THE OFFICIAL PUBLICATION OF THE
PILE DRIVING CONTRACTORS ASSOCIATION

Q1 2014 | Volume 11, No. 1

PILEDRIVER

"A Driven Pile… Is a Tested Pile!"

PDCA 18th Annual International Conference & Expo 2014

- Desert Deep Foundations
- Indemnity clauses: minimize your risk

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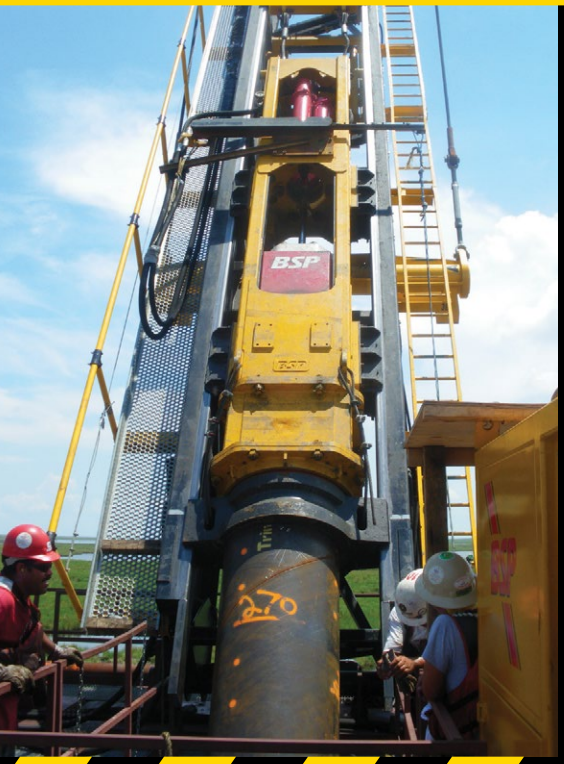

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Though long-time pile driver Eric Hendriksen has been in the business for nearly 40 years, he just recently struck out on his own and formed Desert Deep Foundations to service the deep foundation niche in Utah, Nevada and Idaho. Read the full profile on Hendriksen's new company, starting on page 78.

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Back on Track

By Rusty Signor, President, Pile Driving Contractors Association

After attending the Professors' Driven Pile Institute (PDPI) at Utah State University last summer, I saw how enthusiastic the professors were during the weeklong seminar. While around 25 professors attend every two years for this pile driving course, we feel that the information will easily reach over thousands of future engineering students.

All of the professors admitted that information about driven piles was not a very lengthy topic covered; students that we have invited to our job sites to observe pile driving have made similar remarks. Some students said driven pile lectures were less than an hour during their whole engineering degree program. Locally, we have been trying to address this. We invite engineering students to monitor pile testing and invite experts in the pile driving field to make presentations.

I have been told by several pile driving "old timers" that pile driving had a vast monopoly around 40 years ago. Yet, in today's market, it is a small minority. A short and simplistic reason for the demise was the advent of the relatively inexpensive tubular hydraulic rubber tire cranes along with their vastly reduced cost in job mobilization. Contractors with design-build projects would ask engineers to specifically design deep foundations with drilled piers to be able to utilize their also relatively inexpensive hydraulic and rubber tire drilling trucks.

Along with all this, the drilled shaft industry got extremely organized in their marketing efforts. Two simple marketing bullet points, which have been very effectively used against pile driving, are noise and vibration. We need to show these as simple boilerplate preconceptions and carefully explain these two things. In bidding a project, the client stated that they were they were concerned about the effect of vibrations on neighboring buildings. We took the time to drive three and a half hours to the job site to see if we needed to order vibration-monitoring devices, only to find out the closest buildings were at least a quarter mile away. I have been given many examples by industry professionals that the ambient noises from other construction equipment at job sites were louder than pile driving, so I bought a RadioShack decibel meter to let engineers and students pass around during pile driving. Once, a professor said he had to wait for passing trucks to go by so he could monitor the actual pile driving. It struck him that the passing truck noise was higher and he chuckled out loud about his realization.

Pile driving pretty much dropped off the map, except for coastal areas. The best example of this is the state of Texas. The Texas Department of Transportation basically never specifies driven piles more than fifty miles away from the coast. Piles finally did get a highway job several years ago in San Antonio on top of a fill area, as the piles are known to compact and seal any lower penetrations of the pile to keep contaminates from leaking out into the aquifer. However, even with the same type of very drivable soils at the edge of the fill area, drilled shafts at a higher cost were specified where the landfill stopped.

The driven pile industry was sort of asleep at the wheel until the mid-90s when PDCA was formed. I have been in a number of industry organizations, and none have been as important to my business as PDCA. After offering lunch and learns with PDCA-supplied material to over 30 engineering companies, we finally got pilings specified in a GeoTec report. We have also vastly upgraded our pile driving equipment through pile driving suppliers.

Last, but not least, is the fraternity of friends I have developed in the industry. Every time I call someone with a

(continued on page 6)

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job-related question, I get some really professional advice. One of my favorite examples of this was when I bought a crane from a referral from a pile driver friend on the East coast. The used crane has never been down a day since we bought it. I got a check back in the mail several weeks later after delivery as the owner said the trucking cost was not as much as he had quoted me. How many people do you know would do that?

After some PDCA seminars, I had my bucket saved again from possible lawsuits by having vibration testing monitored. After talks on legal problems with unseen underground obstructions, we modified our contracts to address these issues.

One of the ways to extend the audience of the PDPI was to record the basics of dynamic testing. The professors were excited to be able to receive a relatively short video put on by GRL to be able to show their students. I also realized how far reaching this one event is for our industry and it got me thinking what else we should do. It came across very clear to invite local engineering professors and students to DICEP and the joint driven pile conferences. It was a bit late this year to formalize an extended invitation, but I was able to get a student at the last minute to attend DICEP and a professor to attend the driven pile conference. It dawned on me during the meeting that inviting 10 or 20 professors and students within a 100-mile radius would not cost much at all. The meeting halls could easily accommodate them and I am sure the meal sponsors would gladly entertain them. The various PDCA chapters would be a great way to start this program; as most professors and students can't afford to travel far to make these seminars, the chapter in a specific area could contact local universities.

I have been in a number of industry organizations, and none have been as important to my business as PDCA.

Our real customers are engineers. Generally, knocking on their front door to suggest driven piles on a project is too late. Their back door, disseminating pile driving information in the universities, may be a bit slower, but the final outcome will be rewarding. We need to make an industry effort to do this in every venue possible.

We need to continually step back to analyze who our customers are. How can we help them understand our product in the market, explain it to others and show that when the right conditions exist, piles are generally cheaper and faster? Every driven pile is a tested pile, as we all know, and we need to work harder to get that message across.

I recently read something that applies to our industry: "You don't fail when you lose, you fail when you quit." ▼

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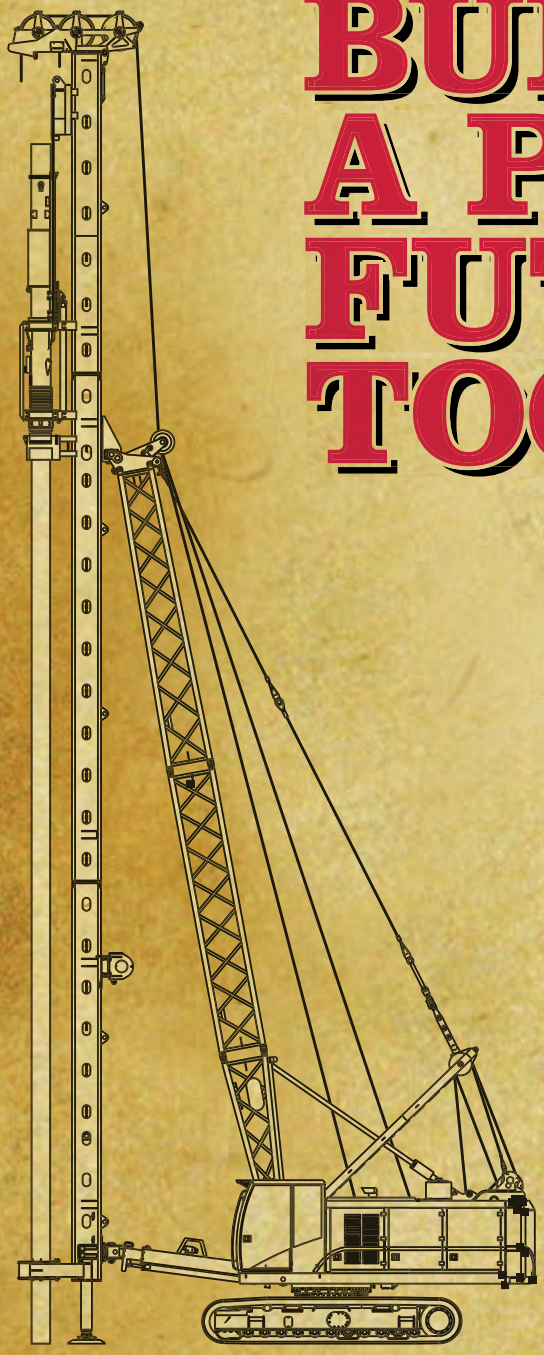

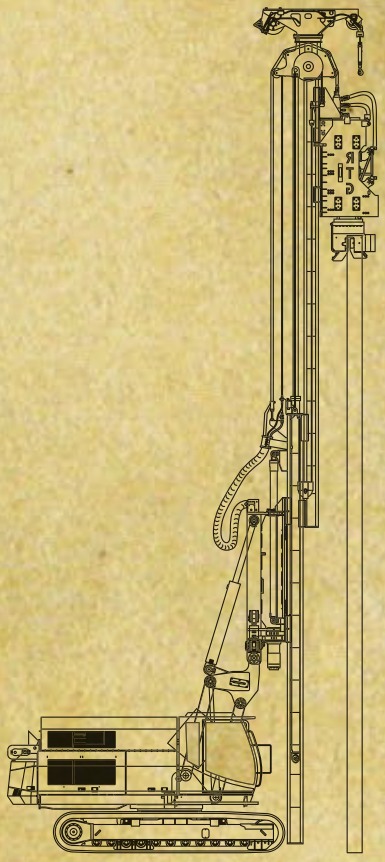

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Ringing in 2014

PDCA is gearing up for another year of success

By Stevan A. Hall, Executive Director, Pile Driving Contractors Association

I want to welcome all of our readers to the first quarter edition of *PileDriver* magazine for 2014. PDCA is extremely proud of our publication and we hope everyone looks forward to the articles that will be presented throughout 2014, as much as we look forward to bringing them to you. The intention of *PileDriver* magazine is to provide a quality publication that focuses on the driven pile industry with articles that you find interesting, informative and, in some cases, educational.

PDCA encourages submission of articles for publication in *PileDriver*. The Communications Committee, which is responsible for the magazine's content, is always looking for articles on your company, projects, technology, equipment and other industry-related topics. If you are interested in submitting an article, contact the PDCA office at 888-311-PDCA (7322) for more information.

As we move into a new year, I want to thank all of our members who provided their support, participation, time and energy throughout 2013. Your involvement in the committees, conferences, seminars and workshops of PDCA is why this organization was so successful in 2013. The continued involvement and support of all members in 2014 will ensure your association's continued progress. I also want to encourage members to get involved. If you are not already involved in the association in some way, you are missing a great opportunity. It would be hard for me to count on two hands and two feet the number of members who have told me that the greatest benefit they got from their investment (dues) in the PDCA came after they got involved. Their ROI did not just come from participating on a committee, although that is a great way to start; they benefited from their membership by attending the various PDCA functions, such as the annual conference, DICEP, educational programs and other PDCA events. Associations are all about networking – building relationships and having a place to go that is an invaluable resource to you and your business. So jump on board in 2014 – all are welcome!

PDCA 18th Annual International Conference & Expo 2014

The PDCA Education and Market Development Committee, along with staff and help from our local St. Louis, Mo. members, are working hard to assemble an exceptional annual conference for 2014, which is will be held in The Gateway City – St. Louis, Mo. The PDCA 18th Annual International Conference & Expo 2014 will be held at the Hyatt Regency St. Louis at The Arch, from April 2 to 4, a Wednesday through Friday schedule. This edition of *PileDriver* contains the full conference brochure and Registration Form for your review and consideration. This annual event will feature a General Session lineup of relevant industry-related topics and expert presenters, General Business Meeting with an industry keynote, opening ceremony with an entertaining presentation, industry exhibits, special industry awards, Project of the Year presentations, the Companion's Program and the annual dinner and reception with entertainment.

The annual dinner and reception will feature "Casino Night" as the entertainment, along with some smooth St. Louis jazz. After the reception and a PDCA over-the-top, buffet-style dinner, join your friends and place your bets. Everyone is invited to join in the fun and see what their luck brings as they double down, spin the wheel, count the cards or throw the dice. See how many "PDCA chips" you can collect towards the evening's finale and grand prize.

The 2nd Annual Scholarship Fundraiser will be held at the conference to raise scholarship money for candidates who will seek careers in the foundation industry, either in the construction or engineering professions. This year's event will be a Sporting Clay Shoot at the St. Louis Skeet and Trap Club. From the novice to the advanced, all are welcomed to join in the fun and raise money for the scholarship fund.

Photographer: Hemera Technologies / Photos.com

Your involvement in the committees, conferences, seminars and workshops of PDCA is why this organization was so successful in 2013. The continued involvement and support of all PDCA members in 2014 will ensure your association's continued progress.

New!: Pre-conference short-course

PDCA will also feature a pre-conference short course, titled "Pile Driving Professionals' Development Course." This entry-level program is being developed for PDCA, with David Sweetin (BAUER-Pileco) taking the lead as Chairman of the course development committee. This is an eight-hour course designed to strengthen the professionalism, knowledge and overall comprehension by exploring critical areas of the pile driving industry through a one-day training seminar. The seminar will be structured to include presentations by industry experts and interactive discussions, which will provide detailed information necessary to achieve a solid foundation of industry skill sets required by entry-level professionals in the pile driving industry to successfully develop in their profession. This course will benefit field personnel, salespersons, engineers and any other personnel entering the profession of pile driving. The cost is low, so businesses can educate their entry-level personnel to ensure they become competent and knowledgeable employees of your companies.

PDCA loses a longtime friend

On a sad note, I am sorry to inform you that our industry has lost one of our most remarkable and well-respected individuals. Mr. John Thomas "Tommy" Parker passed away on Sunday, Oct. 27, 2013. Tommy was the founder of Carolina Dredging Co. and Parker Marine Contracting of Charleston, S.C. Tommy was a special person – loved, admired and respected by all who knew him. It was my privilege to know Mr. Parker; every time I had the honor of shaking his hand or speaking with him, usually at the PDCA of South Carolina Chapter dinner (an event he rarely missed) or occasionally at his office on Braswell Street, I knew that was a special moment spent with a great man. Tommy will leave an empty space in Charleston that cannot be filled. PDCA extends our sympathies and condolences to his son, John, who worked alongside of his father at Parker Marine, and to the other members of the Parker family.

Read more about the life and legacy of a truly wonderful man, starting on page 41. ▼

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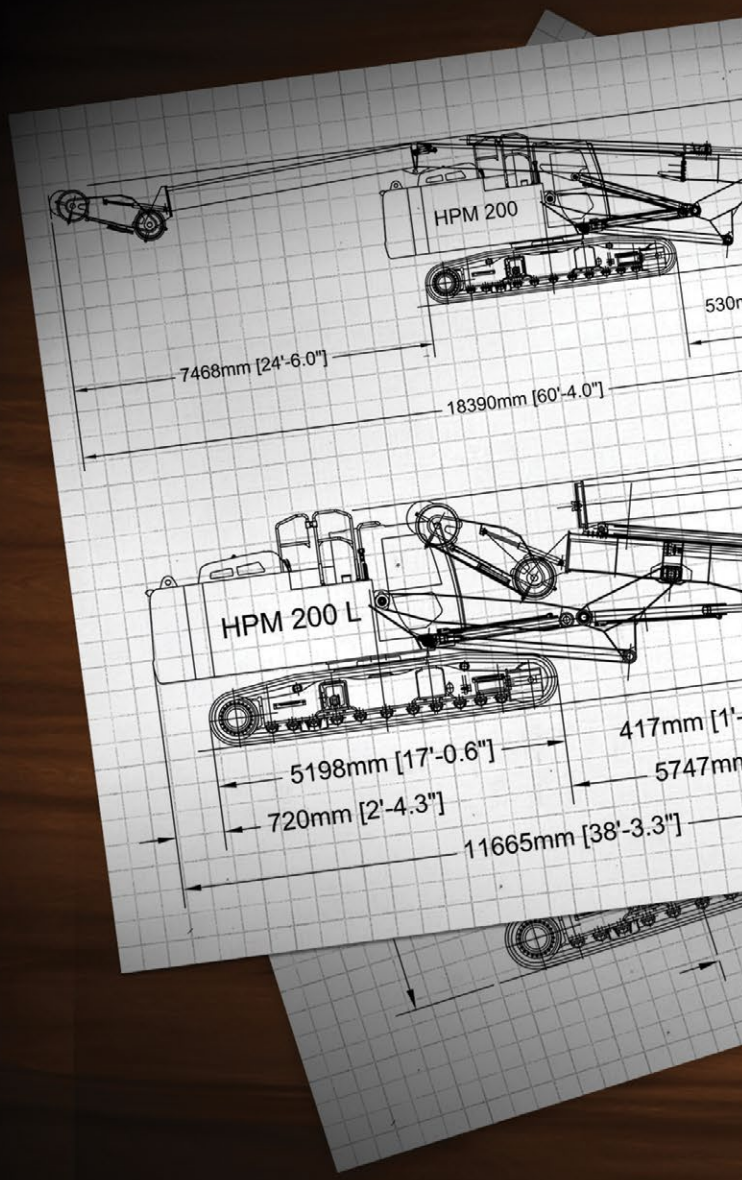

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PDCA
PILE DRIVING CONTRACTORS ASSOCIATION
"A Driven Pile…Is a Tested Pile!"

