discussion by illustrating how far GRL has come in the past 40 years. He recognized past and current employees and explained how each position is an integral part of the organization. Mr. Hannigan also offered a look into the future of the industry, recognizing the challenges that lie ahead in the deep foundation testing market. “GRL is committed to continued innovation, quality, professionalism, and superior service, as well as active participation in industry committees and collaboration with peers,” noted Mr. Hannigan.

I am proud of the way we’ve built GRL Engineers over the last 40 years. Hard work, dedication and striving innovation got us here. It’s also what will continue to fuel our growth in the years to come.”

- Dr. Frank Rausche, P.E. | Founding Member and President Emeritus of GRL Engineers
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customers and academia,” stated Hannigan.

Once the formal presentations concluded, the attendees went across the street to the beautiful Cleveland Botanical Gardens where cocktails and a formal dinner were served. The dining room was decorated with centerpieces resembling pile driving and fall colors. Both a land- and an offshore-piling foundation supported the commemorative cake adorned with GRL historical images.

Dr. Rausche noted, “I am proud of the way we’ve built GRL Engineers over the last 40 years. Hard work, dedication and striving innovation got us here. It’s also what will continue to fuel our growth in the years to come.”

Brent Robinson, Ph.D., P.E. and George Piscsalko, P.E. welcome guests by the GRL Engineers/Pile Dynamics, Inc, Wall of History Showcase.

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