MEMBERSHIP BENEFITS

The Pile Driving Contractors Association & You

Governance, Board of Directors, Committees and Chapters

PDCA Governance, Committees and Chapters

The PDCA's direction, growth and success is a direct result of an involved membership. The association is directed by a dedicated Executive Committee and Board of Directors, who establish PDCA's short and long-term goals and objectives through a comprehensive Strategic Plan. The Strategic Plan is reviewed and revised each year by the Executive Committee and Board of Directors during the Annual Tactical Meeting.

Implementation of the Strategic Plan Focus and Strategies is a team effort between the Board of Directors, Committees and staff.

Governance

Executive Committee: The Executive Committee consists of the Association's Officers, including the President, Vice President, Secretary, Treasurer and Immediate Past President. The Executive Director serves on the Executive Committee in an Ex-Officio, non-voting capacity.

Board of Directors: The Board of Directors consists of the Association's Officers and nine elected member Directors. Directors can be Contractor, Associate and Engineering Affiliate members.

Committees

PDCA Committees include the following, as well as the function they perform:

Education: Responsible for the development of all educational programs, including annual conference general sessions, seminars and workshops. Responsible for development and maintenance of relations with educational institutions. Responsible for promoting driven pile research and technical papers and the presentation of such information at appropriate venues.

Technical: Responsible for technical information and applications impacting the driven pile and deep foundations industry. Responsible for developing and maintaining relations with public and private entities involved in issues impacting driven pile or deep foundations. Responsible for developing and maintaining PDCA-produced design and installation specification documents.

Communications: Responsible for establishing editorial guidelines, acquisition, assembly and review of all editorial content of *PileDriver* magazine, annual directory and calendar. Responsible for the functionality of the PDCA website and distribution of the PDCA E-Letter.

Membership: Responsible for membership development and member retention and issues impacting the continued growth of the association.

Market Development: Responsible for promoting the different pile types and monitoring trends in the market. Responsible for site selection of the annual conference sites, assembly of social programs for the annual conference and promotion of conferences.

Safety: Responsible for the dissemination of information relevant to safe work practices. Responsible for monitoring and reviewing regulations and legislation impacting the driven pile industry.

Environmental: Responsible for environmental issues related to pile driving, including, but not limited to, noise, vibration, biofuels, brownfield sites and marine life.

PDCA members are encouraged to participate on one or more committees. Participation is voluntary, but committee members are encouraged to participate on a consistent basis.

Those members desiring to serve the association at the Executive Committee and/or Board of Director levels are offered the opportunity as existing members rotate off.

PDCA Chapters

The PDCA encourages the formation of local PDCA Chapters. Local chapters provide regional representation and advocacy for the driven pile industry and those companies doing business within the chapter's jurisdiction.

Chapters also provide an opportunity for its members to network through business meetings, educational programs and social activities.

Current PDCA Chapters include Northeast, Mid-Atlantic, South Carolina, Florida, Gulf Coast and Pacific Coast. As of 2012, Texas is organizing a state chapter.

Education and Networking

PDCA Education: Conferences, Seminars and Workshops

The PDCA offers relevant, topical and cutting-edge educational programs throughout the year.

Annual Conference: The PDCA Annual Conference is held each year, generally in April. This internationally-recognized conference provides a forum for experts from industry, private business, government and academia to discuss key trends and issues within the driven pile industry with those who rely on information and technology to improve their business.

Design and Installation of Cost-Efficient Piles (DICEP): Held each fall since 2000, this exclusive PDCA program presents modern approaches to maximize

Efficiency, Effectiveness and Economy (E_3) of driven piles through a series of engineering focused presentations. DICEP is designed primarily for geotechnical, structural and civil engineers, but presents relevant information for contractors and other firms or individuals who support, conduct business or are associated with the deep foundations, earth retention and/or the driven pile industry.

Professors' Driven Pile Institute (PDPI): This intensive week-long program is designed to instruct engineering educators in all aspects of driven pile installation, design and quality control. This program blends practical, real world construction knowledge with academics. The PDPI has been attended by more than 150 university and college representatives who teach driven pile applications in an academic environment. The program is held at Utah State University every other year and is funded 100 percent by the PDCA and its members.

Deep Foundation Testing and Analysis Seminar and Workshops: The PDCA, in collaboration with Pile Dynamics, Inc. conducts several Deep Foundation Dynamic Testing and Analysis seminars and workshops annually. Each seminar or workshop generally includes information on deep foundation integrity testing, wave equation analysis (GRLWEAP), high strain dynamic foundation testing (PDA and CAPWAP). This course is designed primarily for individuals involved in the design, construction and specification of deep foundations; as well as PDA and CAPWAP users, foundation testing professionals, professors and students already familiar with the basic concepts of deep foundation dynamic testing and analysis.

The PDCA also provides the Dynamic Measurement and Analysis Proficiency Test designed to reflect the user's level of knowledge and ability, which is then indicated in a "Certificate of Proficiency." Individuals who qualify to support dynamic measurement and analysis testing are listed on the PDCA website as a reference for end-users.

Pile Driving Inspectors Course: This one-day course is designed for those who inspect pile-driving operations during construction of foundations and major structures. The course presents information on the inspector's role, hammers and installation equipment, pile types, contractor's submittal and review process, establishing PD criteria, record-keeping and monitoring and common problems. This program is supplemented by state DOT personnel and their local practices in the state in which the program is offered.

Dynamic and Static Pile Load Test Options: This one-day course discusses the benefits of a well thought out, quality load test program to provide an overall economic advantage and provide data to maximize the efficiency and effectiveness of a pile load test schedule. The seminar concludes with presentations by manufacturers of the various dynamic and static pile load testing options available in today's industry.

Driven Pile Load Resistant Factor Design (LRFD) Design and Construction Workshop: The application of the Load Resistant Factor Design (LRFD) platform is now required for use by bridge and structure designers using federal funding. This policy requirement applies to all surface transportation features including bridges, tunnels, earth retaining structures and miscellaneous ancillary structural features. The goal of this workshop is to improve and enhance the competiveness of driven piles by communicating and demonstrating the correct and appropriate application of the current (5th Edition) AASHTO LRFD design and construction specifications for structural and geotechnical limit states.

Joint seminars and cooperative support: PDCA works with other organizations such as the Edmonton Geotechnical Society, the Calgary Geotechnical Society, the GeoInstitute of American Society of Civil Engineers, DFI and ADSC.

Communications, Business Networking and Client Development

Communications

***PileDriver* Magazine:** Produced on a quarterly basis and distributed to over 3,000 subscribers, the magazine provides current industry trends, the latest in technology, case histories and legal topics relevant to the pile driving industry. *PileDriver* also features member "Company Profiles" and company completed projects through "Project Spotlights". The PDCA encourages article submissions and is always at no cost to the author.

www.piledrivers.org: The PDCA website is an expansive resource to anyone seeking information about the PDCA, PDCA members or the pile driving industry in general. The site includes information on the benefits of driven pile, membership (new and renewals), advertising, leadership and committees, chapters, events, publications, gallery, reference links, news and the PDCA Store. Visitors to the site can search for member companies or services and products by State or Region; visitors can also download data on Noise and Vibration and the PDCA Installation Specification for Driven Pile (PDCA Specification 103-07 – Private Work).

E-Letter: The PDCA distributes an electronic newsletter on a monthly basis. The E-Letter is designed to keep you up-to-date on all PDCA upcoming activities and events. It also includes a "Members On the Move" section that reports "press release" type information on PDCA member companies.

Membership Directory: Produced annually, the Membership Directory provides a listing of all PDCA member companies, including the company name, main and optional employee contacts, address, phone, fax, email, website and a description of work performed by the company. Companies can also elect to have their logos included with their company information.

Calendar: Produced annually and distributed in November with pages from December to December, the calendar lists all upcoming PDCA activities that have been scheduled at the time of printing.

Business Networking and Client Development

Membership in the PDCA offers numerous opportunities to conduct business networking and client development at every conference, educational program, committee meeting and social function with individuals who share a common interest – pile driving and the pile driving industry. Networking opportunities exist not only between PDCA member-to-member, but also relationships developed between PDCA and public agencies, such as FHWA, AASHTO, Corps of Engineers and State DOTs. The PDCA also maintains liaisons with other industry associations, working with them on issues of mutual concern.

Whether it is member-to-member or member-to-guest, through conferences, educational programs or committee participation, the opportunity to develop new client relationships is ever-present. The chance to strengthen relationships with old clients or just re-connect with old friends is also part of the PDCA experience. ▼

THE PILE DRIVING CONTRACTORS ASSOCIATION
2014 MEMBERSHIP APPLICATION

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Step 1: Company Information

Company Name: _____

Contact Name: _____

Address: _____

City: _____ State / Province: _____

Zip / Postal Code: _____ Country: _____

Phone: _____ Fax: _____

Company Website: _____ Contact Email: _____

Step 2: Select Membership Type - *Check the box that corresponds to your "Membership Type".*

Contractor Member – General or Specialty contractor who commonly installs driven piles for foundations and earth retentions systems.

- ❑ **Contractor I Member Company** – Annual volume > $ 2 million **$850.00**
- ❑ **Contractor II Member Company** – Annual volume < $ 2 million **$425.00**

Associate Member – Firms engaged in the manufacture and/or supply of equipment, materials, or services to PDCA members or the pile driving industry in general.

- ❑ **Associate I Member Company** – Annual volume > $ 2 million **$850.00**
- ❑ **Associate II Member Company** – Annual volume < $ 2 million **$425.00**
- ❑ **Local Associate Member Company** – **$100.00**
  Small Company desiring membership in a single local chapter. A firm that only serves the chapter's geographical area and whose interest is to support the local chapter. Membership must be approved by the PDCA Executive Committee

Engineering Affiliate – Any Engineering company or individual (Structural, Geotechnical, Civil, etc.) involved in the design, consulting, or other engineering aspect associated with driven piles, deep foundations or earth retention systems.

- ❑ **Engineering Affiliate** – *1-5 Offices or an Individual* **$100.00**
  Engineering Affiliates may list up to 5 individuals per office at no additional charge.
- ❑ **Engineering Affiliate** – *6-11 Offices* **$90.00**
  Engineering Affiliates may list up to 5 individuals per office at no additional charge.
- ❑ **Engineering Affiliate** – *12+ Offices* **$80.00**
  Engineering Affiliates may list up to 5 individuals per office at no additional charge.

Individual Member – **$50.00**
Any individual employed full-time by an university or college and teaching Undergraduate or Graduate courses in engineering; or an individual employed full-time by a Government entity.

Retired Industry Member – **$50.00**
Any retired individual who has left active employment and wishes to remain a member. This is a non-voting membership category.

Student Member – **$20.00**
Full-time student enrolled in a Bachelor, Master or Doctoral degree program in construction or engineering at an university or college.

Affiliate Labor Organization Member – **$100.00**
Concerned with pile driving for the purpose of gathering and sharing information. This is a non-voting membership category. Must be approved by the PDCA Executive Committee.

Step 3: Membership Options

❑ **Professors' Driven Pile Institute Contribution** – **$200.00**
Through the PDPI (Professors' Driven Pile Institute), the PDCA provides the nation's leading engineering professors with the expertise to teach engineering students about driven pile advantages. Without question, this program is the standard by which all "teach the teacher" programs are judged and is the best way to ensure the continued progress and strength of our industry for the coming years. The PDCA funds virtually all expenses for the professors, which means a program such as the PDPI is expensive to conduct, but worth every dollar invested. This is a WIN/WIN program. 100% of your contribution goes to help fund this important industry program.

❑ **Optional Employee/Office: Associate & Contractor Members Only (Per Office/Employee Listing)** – **$100.00**
All optional employees/offices receive all of the benefits and services provided to the main contact, including a listing in the annual directory and website.

❑ **Premium Upgrade** – **$225.00**
Your Company Logo and Website linked from your PDCA website Company Profile listing.

❑ **Company Logo on Website Profile** – **$25.00**

Perforated for easy removal.

Step 4: Member Information - *Check only the services/products under the Membership type for which you are applying.*

Contractor Members – check all services that your company provides:

- ❒ Bridge Buildings
- ❒ Bulkheads
- ❒ Deep Dynamic Compaction
- ❒ Deep Excavation
- ❒ Docks and Wharves
- ❒ Earth Retention
- ❒ General Contracting
- ❒ Highway and Heavy Civil
- ❒ Marine
- ❒ Pile Driving
- ❒ List Other Services:

Associate Members – check all products and/or services that your company provides:

- ❒ Air Compressors & Pumps
- ❒ Coatings & Chemicals
- ❒ Consulting
- ❒ Cushions, Hammer
- ❒ Cushions, Pile
- ❒ Cutter Heads & Drill Bits
- ❒ Design
- ❒ Dock & Marine Supplies
- ❒ Drilling Equipment & Supplies
- ❒ Drive Caps & Inserts
- ❒ Equipment Rental
- ❒ Equipment Sales
- ❒ Freight Brokerage
- ❒ Hoses & Fittings
- ❒ Hydraulic Power Packs
- ❒ Leads & Spotters
- ❒ Lubricants & Grease
- ❒ Marine Drayage
- ❒ Marine Equipment
- ❒ Materials Testing
- ❒ Other Structural Materials
- ❒ Pile Hammers
- ❒ Pile Monitoring
- ❒ Pile Points & Splices
- ❒ Piles, Composite
- ❒ Piles, Concrete
- ❒ Piles, Steel H List
- ❒ Piles, Steel Pipe
- ❒ Piles, Synthetic Material
- ❒ Piles, Timber
- ❒ Rigging Supplies
- ❒ Safety Equipment
- ❒ Sheet Piles, Aluminum
- ❒ Sheet Piles, Steel
- ❒ Sheet Piles, Vinyl
- ❒ Structural Steel
- ❒ Surveying
- ❒ Testing
- ❒ Trucking
- ❒ Vibration Monitoring
- ❒ Other Services:

Engineering Affiliate – check all products and/or services that your company provides:

- ❒ Analysis
- ❒ Civil
- ❒ Consulting
- ❒ Geotechnical
- ❒ Surveys
- ❒ Structural
- ❒ List Other Services:

Step 5: Geographic Areas Where Services and Products Are Available – *(Check all that apply)*

❒ All States	❒ AK	❒ AL	❒ AR	❒ AZ	❒ CA	❒ CO	❒ CT	❒ DC
❒ DE	❒ FL	❒ GA	❒ HI	❒ IA	❒ ID	❒ IL	❒ IN	❒ KS
❒ KY	❒ LA	❒ MA	❒ MD	❒ ME	❒ MI	❒ MN	❒ MO	❒ MS
❒ MT	❒ NC	❒ ND	❒ NE	❒ NH	❒ NJ	❒ NM	❒ NV	❒ NY
❒ OH	❒ OK	❒ OR	❒ PA	❒ RI	❒ SC	❒ SD	❒ TN	❒ TX
❒ UT	❒ VA	❒ VT	❒ WA	❒ WI	❒ WV	❒ WY	❒ Canada	❒ Mexico
❒ South America		❒ Europe	❒ Asia	❒ Other				

Step 6: Payment

Membership Type	$ _____
PDPI Contribution	$ _____
Optional Employee/Office	$ _____
Membership Upgrades	$ _____
TOTAL:	**$** _____

Type of Payment

I am making payment in full by: ❒ Check ❒ Visa ❒ MasterCard ❒ American Express ❒ Discover

Card Number: _____ Expiration Date: _____

Name on Card: _____ CVV Code: _____

Statement Billing Address: _____

Signature: _____

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Did You Know?

Wave Equation Analysis Programs

End of initial drive vs. re-strike after seven days

By Bill Marczewski, P.E., M.ASCE, BSM Engineering, Inc.

Basic soil mechanics and porewater pressure

A basic discussion of soil mechanics with an emphasis on granular non-cohesive soil would have you recall that individual soil particles in contact with each other can only transfer shear forces from one adjacent soil particle to another. This relationship is generally shown as a graphical depiction at the micro-soil structure level (see Figure 1). The space between adjacent soil particles is referred to as the "void" area and is comprised of air when no ground water is present, only water when fully saturated and air and water in intermediate zones. When water is present in these voids, or in the "pores" of the soil structure we need to consider these porewater pressure changes during pile driving operations in order to better understand our onsite pile monitoring observations. An increase in porewater pressure is generally associated with a decrease in available soil skin friction or shaft resistance.

Pile installation and porewater pressure

During pile driving operations, using both vibratory and impact hammers, the soil adjacent to the pile is disturbed within the local region of the pile being driven. This disturbance causes the porewater pressure between the soil particles to increase, and consequently results in a decrease in the available skin friction to resist pile penetration during installation. When pile driving operations have stopped at the End of Initial Driving (EOID), the porewater pressure in the soil attempts to restore itself to the pre-driving, or at-rest, condition. This dissipation of the porewater pressure is the basis behind "soil setup" or otherwise known as "pile freeze" and can be exceptionally noticeable during initial driving and restrike comparisons.

The time it takes for the soil to fully recover from pile driving operations, or for the porewater pressure to significantly dissipate, is often thought to be around seven days, but may be as short as one hour or as long as one year depending on the actual pile and soil conditions. Many of these changes in the soil porewater pressure during pile driving have been observed by piling contractors and pile monitoring inspectors for years. The value of these observations, accurately documented in the pile installation logs, should be used to establish a baseline of the pile installation effort that will lead to pile capacity determination. By accurately reporting the details associated with the pile installation effort, a competitive edge will be gained by those obtaining clarity in this simple, but often confusing subject of porewater pressure changes.

EOID versus Beginning of Restrike (BOR)

EOID is often associated with an increase in porewater pressure and a decrease in available skin friction to resist pile penetration during initial installation. The loss of

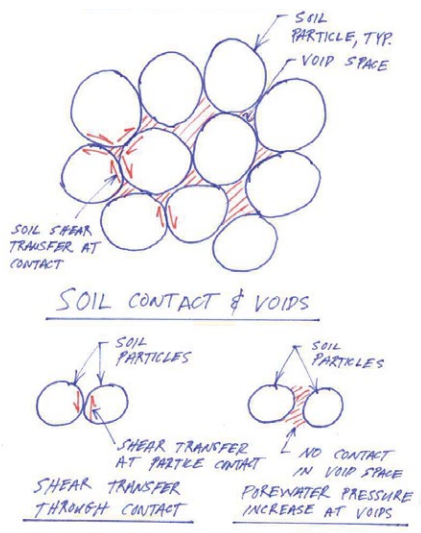

Figure 1 courtesy of Bill Marczewski

resistance along the pile shaft eases the installation effort, but is often associated with not achieving the required ultimate axial pile capacity. This condition, while common as it may be, is not an accurate representation of the available soil resistance or ultimate pile capacity available. The maximum soil skin resistance available should be determined when the porewater pressure in the soil has dissipated. With the exception of very fine-grained soils, this happens approximately seven to 10 days after EOID. Additional capacity increases can be observed beyond this time frame, but are not practical with respect to the project construction schedule.

Accurate pile installation records are paramount for an accurate determination of the final ultimate axial pile capacity. Termination of pile driving for equipment breakdowns, pile splices, shift changes, etc. should be clearly noted in the monitoring logs as well as the time associated with allowing the pile to sit undisturbed until initial pile driving is complete. For long piles driven to depths beyond 100 feet, in order to meet minimum embedment criteria, the effect of porewater pressure and driving delays associated with pile splices, or stops in driving, should be carefully considered.

Piles driven to a minimum embedment depth without achieving the required ultimate pile capacity is a common observed installation condition, and to some degree, this condition should be expected. Such pile installation conditions warrant the need for the contractor to at least restrike a sample of these piles at varying time intervals after EOID. The time intervals between restrikes should be a function of the prevailing soil types and must be accurately reported. Since long waiting times are often associated with additional cost for the contractor, either experience or a series of tests at various time intervals will help deter-

mine an optimal waiting time. For granular soils such as sands, a restrike after a few hours or the following day may be all that is needed, particularly since the regain of soil resistance is relatively insignificant in coarse-grained soils. In fine-grained soils, which may develop very high relative capacity gains, restrikes should be done at exponentially increasing intervals such as one hour, one day and one week. In extreme cases, significant additional gains may be realized even after several weeks. Of course, in such a case, the test program may be more economically performed separate from the actual construction project. When several restrike tests are planned, care should be taken to only drive the piles a very limited distance (e.g., three inches) during testing to prevent excessive loss of the already achieved setup gains.

Wave equation analysis programs and predicted capacities

It should be understood that the observed axial capacity at the EOID will not, and should not, match the predicted capacity of a wave equation analysis that utilizes soil setup resistance models having time intervals greater than zero. A time interval of zero is the same as the EOID condition. When using the proprietary computer software program GRLWEAP™, produced by Pile Dynamics, Inc., as used in our office, it is important to recognize that these wave equation analyses are produced using both a full loss of resistance (gain/loss factor = 1/(soil setup factor)) and no loss of resistance (gain/loss factor = 1.0). In more complicated cases in which waiting times during driving interruptions are to be considered, a default time interval for the calculation of partial or full setup gains of 168 hours (seven days) may be sufficiently accurate to predict the blow count as a function of depth. In any event, it is recommended to perform multiple wave equation analyses using different assumptions of setup factors to create upper and lower bound predictions of blow counts and EOID bearing capacities.

Wave equation analysis predictions should be compared against actual driving conditions to validate their usefulness in pile capacity prediction. A wave equation analysis is a powerful tool to support driven pile installation projects. When combined with high strain dynamic testing using a Pile Driving Analyzer® (PDA) to verify hammer performance and soil resistance, this can lead to exceptionally efficient pile installation projects. ▼

About the author

Bill Marczewski, PE, M.ASCE is the founding principal of BSM Engineering, Inc., a specialty engineering consulting firm in Oregon providing technical and professional services to the heavy civil/marine construction community. PDCA members are welcome to contact the author at bill@bsmengineering.com or directly at 503-325-8065 if you have any questions or would like to further discuss this subject.

Marczewski would like to acknowledge and thank both Dr. Frank Rausche, Ph.D., P.E. with Pile Dynamics, Inc. and Mr. Van Komurka, P.E., D.GE with Wagner Komurka Geotechnical Group, Inc. for their review and comment on the technical accuracy of this article.

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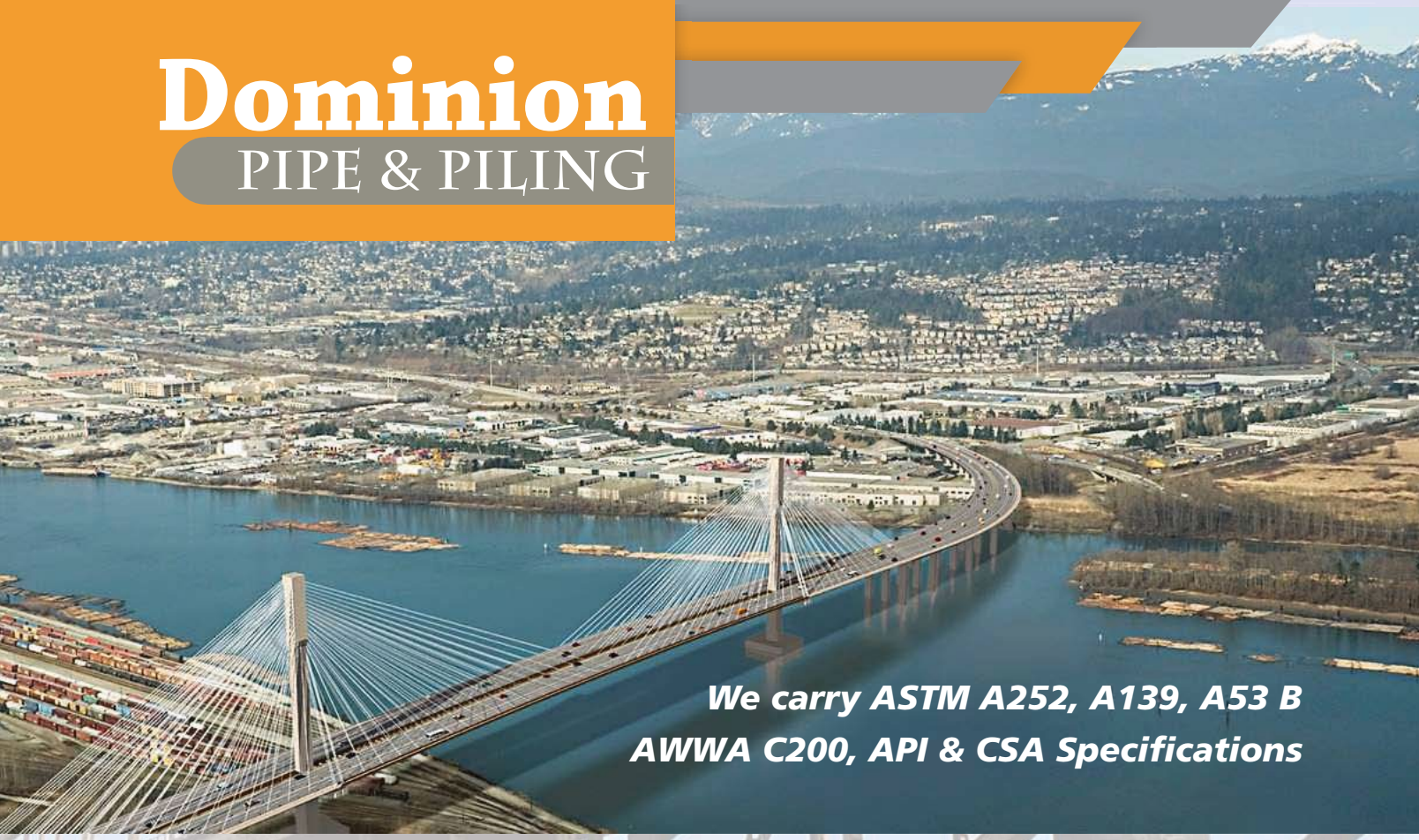

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New **PDCA Members**

The following is a complete list of all members who have joined PDCA in the last quarter*. The association welcomes everyone on the list!

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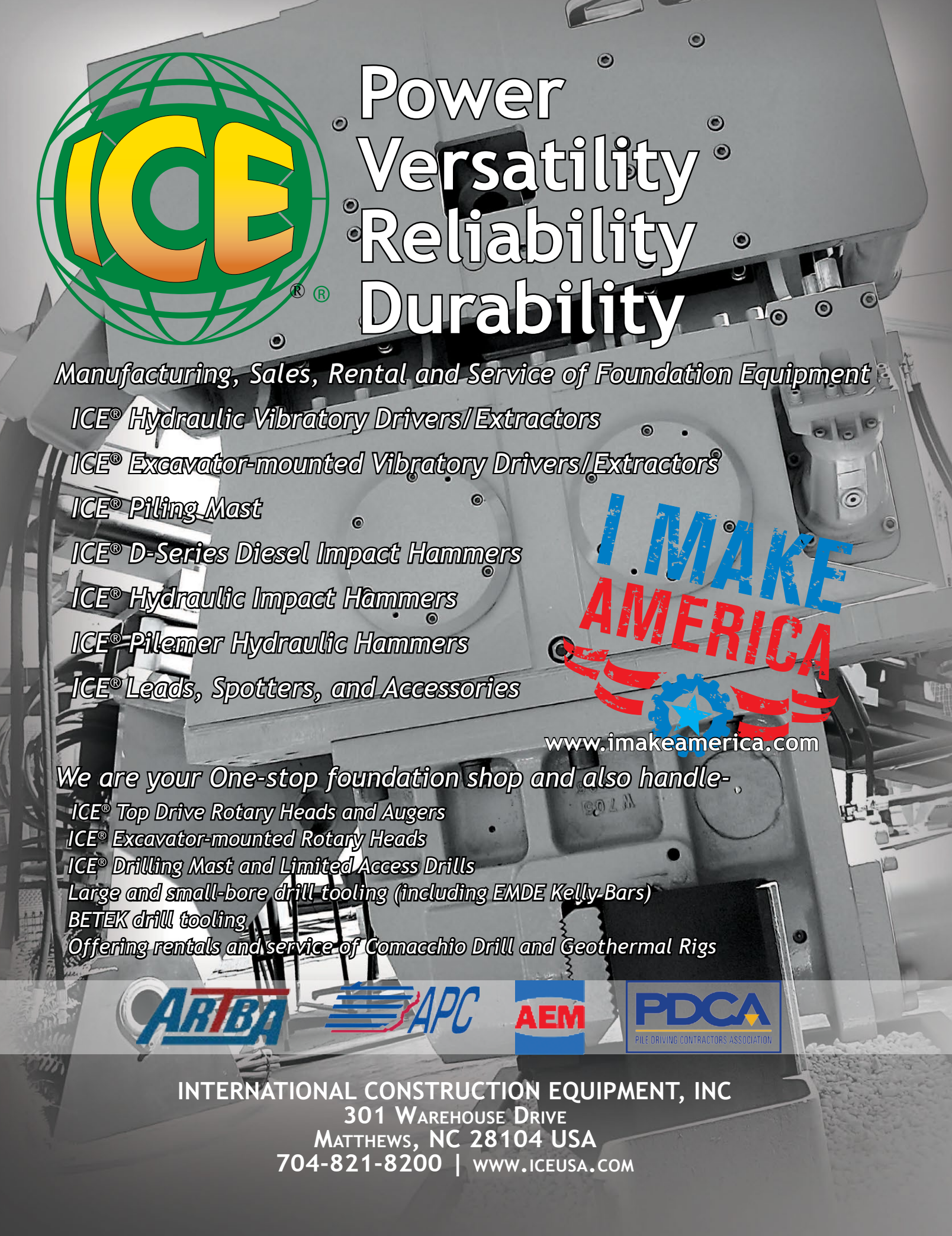

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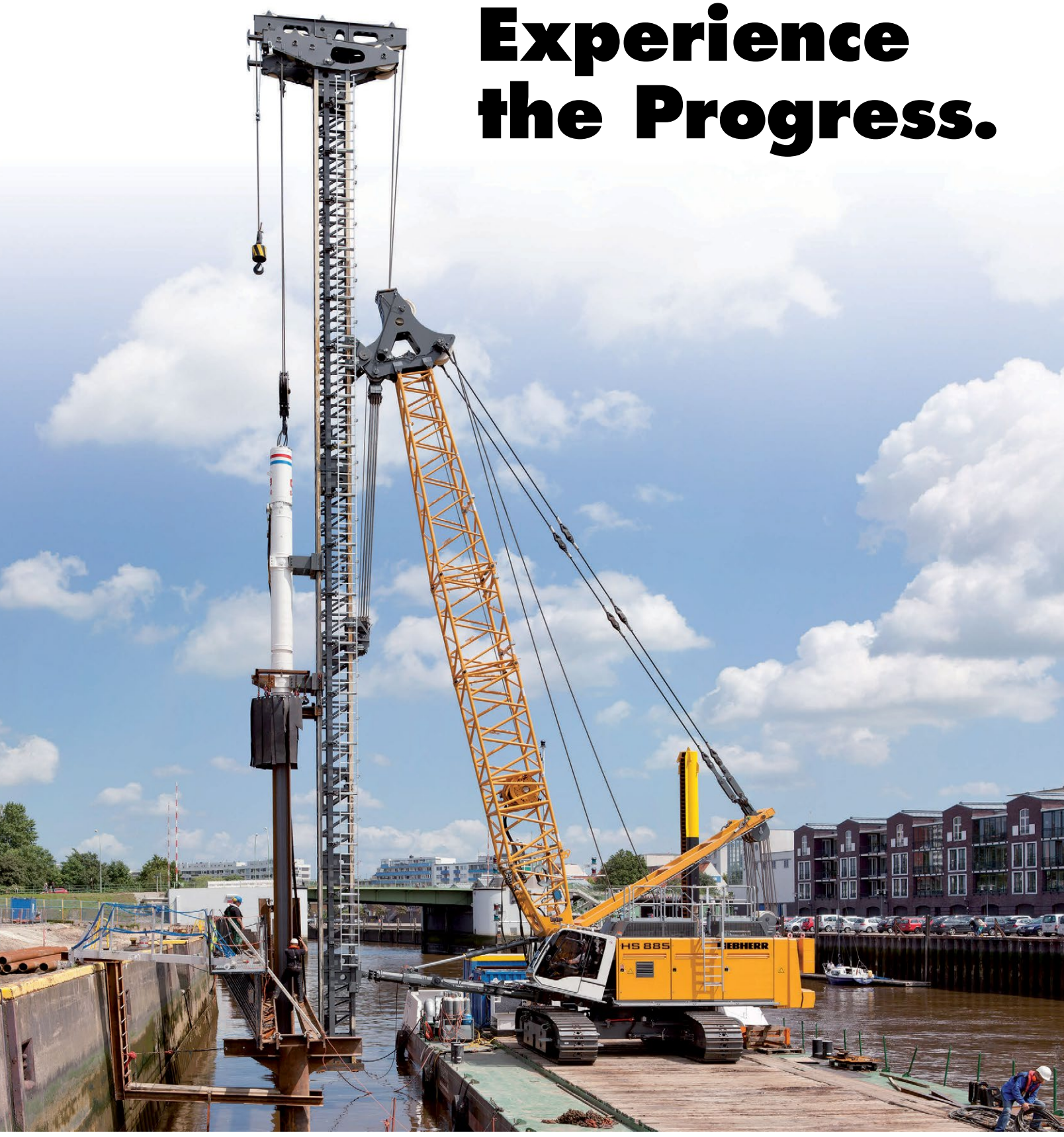

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PDCA Member News

▼ D800-12 PILECO DIESEL HAMMER OFFERS MONUMENTAL RESULTS

It isn't often that something old is better than something new – at least when it comes to technology. However, with the D800-12 Pileco diesel hammer, the old technology combined with a whole new approach is proving to be a winner.

Dubbed the largest of its kind in the world, PDCA member BAUER-Pileco's new D800-12 diesel hammer is capable of delivering monumental results in the pile driving industry.

"It is a sight to behold," said David Sweetin, BAUER-Pileco's director of the Hammer and Rammtechnik GmbH (RTG) business unit in Houston, Texas. "At a length of 34.2 feet and with a width of just over eight feet, it delivers an amazing 1.9 million pounds of foot energy per blow, with 45 blows per minute. It's in a class all on its own!"

Weighing in at 129 tons, the D800-12 drives a 176,000-pound piston consistently and, at a fraction of the cost of a hydraulic hammer in the same field, it will out-perform and outlast the competition.

Pileco – with its nearly 50 years of experience in service, rentals and technical support for a fleet of products including pile driving equipment, piling tool manufacturing, diesel hammers, hydraulic hammers, vibratory hammers and lead systems – had literally "cut its teeth" in the marine pile driving industry with conductor piling.

"It was an area of pile driving that was second nature to Pileco employees and their product line development," explained Sweetin. "However, somewhere along the way more and more jobs seem to be inland and, therefore, reduced marine applications. Pileco never completely stopped the marine aspect and was eager to return with full throttle."

And because BAUER-Pileco's market is global (BAUER-Pileco joined forces in 2005), it has been paying attention to the growth in offshore wind energy. The company's desire to be part of the renewable energy market is what has pushed it to develop a hammer that was suitable for installation of the offshore monopile.

"Subsequently, we have had major involvement with some of the key developers within this area," added Sweetin.

Manufactured at BAUER-Pileco's plant in China, the D800-12 is a result of many years of thought, preparation, research and development.

"Our manufacturing plant has worked endlessly to roll out a product for us that will be utilized for many years to come, especially for larger piles as the industry continues to demand bigger and better applications," said Sweetin.

Following initial technology testing, BAUER-Pileco determined that the D800-12 could be improved further with slight

On a site trip to China in October 2013. Third from left: Mike Burke, Pileco sales director; fourth from left: David Sweetin, director of business unit; fifth from left: Dan Dragone, board member/CEO, Pileco; with plant administrators from China.
Courtesy of BAUER-Pileco

modifications. Subsequently, the hammer was sent back to the design table for a few adjustments that would prove to hit the mark. Placed back into operation, it has worked endlessly without fail and was recently accepted on a job in China.

"We are looking forward to a successful completion," added Sweetin. "In an effort to become more competitive and to show our resolve of this product, BAUER-Pileco is looking forward to being the only hammer with a marine certification from Germanischer Lloyd (GL), the world-renowned maritime group for technical and safety supervisory recognition."

▼ PDCA SAFETY COMMITTEE UPDATE

The PDCA Safety Committee continues to work on the development of Toolbox Safety Talk booklets. The committee has discussed the content of the booklets as well as sponsorship, printing and distribution. The booklets will be roughly four inches by eight-and-a-half inches and made of durable material to withstand continuous use.

Safety topics listed in the booklets include Cranes, Rigging & Signaling, Overhead Power Lines, Marine Construction, Fall Protection and more. Several generous sponsors stepped forward to allow the committee to proceed with printing and distribution of the booklets to our various chapters. The chapters will distribute the booklets among their members so that they can be utilized as needed.

The Safety Committee also contributed to the new Pile Driving Professionals' Development Course that is currently being developed. The Professionals' Development Course, as currently configured, will provide an overview of the driven pile industry to those new to the industry. The Safety Committee prepared course content for the safety portion of the program. Course content for this program will be reviewed by the Education Committee and the Pile Driving Professionals' Development Course will be offered on April 1, 2014 as an eight-hour pre-conference short course at the upcoming PDCA 18th Annual International Conference & Expo 2014. For more information, flip to page 67 of this issue of *PileDriver*.

▼ CORRECTIONS

2013-14 PDCA Membership Directory correction

In the 2013-14 PDCA Membership Directory, the fax number for BSM Engineering was listed incorrectly. Please update your directories to list the correct fax number as 503-325-8061.

The listing also excluded several offered services from BSM Engineering. Please update your directories to include Geotechnical, Testing and Pile Monitoring services.

We regret the errors. ▼

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2014 PDCA Calendar of Events

Mark your calendars with the dates of PDCA's events throughout the year

Note: All meetings, dates and times listed in this calendar are subject to change. Please find updates on the PDCA website, www.piledrivers.org, or call the PDCA office at 888-311-PDCA (7322).

JANUARY 2014

15	PDCA Executive Committee Meeting	
17	PDCA Project of the Year Entry Deadline	
17	PDCA of SC Chapter Oyster Roast	Charleston, SC
22-24	PDCA Board of Directors Tactical Meeting	New Orleans, LA

FEBRUARY 2014

26	PDCA Executive Committee Meeting	

MARCH 2014

4	PDCA of SC Chapter Dinner Meeting	Charleston, SC
12-14	Deep Foundation Dynamic Testing and Analysis Workshop	Orlando, FL
27	PDCA of SC Chapter Driven Pile Seminar	Charleston, SC

APRIL 2014

1	PDCA Executive Committee Meeting	St. Louis, MO
2	PDCA Board of Directors Meeting	St. Louis, MO
2	Pile Driving Professionals' Development Course	St. Louis, MO
2-4	18th Annual International Conference & Expo 2014	St. Louis, MO

MAY 2014

28	PDCA Executive Committee Meeting	

JUNE 2014

3	PDCA of SC Chapter Dinner Meeting	Charleston, SC
5	Pile Driving Inspectors Course	Pacific Northwest
25	PDCA Executive Committee Meeting	

JULY 2014

9	PDCA Board of Directors Meeting	
30	PDCA Executive Committee Meeting	

AUGUST 2014

21	Pile Load Testing Options Course	Sacramento, CA
26	PDCA of SC Chapter Dinner Meeting	Charleston, SC
27	PDCA Executive Committee Meeting	

SEPTEMBER 2014

17-19	Deep Foundation Dynamic Testing and Analysis Workshop	Cleveland, OH

OCTOBER 2014

1	PDCA Executive Committee Meeting	
8	PDCA Board of Directors Meeting	Northeastern U.S.
9	15th Annual Design and Installation of Cost-Efficient Piles	Northeastern U.S.

NOVEMBER 2014

5	PDCA Executive Committee Meeting	

DECEMBER 2014

2	PDCA of SC Chapter Dinner Meeting	Charleston, SC
3	PDCA Executive Committee Meeting	
5	PDCA of the Pacific Coast Chapter Annual Luncheon	Richmond, CA
10	PDCA Board of Directors Meeting	

▼

Remembering Tommy Parker

The life and legacy of a truly great man

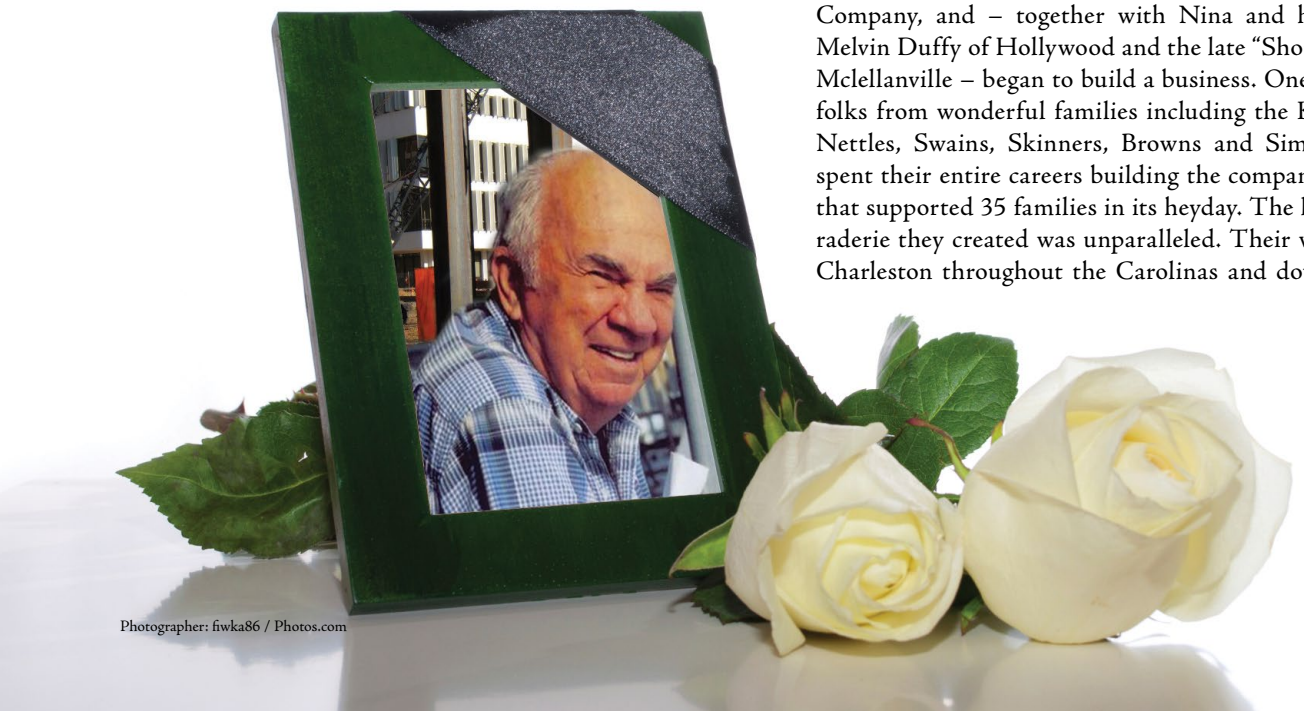
John Thomas "Tommy" Parker, 90, of Charleston, S.C., widower of Nina Kent Parker, entered into eternal rest Sunday, Oct. 27, 2013. His funeral service was held on Oct. 31.

Tommy was born June 27, 1923, in Charleston, S.C., a son of the late Julius S. Parker and May Lawson Parker. He was the founder of Carolina Dredging Company and Parker Marine Contracting. Tommy served as the local, regional and national president of the American Sub-Contractors Association. He was a Merchant Marine World War II veteran, a charter member of the Charleston Yacht Club and an avid private pilot. Tommy loved Charleston so much that he never lived more than five miles from where he was born.

A graduate of the Murray Vocational School in 1941, Tommy grew up with his mother and sister during the Great Depression in Charleston. He lived on Vanderhorst Street, Queen Street and Ashley Avenue as a boy. He began working at the *News and Courier* and *Evening Post* as a young man, delivering papers south of Broad and stuffing newspapers on the weekends to help his family pay bills. He was proud of his service in the Merchant Marines during World War II, an adventure that took him to Russia, Italy and Turkey as he aided the Allies in defense of freedom. Tommy was a great patriot whose love of South Carolina and the United States were unwavering throughout his years.

In the mid-1940s during a brief stop in New York City, a handsome young Tommy met the one and only love of his life – a beautiful young woman named Nina Othello Kent who had ventured far from her rural Georgia home to seek a career as a model as she worked as a scheduler for CBS radio. The reluctant pair met at the USO, where they were pushed together by friends and spent the evening dancing to Tommy Dorsey and Glenn Miller tunes. The two spent the next few years avidly corresponding mainly by mail until they decided to get married.

The pair set up house in Riverland Terrace and Tommy worked as the manager of the Charleston City Marina while doing side jobs, including dock building. In the early 1950s, Tommy created his own company called Carolina Dredging Company, and – together with Nina and his great friends, Melvin Duffy of Hollywood and the late "Shorty" Manigault of Mclellanville – began to build a business. One by one, he hired folks from wonderful families including the Knights, Mullins, Nettles, Swains, Skinners, Browns and Simmons, who have spent their entire careers building the company into a business that supported 35 families in its heyday. The loyalty and camaraderie they created was unparalleled. Their work spread from Charleston throughout the Carolinas and down into Georgia.



Photographer: fiwka86 / Photos.com

Bridges, docks, military installations including all of the submarine piers in the Naval Weapons Station, pipelines, power lines, TV towers and uncounted projects for the Medical University, Roper St. Francis, the Citadel and the College of Charleston. Though not a college graduate, one of Tommy's proudest achievements was the work his company performed during the construction of Littlejohn Coliseum in Clemson. Tommy was a lifelong supporter of IPTAY and a frequent attendee at Clemson home and away football games supporting his beloved Tigers.

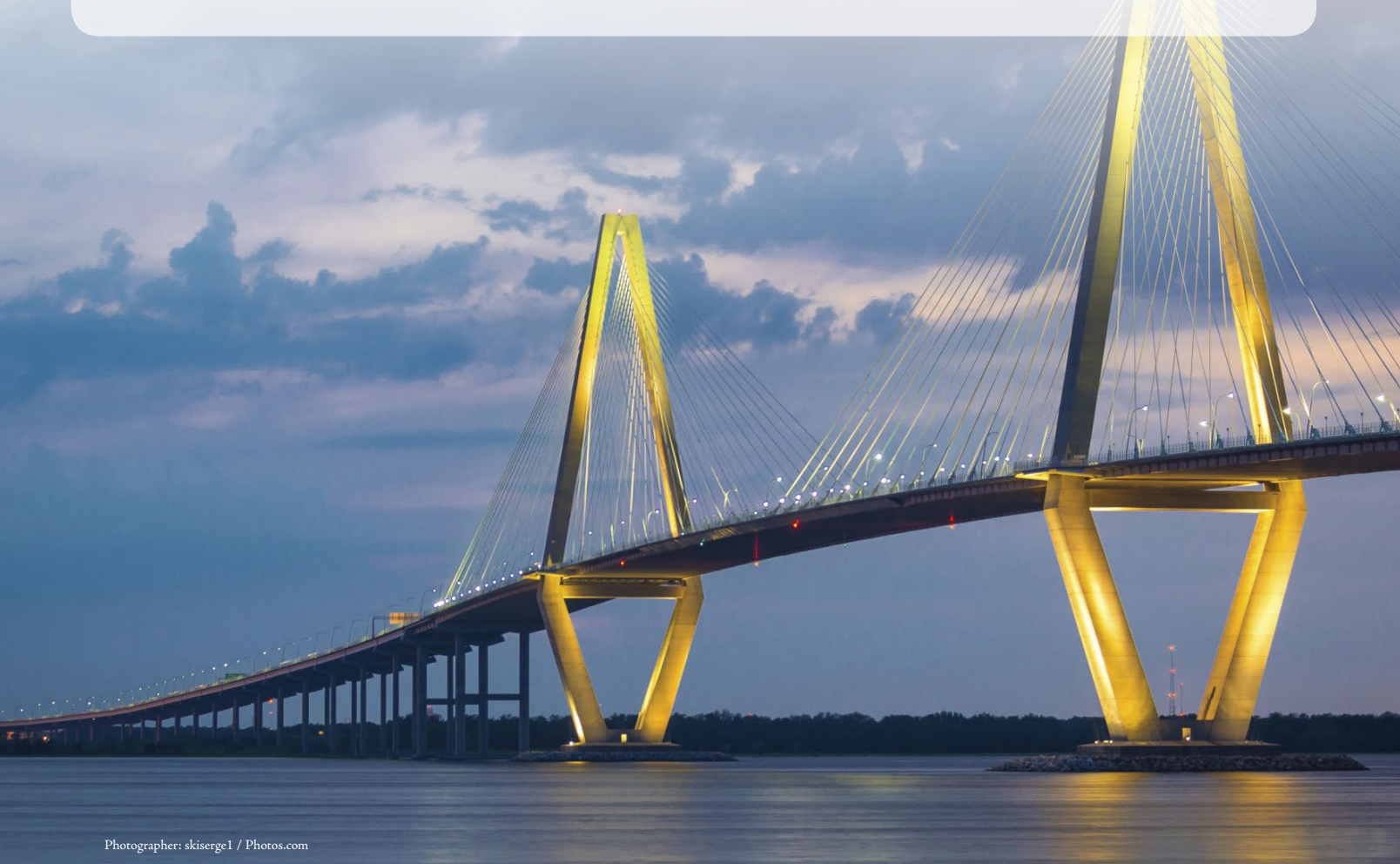
In 1961, the Parkers built one of the first homes in Northbridge Terrace in West Ashley where they lived out the entirety of their lives. It was here that they raised two boys in a loving but stern household. Their doors were always open to the neighborhood children. After Nina acted as a Cub Scout den mother, Tommy acted as a chief in the Indian Guides with his two boys. Countless campouts to Hononwah, Bonnie Doone, Bull's Island, Dewees and an uninhabited Kiawah Island followed over the years. Tommy was always a dedicated supporter of his sons' football and baseball teams as he guided them off to college.

As a child of the Great Depression, Tommy always wanted to reach out and help whomever he could. He loaned money to people who had hardships, only half-expecting to be repaid. Later in life, he supported St. Jude's, Special Olympics and the Wounded Warriors Project on a monthly basis. In the 1930s, he saw so many of his childhood friends suffering through hunger and pain that his strong focus always seemed to center around helping kids. He was a lifelong supporter of the Thornwell Children's Home in Clinton, S.C. He supported a cottage full of children and cried when he got thank you notes back from them for the Christmas and birthday presents he sent. Several times in the 1970s, he flew children from Thornwell to visit Disney World because he knew they would never get to experience it otherwise.

Mostly, Tommy was dedicated to his community and church. A lifelong member of Westminister Presbyterian, Tommy was instrumental in relocating the church from Rutledge Avenue in the 1970s to its current home today. He acted as an Elder, Deacon, Head of the Building Committee, Sunday school teacher, historian and oyster and shrimp cooker for the church community. As a past president of the American Sub-Contractors Association, Tommy fought and lobbied on behalf of his fellow business owners. His efforts in Washington and throughout the country garnered many of the rights and privileges subcontractors find today in the workplace.

An always humble gentleman, Tommy never sought to live above his means. He loved his Cherokee Six airplane that he used to fly his family and friends on countless dive trips to the Bahamas and Virgin Islands. He once flew the single engine plane all the way to Grenada. His favorite trips were the ones he took with his family to Nantucket and Maine in the late summer.

Tommy's greatest testament was the love he had for Nina.



Photographer: skiserge1 / Photos.com

As a child of the Great Depression, Tommy always wanted to reach out and help whomever he could.

She was always there for him and he was always there for her, and together they were always there for their boys. Towards the end of her life, there were years when she could no longer communicate or even recognize Tommy, but he was there sitting at her bedside every morning and every afternoon holding her hand. Even after she passed away in 2007, he never missed a single day going to visit her resting place – rain or shine.

He is survived by two sons, John T. Parker Jr. (Sara Margaret) of Mount Pleasant, S.C., and Kent Julius Parker (Tania) of Wadmalaw Island, S.C.; grandchildren Nina Mitchell Parker, Austen Albert Parker, Maddison Bailey Parker, Alice Kent Parker, Tess Nadia Parker; and a sister, Mary P. Varella of Marietta, Ga.

In lieu of flowers, memorials may be made to Thornwell Home & School for Children, 302 S. Broad Street, Clinton, S.C., 29325. ▼

Photos courtesy of John King

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PDCA Chapter News

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▼ PDCA OF SOUTH CAROLINA CHAPTER

The South Carolina Chapter held their fourth quarter meeting at the Town and Country Inn in Charleston on December 3, 2013. The featured speakers were John Ryan and Brian Shiver of Terracon, who discussed the installation testing of steel pipe pile via Remote Pile Driving Analyzer. Officer elections for 2014 were also conducted.

Officers for 2014 are as follows:

President: Scott Nigels (Palmetto Pile Driving); President-Elect: Greg Canivan (S&ME); Secretary/Treasurer: Andrea Edwards (Carolina Pole); and Asst. Treasurer: Harry Robbins (Palmetto Pile Driving)

2014 PDCA of South Carolina Chapter president and Mac Nigels' son, Scott Nigels (left), and Cadet James Munsen of The Citadel, recipient of the seventh annual Mac Nigels Scholarship

Seventh annual Mac Nigels Scholarship

At the meeting, the chapter also honored Cadet James Munson of The Citadel with the award of the 2013 Mac Nigels Scholarship.

Munson is a sophomore at The Citadel, the Military College of South Carolina. The award is in memory of McLeod "Mac" C. Nigels, P.E. Mac died of complications from pancreatic cancer on Oct. 27, 2006. Mac was a true champion of the pile driving industry and a fine engineer.

PDCA of South Carolina honors his memory through the Mac Nigels Scholarship, awarded annually to an engineering student from his alma mater, The Citadel. The recipient is chosen by the engineering professors using a simple criterion – "Who would Mac choose?"

Events

The South Carolina Chapter's next regularly scheduled meeting will be Tuesday, March 4, 2014. The program for the meeting has yet to be determined.

On Thursday, March 27 in the Riverview Room at The Citadel, the chapter will host their biennial Driven Pile Seminar. This all-day event will feature a number of interesting speakers and topics related to driven piles. It typically draws attendees from Florida to the Mid-Atlantic.

10-year anniversary

On May 16, 2002, a fax was sent requesting a meeting to discuss the formation of a local PDCA chapter in South Carolina. The meeting was held on May 29, 2002 and was attended by then-national executive director of PDCA, Stan Orr, and national board member, Wayne Waters. The result of the meeting was the formation of a steering committee to develop the PDCA of South Carolina Chapter.

After numerous phone calls, another meeting was held on August 29, 2002 to discuss the proposed by-laws with input from national PDCA.

On March 11, 2003, a mailing address with a P.O. box in Charleston was established. The first official chapter meeting was held on May 6, 2003.

Over 10 years later, the sixth president of the chapter has started his term in office and the chapter continues holding its quarterly meetings. Over the years, PDCA of South Carolina has hosted a DICEP Conference, conducted four one-day driven pile seminars and annually awarded a $1,000 scholarship to an engineering student at The Citadel. January 17, 2014 marked our eighth annual Oyster Roast.

The South Carolina Chapter continues to promote the driven pile, foster strong business relationships among members and provide for the future of our industry through education.

▼ PDCA OF THE GULF COAST CHAPTER

The Gulf Coast Chapter hosted their fourth quarter chapter meeting on Dec. 4, 2013 at Messina's in Kenner, La. The featured speaker was Matt Houston of RSC BioSolutions, a PDCA member and leading provider of environmentally safe lubrication and cleaning products. His presentation focused on the various types of lubrication products, their classifications regarding biodegradation and the costs associated with the inevitable leaks and spills of each type of lubricant.

Officer elections for 2014 were also conducted at the meeting. Officers for 2014 are as follows:

President: Bryan Klibert (Coastal Bridge Company, LLC); Vice President: Brian Hill (Baker Pile Driving, LLC); and Treasurer: Sean Spatz (ICE® – International Construction Equipment).

▼ PDCA OF THE PACIFIC COAST CHAPTER

The Pacific Coast Chapter hosted their annual Holiday Luncheon at Hotel Mac in Point Richmond, Calif. on Friday, Dec. 6. The meeting was led by chapter president, Dermot Fallon of Foundation Pile. The luncheon featured outstanding food and, of course, the annual tradition of each attendee telling a joke. The chapter raised $4,350 at their luncheon, which will go toward their annual scholarship program.

The chapter's scholarship program has been a great success. Earlier this year, the chapter awarded seven students each $1,000 scholarships to help with their expenses during the current school year.

And they're off!

Over 40 of the Pacific Coast Chapter's members and guests enjoyed a buffet lunch and a beautiful day on Friday, Oct. 25th at Golden Gate Fields, in Berkeley, Calif.; some even won a few bets on the horses that raced.

Several Pacific Coast Chapter members with the winning horse and jockey from a special race, which was dedicated specifically to the PDCA chapter

This was the chapter's second annual Day at the Races and is quickly becoming a PDCA of the Pacific Coast Chapter traditional event. The purpose of the event is to raise money for the chapter's scholarship fund. Over $1,400 was raised during this event for the scholarship fund.

A special raffle was held during the event and Antone Ivovic (Shimmick Construction) was the lucky winner. He won a return trip to Golden Gates Field with three friends.

Pacific Coast Chapter president, Dermot Fallon, speaking at the annual Holiday Luncheon in California in December

The Challenge

The PDCA of the Pacific Coast Chapter challenges other PDCA chapters to match or beat our scholarship fund, and help the next generation in their pursuit of a degree in construction-related fields.

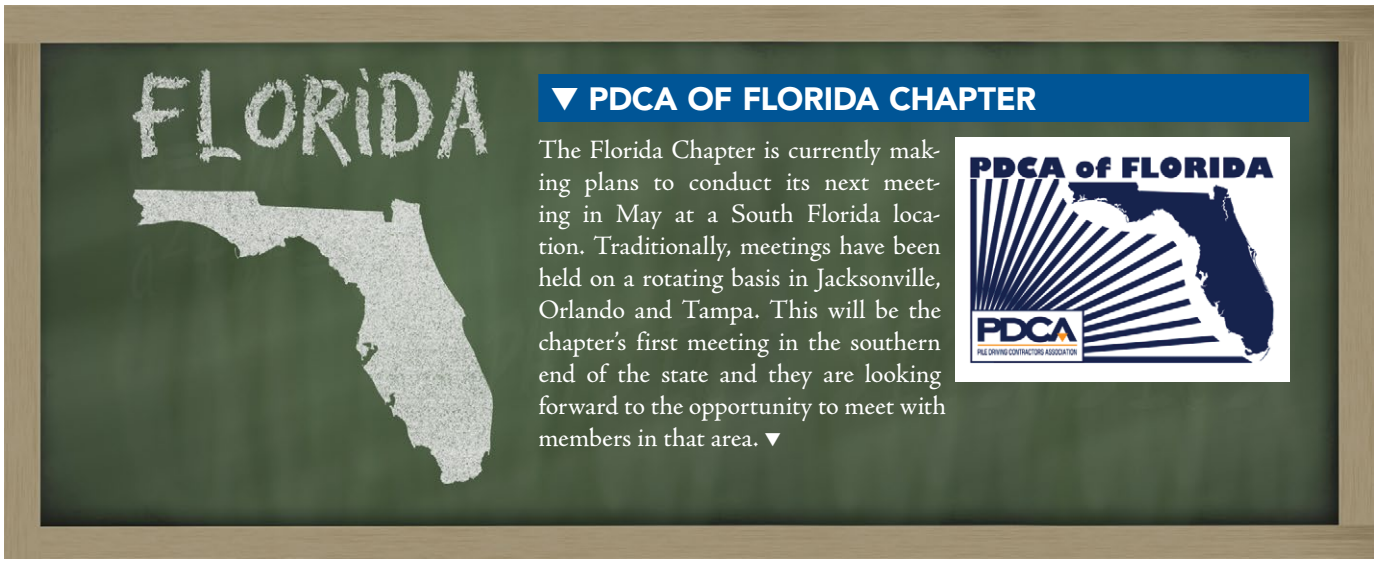
▼ PDCA OF THE NORTHEAST CHAPTER

Silas Nichols, principal bridge engineer at the Federal Highway Administration (FHWA), presented at the Oct. 9 PDCA of the Northeast Chapter dinner meeting. He provided a thorough presentation on the role of the FHWA and how it impacts contractors and engineers. All in attendance thought it was a very interesting and informative talk. Thank you, Silas, for sharing your vast knowledge with the Northeast Chapter!

Under consideration for the Northeast Chapter's February meeting is a panel discussion with New Jersey/New York departments of transportaion. A panel discussion will allow for an open dialogue between contractors, engineers and suppliers on a variety of topics and an excellent forum for better understanding the very different specifications of each DOT.

Seating is limited, so please contact Herb Engler at 718-786-8814 or herb.pennstatefab@verizon.net at your earliest convenience to reserve your seat.

Silas Nichols, principal bridge engineer at FHWA, spoke at the Northeast Chapter dinner meeting on Oct. 9, 2013



Photographer: Vepar5 / Photos.com

▼ PDCA OF FLORIDA CHAPTER

The Florida Chapter is currently making plans to conduct its next meeting in May at a South Florida location. Traditionally, meetings have been held on a rotating basis in Jacksonville, Orlando and Tampa. This will be the chapter's first meeting in the southern end of the state and they are looking forward to the opportunity to meet with members in that area. ▼

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PILE DRIVING CONTRACTORS ASSOCIATION

PDCA
PILE DRIVING CONTRACTORS ASSOCIATION
"A Driven Pile… Is a Tested Pile!"

18th Annual International Conference & Expo 2014

KNOWLEDGE ■ INSIGHT ■ OPPORTUNITY

April 2–4, 2014

Hyatt Regency St. Louis at The Arch
St. Louis, Missouri

Conference Brochure, Registration and Hotel Information

President's Message

By Rusty Signor, President, Pile Driving Contractors Association

This is the first time that PDCA has held its Annual International Conference and Expo in the City of St. Louis. This city has many great attractions and is the ideal setting for the PDCA's 2014 conference. Our hotel, the Hyatt Regency St. Louis at The Arch, is located within sight of the famous Gateway Arch, so be sure to include it in your visit while you are there.

This year, we've decided to move the conference to early April to avoid other conflicting events in late spring. PDCA is having a Sporting Clay Shoot in the place of the traditional golfing tournament as the 2nd Annual PDCA Scholarship Fundraiser. The idea for a Sporting Clay Shoot came up with unanimous approval from the Market Development Committee since Missouri's climate in early April does not particularly warrant a golf tournament.

To accommodate those individuals not interested in the Sporting Clay Fundraiser, PDCA will feature a scheduled tour of the America's Central Port to see a marine piling project in progress.

Check out the posted times for all of the PDCA Committees and remember PDCA committee meetings are open to anyone who is interested in attending. Because of the huge interest in the Joint Chapter's meeting in 2013, another joint meeting is scheduled in St. Louis. This meeting is scheduled to have minimal conflicting times with other meetings and will provide ample time for all chapters to share ideas about their successes, membership and events.

The conference will feature an Exhibit Hall with vendors representing a wide variety of products and services. Every vendor has a great deal of valuable information and experience to share, so take this opportunity to visit with them and discuss the latest technologies impacting your industry and have your questions answered by the experts.

PDCA is always grateful to our sponsors. They will be listed on signs throughout the conference, so are therefore easily identifiable. Please thank them for their sponsorship

of the conference as you pass them in the hall, in the General Session, special events or during breaks.

Casino Night will be the featured evening entertainment for the Annual Reception, Dinner and Entertainment. PDCA will also have a local jazz band to provide great music to accompany the evening's program.

Don't forget the Companion's Program. PDCA will continue its tradition by providing a very special program for all spouses and guests! With a scheduled lineup of fun and interesting local activities, the Companion's Program will keep the entire group busy and excited throughout their visit to St. Louis.

I encourage all of you to mark the PDCA 18th Annual International Conference and Expo 2014 on your calendar and make every effort to attend this unique pile driving industry conference. I know you will find it not only educational and informative, but also fun and entertaining.

I look forward to seeing all of you in St. Louis this April 2014.

Rusty Signor, President
Pile Driving Contractors Association ▼

Photographer: Rudolf Balasko / Photos.com

Hyatt Regency St. Louis at The Arch

Home of the PDCA 18th Annual International Conference and Expo 2014, the Hyatt Regency St. Louis at The Arch is an exemplary hotel in St. Louis, Mo. that blends world-class service with an unparalleled location near the river. The Hyatt was awarded a AAA Four Diamond Award and the Certificate of Excellence by TripAdvisor in 2012 and Best of MidAmerica Award five years in a row.

With uncompromising hospitality in a luxury hotel, experience its fresh, modern design and cool urban style. Delight in the ultimate comfort of the Hyatt Grand Beds in each room along with high-speed internet access, 37-inch flat screen television, telephone with voicemail and data port, deluxe bath amenities and hair dryer, coffeemaker, in-room refrigerator, iron/ironing board, iHome® alarm clock radio and amazing views of the Gateway Arch. After a long day of conferencing, relax in the comfort of your room and indulge in Hyatt's signature hospitality.

Photo courtesy of Hyatt Hotels

Anyone requiring travel assistance or who has special needs of any kind should contact PDCA Travel Agent, Lorraine Engelman with Blue Ribbon Travel, at (718) 767-5455 or email Lorraine@travelblueribbon.com. ▼

Accommodation Details

Hyatt Regency St. Louis at The Arch
315 Chestnut Street
St. Louis, MO 63102, US

Special conference room rate – $179 per night for a single or double (triple, quad and club rates available online)

Reservation deadline for the special conference room rate is Friday, March 7, 2014!

Individuals are responsible for making their own reservations. To make reservations, please go to our Booking Website by visiting http://bit.ly/1ilaOTZ or by calling Central Reservations at 1-888-421-1442 and referring to the conference.

If you would like to come early or stay late, the special conference room rate is available for three days prior to and three days after the conference dates.

Pre-Conference Short Course: Pile Driving Professionals' Development

The Pile Driving Contractors Association's "Pile Driving Professionals' Development" course is designed to strengthen professionalism, knowledge and overall comprehension by exploring critical areas of the pile driving industry through a one-day interactive short course. The course is structured to include discussions and interactive sessions, which will provide detailed information necessary to achieve a solid foundation of industry skill sets required by entry level professionals in the pile driving industry to successfully develop in their profession.

Presentation topics include Introduction to the Pile Driving Profession, Communications, Introduction to Pile Driving Aspects, Safety, Units of Measurement and Conversion Factors, Project Management, Hammer Components and Mechanics and Geotechnical Aspects.

Those registered for the Annual Conference may attend this short course at a discounted registration fee of $50.00. Individuals who wish to attend the short course only may do so with a registration fee of $150.00. Please see registration form attached to this brochure.

Course participants will receive a "Certificate of Completion" and earn 8 Professional Development Hours. ▼

Schedule at a Glance & Daily Agenda

Schedule at a Glance

Tuesday, April 1

- Pile Driving Professionals' Development Course
- Executive Committee Meeting
- Executive Committee Dinner

Wednesday, April 2

- Exhibitor Set-up
- Board of Directors Meeting
- Registration Open
- 2nd Annual PDCA Scholarship Fund Luncheon
- 2nd Annual PDCA Scholarship Fundraiser – Sporting Clays Tournament
- Port Tour – America's Central Port
- Opening Reception
- Board of Directors, Committee Chairs and Spouses Dinner – Invitation Only

Thursday, April 3

- Registration Open
- Exhibit Hall Open
- Opening Ceremony
- Companion's Program – Travel to St. Louis Art Museum Tour and Lunch
- General Session I
- Business & Awards Luncheon
- Companion's Program – Forest Park Activities
- General Session II
- Reception
- Executive Committee & Past Presidents Dinner – Invitation Only

Friday, April 4

- Registration Open
- Exhibit Hall Open
- General Business Meeting
- Companion's Program Breakfast
- General Session III
- Companion's Program – St. Louis Arch
- Exhibitor's Luncheon
- Companion's Program Luncheon
- Exhibitor Breakdown
- PDCA Chapter Meeting
- PDCA Committee Meetings
- Companion's Program – Botanical Gardens
- Reception
- Annual Dinner and Entertainment

Photographer: Stewart Drolet / Photos.com

Daily Agenda

Tuesday, April 1

8:00 AM Pile Driving Professionals' Development Course

4:00 PM PDCA Executive Committee Meeting – Premiere Parlor Suite

6:30 PM PDCA Executive Committee Dinner – Reception at Three-Sixty and Dinner at Tony's Restaurant

Wednesday, April 2

7:00 AM Exhibitor Set-up – Grand ABCD

7:30 AM Board of Directors Meeting – Mills 3

9:00 AM Registration Open – Grand Foyer E
Full Conference Registration Only

11:00 AM 2nd Annual PDCA Scholarship Fund Luncheon – St. Louis Skeet & Trap

12:00 PM 2nd Annual PDCA Scholarship Fundraiser – Sporting Clays Tournament – St. Louis Skeet & Trap

1:00 PM Port Tour – America's Central Port

6:00 PM Opening Reception – Grand ABCD

8:00 PM Board of Directors, Committee Chairs and Spouses Dinner – Kemmoll's

Thursday, April 3

7:00 AM Registration Open – Grand Foyer E

Exhibit Hall Open – Grand ABCD

7:30 AM Opening Ceremony – Grand FGH

10:00 AM Break – Grand ABCD

Companion's Program – St. Louis Art Museum Tour and Luncheon

10:30 AM General Session I – Grand E

12:00 PM Business & Awards Luncheon – Grand FGH

1:30 PM Companion's Program – Forest Park Activities

2:30 PM Break – Grand ABCD

3:00 PM General Session II – Grand E

6:00 PM Reception – Grand ABCD

7:30 PM Executive Committee and Past Presidents Dinner

** Times and locations subject to change **

Friday, April 4

7:00 AM Registration Open – Grand Foyer E

Exhibit Hall Open – Grand ABCD

8:00 AM General Business Meeting – Grand FGH

8:30 AM Companion's Program Breakfast – Premiere Parlor Suite

9:30 AM Break – Grand ABCD

10:00 AM General Session II – Grand E

10:30 AM Companion's Program – St. Louis Arch

12:00 PM Exhibitor's Luncheon – Grand ABCD

Companion's Program Luncheon

2:00 PM Exhibitor Breakdown – Grand ABCD

Companion's Program – Botanical Gardens

PDCA Chapter Meeting – Mills 3

Technical Committee Meeting – Mills 1

Marketing Development Committee Meeting – Mills 2

3:00 PM Environment and Safety Committees Meeting – Mills 1

Communications Committee Meeting – Mills 2

4:00 PM Educational Committee Meeting – Mills 1

Membership Committee Meeting – Mills 2

6:00 PM Reception

6:30 PM Annual Dinner and Entertainment – Grand EFGH ▼

Photo courtesy Saint Louis Art Museum/Alise O'Brien

Companion's Program

The PDCA will host another exciting Companion's Program with special activities throughout the conference. This PDCA tradition brings spouses and guests together once again to renew old friendships and create new ones.

Wednesday, April 2

- All companions and guests are welcome to register for the 2nd Annual PDCA Scholarship Fundraiser – Sporting Clays Tournament
- Opening Reception Hyatt Regency St. Louis at The Arch

Thursday, April 3

- Opening Ceremony – Hyatt Regency St. Louis at The Arch
- **St. Louis Art Museum Tour and Lunch**

  Companions will depart the Hyatt on provided transportation to The Saint Louis Art Museum. The museum collects, presents, interprets and conserves works of art of the highest quality across time and cultures; educates, inspires discovery and elevates the human spirit; and preserves a legacy of artistic achievement for the people of St. Louis and the world. Companions will participate in a guided tour.

  Following the tour, the Companions will sit down for a quiet lunch at the Panorama Restaurant, located in the museum. The 2,500-square-foot restaurant is named after its sweeping views of Forest Park through floor to ceiling windows overlooking Art Hill.

  After lunch, the Companions will have several options.

OTHER FOREST PARK ACTIVITES

- **The St. Louis Zoo**

  The Saint Louis Zoo is a get-away destination that brings together more than 19,000 wild animals on 90 acres in beautiful Forest Park. The Zoo is home to 655 species of animals, many of them rare and endangered.

- **Missouri History Museum**

  Featured Exhibits include
  250 in 250
  – St. Louis turns 250 in 2014! The Missouri History Museum celebrates it through the stories of 50 People, 50 Places, 50 Images, 50 Moments, and 50 Objects.

  Street of St. Louis
  – See St. Louis streets from a different angle in this installation, which features some of our favorite images from the Museum's photography and prints collection.

- **World's Fair Pavilion**

  Sitting atop Government Hill, the World's Fair Pavilion commands a dramatic view of Forest Park. This magnificent open air shelter has been one of the park's most popular and impressive attractions since it was built in 1909.

- **James S. McDonnell Planetarium**

  The planetarium was founded in 1963 and contains over 750 exhibits in a complex of 300,000 square feet. It is among the largest of its type in the country and one of the top five science centers in the U.S.

- **Evening Reception**

Friday, April 4

- Companion's Program Breakfast – Presidential Suite
- **St. Louis Arch**

A trip to St. Louis would not be complete without a tour of The Gateway Arch, which includes an elevator ride to the top of the 630-foot-tall structure. At the highest point in downtown St. Louis, you'll experience unforgettable views of the city and the Mississippi River.

- Companion's Program Luncheon
- **Botanical Gardens**

  The Missouri Botanical Gardens was founded in 1859 and is one of the oldest botanical institutions in the U.S., making it a National Historic Landmark. Established on 79 acres of horticultural display, including blooms such as tulips, dogwood, azalea and double daffodils, just to name a few.

- **Hyatt Regency St. Louis at The Arch**

  Annual Conference Dinner Reception
  Annual Conference Dinner
  Annual Conference Entertainment ▼

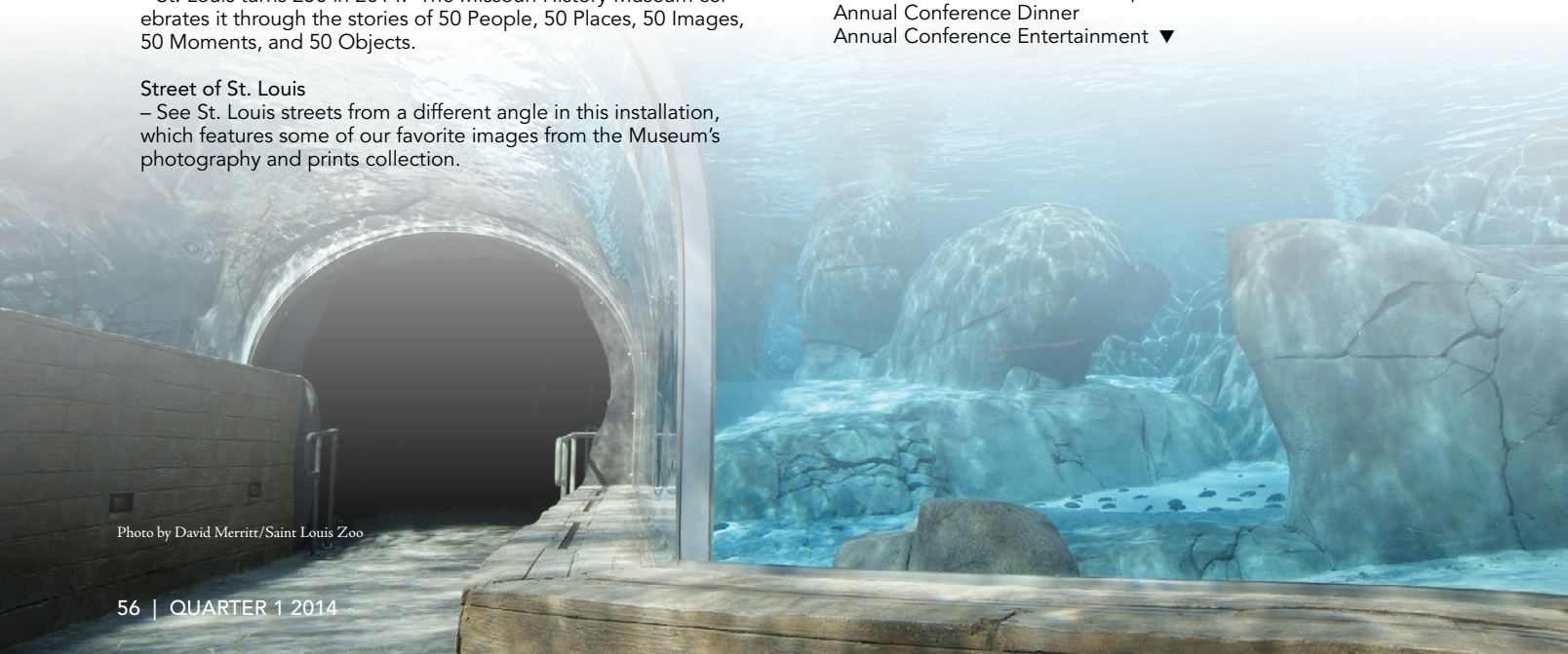


Photo by David Merritt/Saint Louis Zoo

General Sessions

Attend all PDCA General Sessions, the General Business Meeting and the Business and Awards Luncheon to earn seven Professional Development Hours (PDH) or Continuing Professional Competency Hours (CPCH).

PDCA is a registered provider through the State of Florida Board of Professional Engineers (Provider Number 0005072), New York State NYSED (Sponsor Number 123) and State of Maryland Department of Labor, Licensing and Regulations Continuing Professional Competency (CPC) hours.

Title: **Driven Pile Test Programs – Paying Off with More Than Just Information**

Presenter: *Van E. Komurka, P.E., D.GE, F.ASCE – Wagner Komurka Geotechnical Group, Inc.*

Summary: Driven pile test programs are often performed for a number of reasons, may include several components and can yield a variety of results. Often, testing is performed to obtain information pertinent to design and/or construction, and as such is requisite to good engineering practice.

However, since testing carries an obvious, quantifiable up-front cost (of which all interested parties seem painfully aware), potential cost-saving aspects of testing are perhaps overlooked. This presentation will present various load-testing options, and considerations for properly and effectively applying their results to design and installation. The cost-effectiveness (i.e., value added and/or cost savings) potential of the testing options will be emphasized throughout.

Title: **Bulkhead Dock Design for Shallow Bedrock Conditions – Owensboro River Port**

Presenter: *Jim Campbell – PND Engineers, Inc.*

Summary: Cellular structures constructed with flat web steel sheet piling do not rely on toe embedment for support and, for this reason, are a common design approach for sites where shallow bedrock is present. The OPEN CELL® bulkhead design has additional benefits over conventional closed cell designs because its open geometry allows land-side access inside the cells during construction, and tail wall designs can be adjusted to provide required structural capacity in varied site conditions. The new cargo dock at the Owensboro River Port highlights the advantages of this technology.

Title: **Identifying and Managing Project Delivery Risks – From Design to Close Out, including Project Legal Elements**

Presenter: *Mark Rice – McNeil, Silveira, Rice & Wiley*

Summary: This presentation will focus on incorporating risk modeling and assessment during each critical phase of project selection, team selection and defining legal relationships, project delivery and troubleshooting and risk allocation/conflict resolution. Each construction project involves a series of risks to the parties. These risks typically arise at key and critical project moments, or "pivot points".

This presentation provides the project participants with enhanced tools to readily identify heightened project risk, and implement solutions in real time to both minimize project management errors and enhance project success. The course will cover both how the legal system sorts out risk after the fact on a construction project, but also the tools available to define, allocate and spread project risk properly during the project to maximize success.

Title: **Pile Driving Contractor's Role in Design-Build/Value Engineering – Lessons Learned**

Presenter: *Richard Thomas – Design-Build Institute of America*

Summary: The use of design-build has doubled in the last five years in the transportation sector. This session will shed light on why owners are using design-build, best practices and the emerging design-build trends. Most importantly this session will cover the pile driving contractor's role in design-build and how they make this delivery method work for them.

Title: **1926 Subpart CC – OSHA's New Crane & Derrick Regulations**

Presenter: *Bo Collier – Crane Tech*

Summary: An overview of the new crane regulations in OSHA 1926 Subpart CC with an emphasis on lines of authority, definitions, assembly/disassembly, overhead power line safety, ground conditions, required inspections, signaling and training, including operator certification and qualification.

Title: **Lattice Booms – Condition/Repairs and Third Party Inspections**

Presenter: *David Wood – Wheco Corporation*

Summary: We will discuss Lattice Boom Repairs in cranes and what is allowed under OSHA and what a company should look for in a structural repair company.

Title: **Geotechnical Engineers and Pile Drivers – Ethical Responsibilities**

Presenter: *Vic Donald – Terracon Consultants*

Summary: The geotechnical engineer and the pile driving contractor must honor the ethical responsibility of professional engineers to hold paramount the protection of public health, safety and welfare. We have an important opportunity, if not responsibility, to work together to serve the owner's needs when designing and building

General Sessions (cont.)

Earn 7 Professional Development Hours – Including 1 PDH for Ethics

foundations. This presentation will help us to consider our ethical responsibility to work together in the interest of the owner and the public.

Title: **Harry S. Truman Parkway Project**
Presenter: *Josh Sommer – Balfour Beatty Infrastructure, Inc.*
Summary: Construction of the final phase of the Harry S. Truman Parkway Project in Savannah, Ga. presented some unique challenges for Balfour Beatty Infrastructure (BBII) and the Georgia Department of Transportation. The Vernon River channel is inaccessible to barges for construction access or material delivery, so BBII utilized an 840-foot-long moveable temporary erection platform (trestle). With the trestle and two 230-ton cranes positioned between the twin 5,000-foot-long structures, there was no room for error as BBII worked to drive 1,700 pre-cast pile to complete the bridges on schedule. The repetitive, linear nature of the Vernon River Bridges allowed BBII to achieve assembly-line efficiency, and the end-on construction technique minimized adverse impacts on the ecology of the Vernon River and surrounding marsh.

Photo courtesy of Hyatt Hotels

Title: **Pile Installation Platforms**
Presenters: *Dave Chapman, P.E. – Blakeslee, Arpaia, Chapman*
Van Hogan – PDCA
Summary: This presentation will discuss the various equipment systems used to install driven piles – from cranes with swinging or fixed leads to dedicated pile driving rigs – the pros and cons of each and the considerations for selecting each system. ▼

General Business Meeting Keynote Speaker, Kevin McLain

Kevin McLain, MS, PE, RG, is the Geotechnical Director for the Missouri Department of Transportation (MoDOT). McLain will be the Keynote Speaker at the General Business Meeting on Friday morning, April 4. McLain will present information on the current MoDOT pile driving specification and guidance in their Engineering Policy Guide and Specs for Highway Construction. He will also discuss the current and future MoDOT sponsored research on pile capacity and design procedures, and MoDOT pile driving projects.

The General Business Meeting will also include updates on the PDCA 2014 Strategic Plan by the Executive Committee. ▼

Early Bird Registration Deadline is Friday, February 28, 2014

Registration Forms must be completely filled out and submitted with payment information to PDCA before registration can be considered finalized. Receipts will be sent once payment has been processed.

Submit completed Registration Forms, payment information or checks to:

PDCA, 1857 Wells Road, Suite 6
Orange Park, FL 32073

Payment by credit card can also be submitted as follows:
Fax to the PDCA office: 904-215-2977
Scan and email to the PDCA office: Jessica@piledrivers.org

Note: Please print clearly or type all information on the Registration Form. Incomplete or incorrect information will delay the processing of your Registration Form. Please read registration form carefully.

All inquiries should be addressed to the PDCA office by phone, toll-free at 888-311-PDCA (7322) or by email to Jessica@piledrivers.org. ▼

PDCA Project of the Year Sponsorship

The Project of the Year Awards are an important part of PDCA. It is a time to recognize and pay tribute to the projects that PDCA members construct and complete every day in the pile driving industry; a time when new ideas can be brought to the forefront and an opportunity to share best practices with our fellow pile drivers.

The PDCA's Project of the Year entry proceeds and sponsorships help support the PDCA educational pro-grams, research and scholarship fund.

Sponsor benefits include a company logo printed on the Project of the Year advertising, one full registration to the 18th Annual International Conference and Expo 2014, participation in the PDCA Project of the Year Award presentation and company information and logo presented in the PDCA Project of the Year video loop that is shown continuously at the annual conference. ▼

Sponsorship for the PDCA Project of the Year is $3,000 and is limited to three Associate Members.

Port Tour

Photographer: Jupiterimages / Photos.com

PDCA will also conduct a tour of America's Central Port on Wednesday, April 2. The tour will depart from the Hyatt at 1:00 PM.

ACP is a 1,200-acre multi-use facility owned and operated by the Tri-City Regional Port District and is the hub of the nation's transportation infrastructure. Mr. Bill Stahlman, Port Engineer, will join PDCA members and guests as the Port's guide.

Tour highlights will include a history of the Port and how ACP has developed and funded current projects. The group will also visit the North Harbor, a working barge dock facility; and South Harbor, currently under construction and driving sheet pile.

Tour participants are required to have their own hard hats, safety glasses and appropriate shoes.

The Port Tour fee will be $25.00 per attendee. Sign up using the conference Registration Form. ▼

Silent Auction

Photographer: DavidFR / Photos.com

PDCA will hold its 4th Annual Silent Auction during the annual conference.

Silent Auction items will be displayed in the Exhibit Hall and bidding opportunities will be conducted throughout the conference dates. Final bidding will take place during the Annual Conference Dinner Reception, with winners announced at the conclusion of the dinner.

The proceeds from the Silent Auction will benefit the PDCA Scholarship Fund.

Companies are encouraged to participate in the auction by donating an item for this worthy cause. Any individual or company interested in contributing to the Silent Auction should contact PDCA at 888-311-PDCA (7322). ▼

The 2nd Annual PDCA Scholarship Fundraiser – Sporting Clays Tournament

St. Louis Skeet and Trap Club

The 2nd Annual PDCA Scholarship Fundraiser for 2014 will be a Sporting Clays Tournament at the St. Louis Skeet and Trap Club. All proceeds from the tournament will be used to support the PDCA Scholarship Fund, which provides money to students enrolled in university, college or technical programs in construction, construction management, engineering or related industry advancement programs.

The St. Louis Skeet and Trap Club is the premier shotgun shooting facility in the St. Louis area. They have all major disciplines of shot gunning – Sporting Clays, Skeet, 5-Stand, Trap, International Trap and International Skeet. For the fundraiser, PDCA will be using the Sporting Clays layout with 10 shooting stations.

Details

The 2nd Annual PDCA Scholarship Fundraiser will begin at 11:00 AM, with a catered luncheon by Poor Richard's. The tournament will follow at 12:00 PM.

Participants are urged to bring their own shotgun. Shotgun rentals will be available on a very limited basis. If you require a rental, please contact PDCA as soon as possible to make arrangements. Shooters are required to provide their own safety glasses and ear protection.

Teams will consist of four shooters. The winning team will be acknowledged at the PDCA Business and Awards Luncheon on Thursday, April 3, 2014. ▼

Cost

$150.00 per player – includes lunch, shoot, ammo, transportation and prizes

$5.00 Shotgun Rental (limited availability)

Contact the St. Louis Skeet and Trap Club directly for shotgun rentals at 636-271-4210.

Exhibitors

The Exhibit Hall will be located in the Grand Ballroom of the Hyatt. Exhibitors at the PDCA 18th Annual International Conference and Expo 2014 will have the opportunity to display information about their company, products, services and materials throughout the duration of the conference.

Exhibitor's fee includes an eight-foot by ten-foot pipe and draped booth, with a ten-foot back wall and eight-foot side walls with cloth drapery. Booth back drape is eight feet high and side walls are three feet high. Booths also include one six-foot by two-foot skirted table, two chairs, a wastebasket and company sign.

The Exhibit Hall is located next to the General Session ballroom, providing easy access and a constant flow of traffic between the General Sessions and Exhibitors. Along with the exhibits, the Exhibit Hall will be the site of the Opening Reception, Evening Reception, Exhibitor's Luncheon and all morning and afternoon breaks.

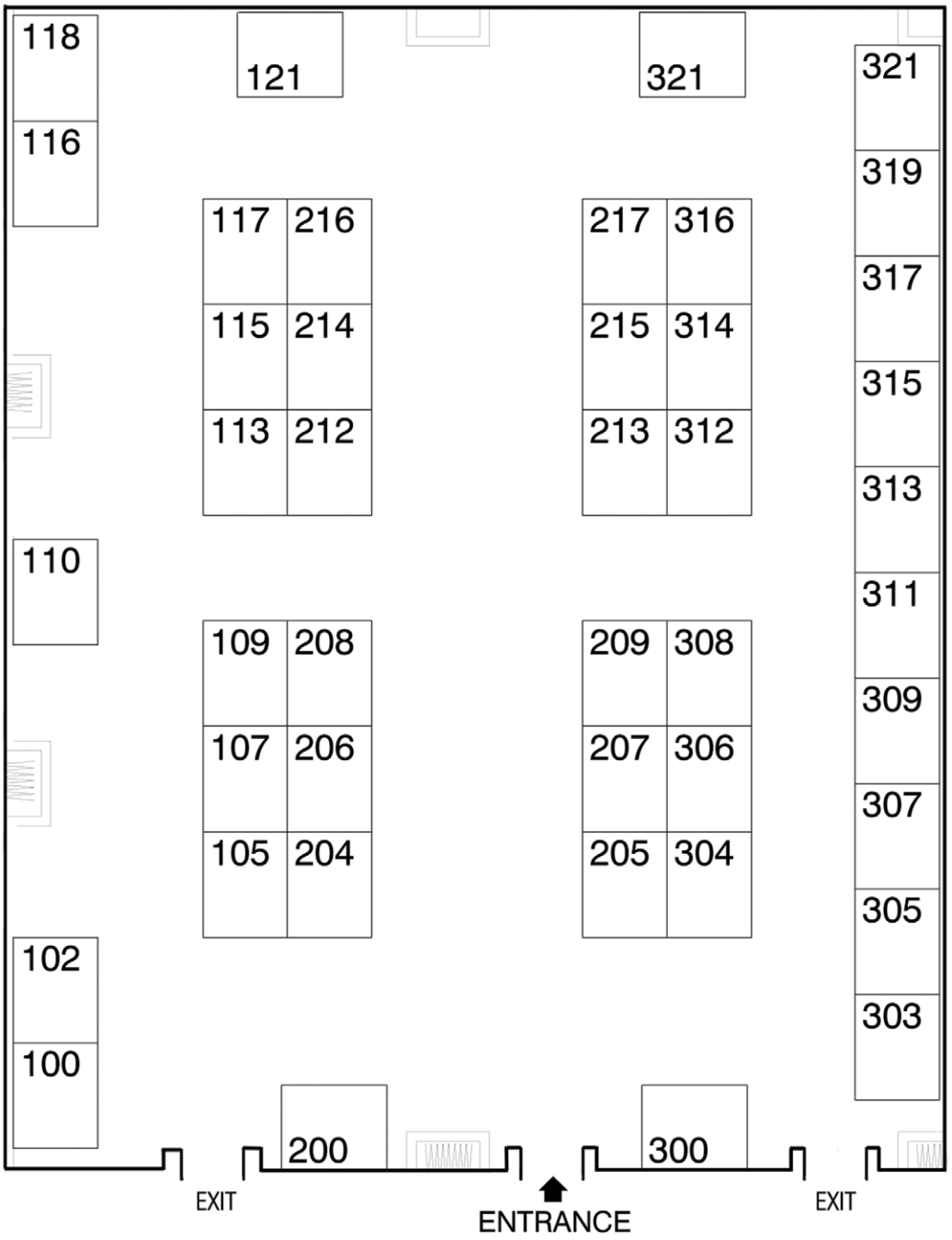
Booth selection is made on a first come, first paid in full basis, only after the company completes and submits a Conference Registration Form and payment to PDCA. ▼

Exhibitor Fees

PDCA Member (2 registrants)	$1,600.00
PDCA Member (1 registrant)	$1,200.00
Non-Member (2 registrants)	$2,100.00
Non-Member (1 registrant)	$1,700.00
Additional Registrant	$725.00

PDCA Exhibit Hall Floor Plan

April 2–4, 2014
Hyatt Regency at The Arch,
St. Louis, Mo.



Sponsorship Opportunities

The tradition of featuring PDCA Annual Conference Sponsors in a highly visible, consistent and professional manner throughout the conference will be continued with emphasis in 2014.

All sponsoring companies will receive on-site advertisement on signage and digital projector displays, on-site recognition through continuous announcements during conference events, recognition in Annual Conference marketing materials, the PDCA E-Letter, *PileDriver* magazine, the PDCA website and PDCA's social media sites.

▼ Project of the Year Awards Program – $3,000

Sponsor benefits include one full registration to the Annual Conference, participation in the PDCA Project of the Year Award presentation and company information and logo presented in the video loop at the annual conference. This sponsorship is limited to three Associate Member sponsors.

▼ Platinum – $2,500

Major conference sponsor, includes one full conference registration and highly recognizable promotion of your company throughout the conference.

▼ Opening Ceremony – $2,000

Sponsorship includes the Opening Ceremony Breakfast, which includes the presentation of colors by the Color Guard, entertainment and highly recognizable promotion of your company throughout the conference. Limited to three sponsors.

▼ Annual Reception, Dinner and Entertainment – $2,000

Sponsorship includes the Annual Dinner and Reception, including full buffet dinner, Casino Royale theme, all-evening hosted bar and the evening's entertainment and highly recognizable promotion of your company throughout the conference.

▼ Name Badges and Lanyards – $2,000

Sponsorship includes your company name and logo printed on the conference name badge lanyards given to all attendees and highly recognizable promotion of your company throughout the conference. Limited to one sponsor. Deadline: February 24.

▼ Guest Room Keys – $2,000

Sponsorship includes your company name and logo printed on every hotel guest room key and highly recognizable promotion of your company throughout the conference. Limited to one sponsor. Deadline: February 24.

▼ Flash Drives – $2,000

Sponsorship includes your company logo on a 3D custom shaped flash drive given to all attendees and highly recognizable promotion of your company throughout the conference. Limited to one sponsor. Deadline: February 24.

▼ Companion's Program – $1,500

Sponsorship of the entire Companion's Program, including the St. Louis Art Museum, St. Louis Zoo, Missouri History Museum, Gateway Arch Tour, Botanical Gardens, breakfasts, luncheons, receptions and annual dinner and entertainment.

This sponsorship includes one Companion's registration fee and highly recognizable promotion of your company throughout the conference.

▼ Opening and Evening Reception – $ 1,500

Sponsorship of the Opening and Evening Receptions in the Exhibit Hall, including heavy buffet-style hors d'oeuvres, carving stations, all-evening hosted bar and highly recognizable promotion of your company throughout the conference.

▼ Business and Awards Luncheon – $1,500

Sponsorship includes lunch buffet, Committee Chair of the Year Award, Professional Engineers Service Award and the Presidential Award for Distinguished Service. Sponsorship also includes highly recognizable promotion of your company throughout the conference.

▼ The 2nd Annual PDCA Scholarship Fundraiser – Sporting Clays Tournament – $1,000

Sponsorship includes one shooter's registration fee for the tournament (including lunch, shoot and ammo) and highly recognizable promotion of your company throughout the conference.

▼ General Business Meeting and Keynote Speaker – $1,000

Sponsorship includes the General Business Meeting, Keynote Speaker and highly recognizable promotion of your company throughout the conference.

▼ A.M. & P.M. Breaks – $750

Sponsorship includes support of all the A.M. and P.M. breaks in the Exhibit Hall and highly recognizable promotion of your company throughout the conference. ▼

Annual Reception and Dinner Entertainment

Are you ready to double down, spin the wheel or take a chance and roll the dice? Could an ounce of luck be your pot of gold? You will have the opportunity to find out at the PDCA Annual Reception and Dinner, featuring "Casino Night" as the entertainment. Come join your fellow friends as they place their bets with "PDCA Chips" – a win-win event for everyone.

The evening will start with a cocktail reception, featuring a hosted bar and light hors d'oeuvres. Come relax, mingle and listen to the background sounds of St. Louis jazz. The reception will be followed by the traditional PDCA buffet dinner – "A Taste of Spring!" The menu will feature food that is "thoughtfully sourced and carefully served" that reflects the season and local flavors.

After dinner, it's time to continue the fun, spending some "PDCA Chips" at the Hotel Hyatt PDCA Casino. "Casino Night" will test your skills at Black Jack, Texas Hold 'em, Roulette and Craps. Using "PDCA Chips" everyone will work towards amassing your millions. At the end of the evening, PDCA will see who the richest people are in the room and they will be presented with a gift for their winnings. ▼

Images by: tarras79, Kesu01, Dan Dumitru Comaniciu & Jacob Wackerhausen / Photos.com

ATTENDEE REGISTRATION

Complete & Return to: PDCA, 1857 Wells Road, Suite 6, Orange Park, FL 32073, fax to 904-215-2977 or email to Jessica@piledrivers.org.
Please print clearly or type. Photocopy this form or download additional forms from www.piledrivers.org.

Please print your information EXACTLY how you would like it to appear on name tags, attendee packet, etc.

Type: (please check one)	❑ Contractor	❑ Supplier	❑ Manufacturer	❑ Engineer	❑ Service Provider	❑ Other
Company:						
Address:						Suite:
City:		State:			Zip:	
Province:		Country:			Postal Code:	
Phone:		Website:				
Main Contact:				Email:		
Name:				Email:		
Name:				Email:		
Name:				Email:		

Registration Type	*# of Registrations*		*Amount*	*Total*
PDCA or Co-operating Sponsor Member Registration		×	$725.00	$ _____
Non-Member Registration		×	$825.00	$ _____
On-Site Registration		×	$875.00	$ _____
Federal, State, City or County Employee Registration		×	$500.00	$ _____
Student Registration		×	$350.00	$ _____
One Day Pass – Thursday		×	$350.00	$ _____
One Day Pass – Friday		×	$350.00	$ _____
Early Bird Discount – $50 discount on each Attendee registration prior to **Friday, February 28, 2014**		×	**-$50.00**	$ _____
			Attendee Registration Total	$ _____
Silent Auction Item – please indicate if you or your company would like to contribute a silent auction item(s)			Item(s): _____ _____	

For travel and hotel information contact:

Lorraine Engelman
Blue Ribbon Travel / American Express
11–16 154th St.
Whitestone, NY 11357
Tel: 718-767-5455 Fax: 718-767-5601
lorraine@travelblueribbon.com
www.travelblueribbon.com

Will you require a Certificate of Completion for Professional Development Hours? ☐ Yes ☐ No

Sponsorships, payment information, additional options on last page.

Please see next page for the 2nd Annual PDCA Scholarship Fundraiser – clay shoot sign ups.

EXHIBITOR REGISTRATION

Complete & Return to: PDCA, 1857 Wells Road, Suite 6, Orange Park, FL 32073, fax to 904-215-2977 or email to Jessica@piledrivers.org.
Please print clearly or type. Photocopy this form or download additional forms from www.piledrivers.org.

Please print your information EXACTLY how you would like it to appear on name tags, attendee packet, etc.

Type: (please check one)	❑ Contractor	❑ Supplier	❑ Manufacturer	❑ Engineer	❑ Service Provider	❑ Other
Company:						
Address:						Suite:
City:		State:			Zip:	
Province:		Country:			Postal Code:	
Phone:		Website:				
Main Contact:				Email:		
Name:				Email:		
Name:				Email:		
Name:				Email:		

Registration Type	*Amount*	*Total*
PDCA Member Dual Exhibitor Registration – Includes 2 Registrations	$1,600.00	$ _____
PDCA Member Single Exhibitor Registration – Includes 1 Registration	$1,200.00	$ _____
Non-Member Dual Exhibitor Registration – Includes 2 Registrations	$2,100.00	$ _____
Non-Member Single Exhibitor Registration – Includes 1 Registration	$1,700.00	$ _____
Additional Exhibitor Registration	$725.00	$ _____
	Exhibitor Registration Total	$ _____
Silent Auction Item – please indicate if you or your company would like to contribute a silent auction item(s)	Item(s): _____ _____	

The 2nd Annual PDCA Scholarship Fundraiser

– Sporting Clays Tournament

Shooter 1: _____

Shooter 2: _____

Shooter 3: _____

Shooter 4: _____

# of Shooters	_____	×	$150.00	Total: $ _____
			Additional Fund Contribution	$ _____
			Fundraiser and Luncheon Total	$ _____

SPONSORSHIPS, OTHER OPTIONS & PAYMENT INFORMATION

Sponsorship	*Number Available*	*Amount*	*Total*
Project of the Year Sponsor	3	$3,000.00	$ _____
Platinum Sponsor	Unlimited	$2,500.00	$ _____
Opening Ceremony	3	$2,000.00	$ _____
Annual Reception, Dinner and Evening Entertainment	Unlimited	$2,000.00	$ _____
Name Badges and Lanyards	1	$2,000.00	$ –SOLD–
Guest Room Keys	1	$2,000.00	$ –SOLD–
Flash Drives	1	$2,000.00	$ _____
Companion's Program	Unlimited	$1,500.00	$ _____
Opening and Evening Receptions	Unlimited	$1,500.00	$ _____
Business and Awards Luncheon	Unlimited	$1,500.00	$ _____
The 2nd Annual PDCA Scholarship Fundraiser and Luncheon	Unlimited	$1,000.00	$ _____
General Business Meeting & Keynote Speaker	Unlimited	$1,000.00	$ _____
A.M. & P.M. Breaks	Unlimited	$750.00	$ _____
		Sponsorship Total	$ _____

Other Options	*# of Registrations*		*Amount*	*Total*
Companion's Program		×	$350.00	$ _____
Companion's Name:				
Children (Under the age of 21)		×	$100.00	$ _____
Child's Name:				
Professional Development Course (Full Conf. Attendees)		×	$50.00	$ _____
Professional Development Course ONLY		×	$150.00	$ _____
Port Tour – America's Central Port		×	$25.00	$ _____
			Options Total	$ _____
			Conference Total	$ _____

Return the completed Registration Form and Payment to:
PDCA, 1857 Wells Rd. Ste. 6, Orange Park, FL 32073
Registrations with credit card information may be faxed to PDCA at 904-215-2977 or scanned and emailed to jessica@piledrivers.org

Payment Information (All information must be completed to process your registration form):

Check One: ☐ Check ☐ Visa ☐ MC ☐ AMX ☐ Discover Exp. Date: _____/_____

Name On Card: _____ CVV (3 or 4 Digit Code): _____

Credit Card Number: _____

Statement Billing Address: _____

City: _____ State: _____ Zip Code: _____

Province: _____ Country: _____ Postal Code: _____

Signature: _____

REFUND POLICY: 50% REFUND UP TO MARCH 7 – NO REFUNDS AFTER MARCH 7, 2014

Please list any food allergies for anyone in your group: _____

Pile Driving Professionals' Development Course

A new PDCA course offered at annual conference

The PDCA Education Committee assembled an ad hoc sub-committee for the purposes of developing a new course, titled the Pile Driving Professionals' Development Course. This new course will be presented as a pre-conference short course on Tuesday, April 1, 2014, at the Hyatt Regency St. Louis at The Arch, the site of the PDCA 18th Annual International Conference & Expo 2014.

This exclusive eight-hour PDCA course is designed to strengthen the professionalism, knowledge and overall comprehension of the pile driving professional (which include field personnel, sales representatives, engineers, estimators and more) by exploring critical areas of the pile driving industry through an interactive training workshop.

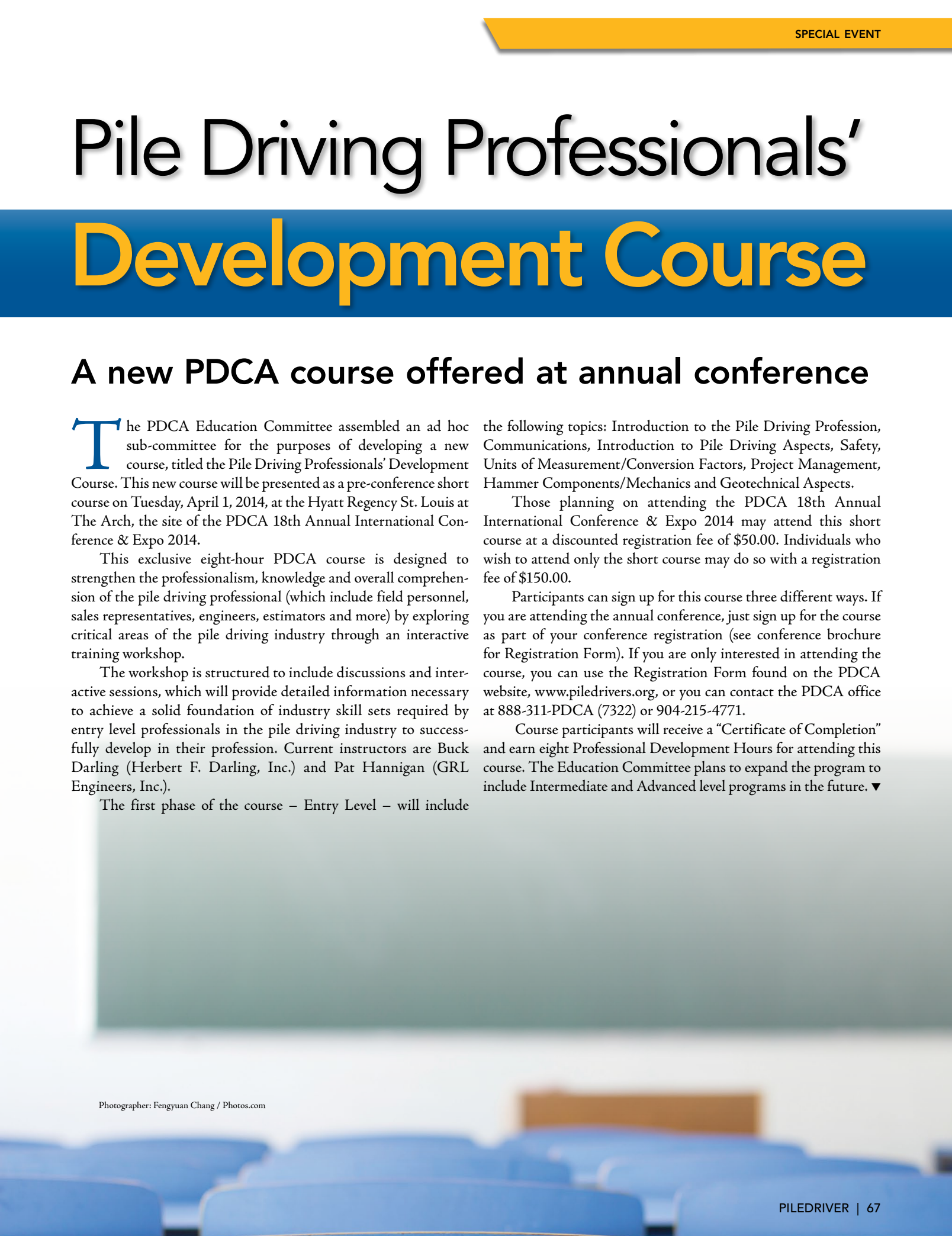
The workshop is structured to include discussions and interactive sessions, which will provide detailed information necessary to achieve a solid foundation of industry skill sets required by entry level professionals in the pile driving industry to successfully develop in their profession. Current instructors are Buck Darling (Herbert F. Darling, Inc.) and Pat Hannigan (GRL Engineers, Inc.).

The first phase of the course – Entry Level – will include the following topics: Introduction to the Pile Driving Profession, Communications, Introduction to Pile Driving Aspects, Safety, Units of Measurement/Conversion Factors, Project Management, Hammer Components/Mechanics and Geotechnical Aspects.

Those planning on attending the PDCA 18th Annual International Conference & Expo 2014 may attend this short course at a discounted registration fee of $50.00. Individuals who wish to attend only the short course may do so with a registration fee of $150.00.

Participants can sign up for this course three different ways. If you are attending the annual conference, just sign up for the course as part of your conference registration (see conference brochure for Registration Form). If you are only interested in attending the course, you can use the Registration Form found on the PDCA website, www.piledrivers.org, or you can contact the PDCA office at 888-311-PDCA (7322) or 904-215-4771.

Course participants will receive a "Certificate of Completion" and earn eight Professional Development Hours for attending this course. The Education Committee plans to expand the program to include Intermediate and Advanced level programs in the future. ▼



Photographer: Fengyuan Chang / Photos.com

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Charlotte LRFD Workshop

PDCA presented the workshop in North Carolina in September 2013

By Van Hogan, PDCA

On September 17, 2013, PDCA presented the Driven Deep Foundations, Load and Resistance Factor Design (LRFD) Design and Construction Workshop at the Crowne Plaza Executive Park in Charlotte, N.C. The course instructor was Jerry DiMaggio, P.E., D.GE.

The workshop highlighted AASHTO LRFD Section 10.4 and its logical approach to subsurface exploration, material testing and material determination. The LRFD design code also promotes more efficient designs and better defines structural design loads, making driven piles cost-effective. It also improves communication between the construction, structural and geotechnical communities. The LRFD approach is still relatively new in foundation design.

The workshop reviewed the fundamentals of LRFD and compared them to traditional design platforms. It also discussed the development of subsurface investigation programs for specific geotechnical features, proper pile selection, the development of project performance requirements and how to correctly use LRFD principals for driven pile foundation projects.

Jerry did an excellent job leading the workshop and explaining the LRFD approach in detail. 22 people from across the Southeast and Midwest attended the workshop.

Thank you to Jerry and to all those who attended.

PDCA is in the process of scheduling another Driven Deep Foundations LRFD Design and Construction workshop. The next program will be held in Kansas City, Mo. in late-May 2014. PDCA will provide additional information on this workshop as details become available. In the meantime, interested companies or individuals may find updates on this and other PDCA activities and events on the association's website, www.piledrivers.org. ▼

22 people attended the workshop in Charlotte, N.C.

Photos courtesy of Van Hogan

The LRFD approach is still relatively new in foundation design.

Illustrator: naqiewei / Photos.com

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Deep Foundation Dynamic Testing & Analysis Workshop

PDCA and Pile Dynamics, Inc. will present a seminar and workshop on Deep Foundation Dynamic Testing and Analysis (DFDTA) in Orlando, Fla., March 12 to 14, 2014. This three-part program includes the Day One seminar, Day Two and Three workshops and the Dynamic Measurement and Analysis Proficiency Test.

Day One: Wednesday, March 12, 2014

Seminar on Deep Foundation Integrity Testing and Wave Equation Analysis

Who should attend? Geotechnical, structural and construction engineers, owners, contractors and other professionals involved in the design, construction and specification of deep foundations.

Learning objectives

Select an appropriate method of integrity assessment of deep foundations for a particular application.

- Review reports of integrity and dynamic load testing of deep foundations conducted by others.
- Run a basic wave equation analysis of pile driving.

Days Two and Three: Thursday and Friday, March 13 and 14, 2014

Workshops on high strain dynamic foundation testing (PDA and CAPWAP®)

Who should attend? Pile Driving Analyzer® (PDA) and CAPWAP® users interested in sharpening their skills; engineers, foundation testing professionals, student and professors already familiar with the basic concepts of deep foundation dynamic testing and analysis; professionals who desire to have a basic understanding of the dynamic testing results being presented to them.

Learning objectives

- Operate the PDA in a manner conducive to acquiring good quality data.
- Assess pile bearing capacity, pile driving stresses, hammer performance and pile integrity by various methods.
- Avoid pitfalls when analyzing PDA data with the CAPWAP® software.
- Interpret PDA testing and CAPWAP® software results.
- Describe the soil-model used in CAPWAP®.
- Prepare the input for CAPWAP®.
- Review options for CAPWAP® analysis and output.
- Calculate bearing capacity and its distribution for driven piles from impact records.

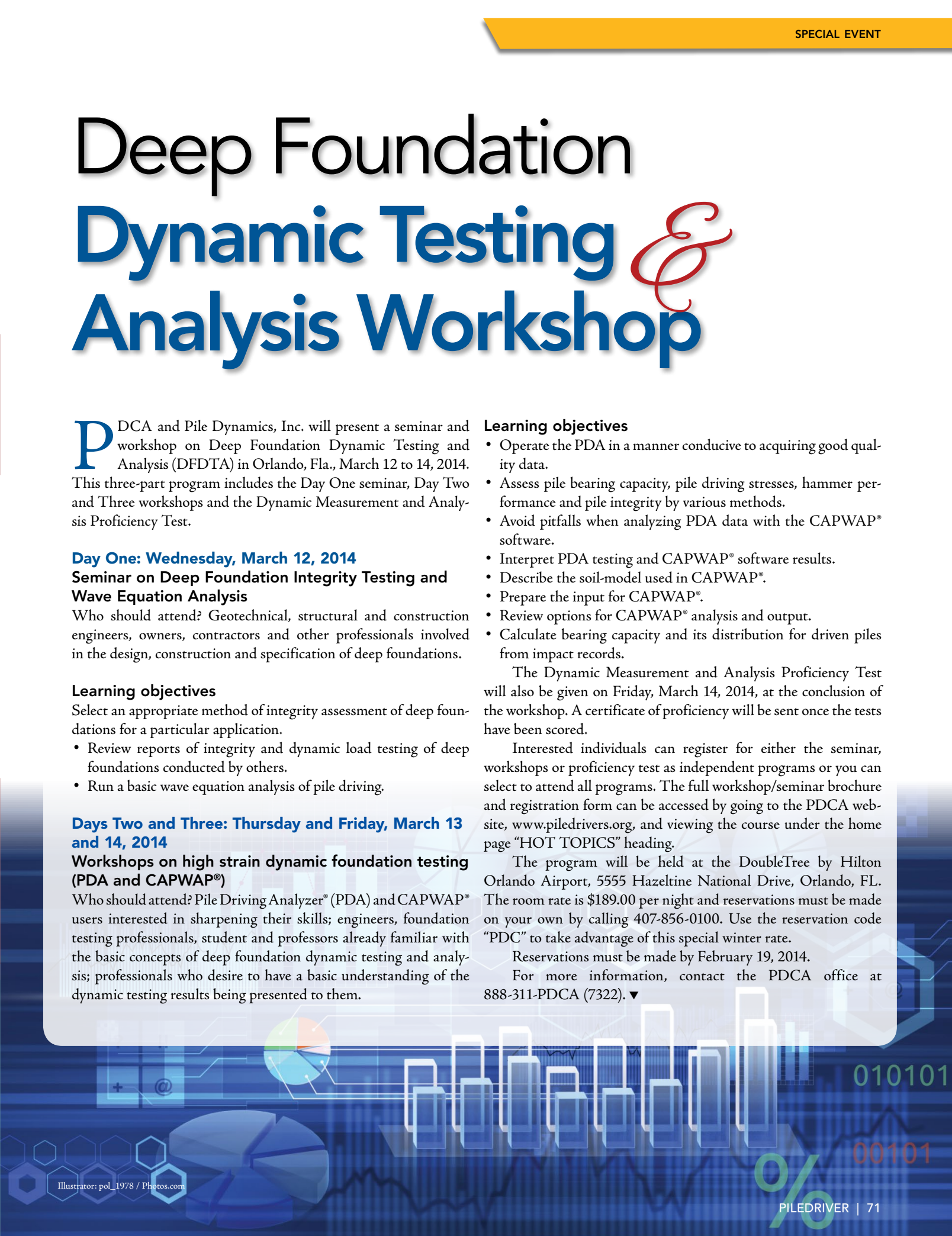
The Dynamic Measurement and Analysis Proficiency Test will also be given on Friday, March 14, 2014, at the conclusion of the workshop. A certificate of proficiency will be sent once the tests have been scored.

Interested individuals can register for either the seminar, workshops or proficiency test as independent programs or you can select to attend all programs. The full workshop/seminar brochure and registration form can be accessed by going to the PDCA website, www.piledrivers.org, and viewing the course under the home page "HOT TOPICS" heading.

The program will be held at the DoubleTree by Hilton Orlando Airport, 5555 Hazeltine National Drive, Orlando, FL. The room rate is $189.00 per night and reservations must be made on your own by calling 407-856-0100. Use the reservation code "PDC" to take advantage of this special winter rate.

Reservations must be made by February 19, 2014.

For more information, contact the PDCA office at 888-311-PDCA (7322). ▼



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So it can be filled back up with a sea of fun-loving people.
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Tough, Trouble-Free, Patented Tapertube Piles Save Time, Reduce Costs, Outperform Others

Project-proven Tapertubes are a dramatic leap forward in on-the-job pile performance. Superior design and robust construction means this remarkable product delivers big advantages over conventional piles or other tapered piles.

Tapertube piles are the only tapered piles available with heavier wall thicknesses ranging up to 0.500" produced from mill-certified 50 ksi steel.

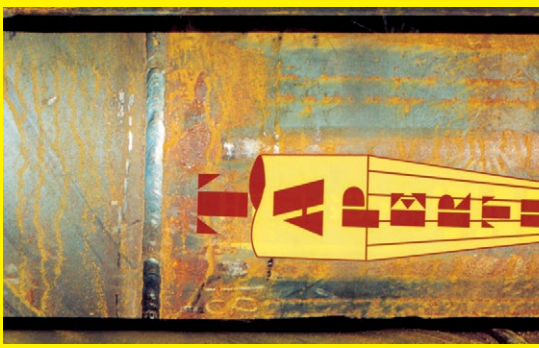
This extra thickness and higher grade steel often eliminates the need for coating and internal reinforcement. Larger hammers may be used with these piles to provide higher capacities and increased productivity, effectiveness, and lower costs.

Tapertube piles are available in an array of shapes and sizes to meet your soil and capacity requirements.

We invite your inquiries for specific site applications.

TAPERTUBE ADVANTAGES

- Made from 50 ksi steel, higher grades available upon request
- High capacities for shorter driven lengths
- Conventional equipment and installation methods
- Reduces concrete volume requirements
- Factory attached cast steel points
- Tapertube diameters are made to match standard pipe sizes or even non-standard pipe sizes
- Directly driven... no mandrel or butt reinforcement required
- Full-butt welded splices for direct bearing of pipe extension on Tapertube
- Drive-fit DFP S-1800 sleeves may be used instead of welding to extend piles
- Heavier thickness provides greater drivability, eliminates need for coating and reinforcement



DFP Foundation Products, LLC

PO Box 688 • Franklin Lakes, NJ 07417-0688
201-337-5748 • fax: 201-337-9022 • www.pileline.com

Pile Driving Terms and Definitions

PDCA's Technical Committee has produced a Pile Driving Terms and Definitions document – here are definitions A through M. Check the Quarter 2 2014 edition of *PileDriver* for definitions N through Z, or download the entire document at www.piledrivers.org.

Preferred terms are descriptively defined. Potentially synonymous (but not preferred) terms are identified with the nomenclature "Same as Preferred Term."

Allowable Stress Design ("ASD") – A design method in which stresses caused by design loads are not permitted to exceed a percentage of the elastic limit of the components.

Batter(ed) pile – Same as **Inclined pile**.

Beginning of restrike ("BOR") – The first representative restrike hammer blow.

Blow count – A measure of the effort required to advance a pile, quantified as the number of hammer impacts required for the pile to penetrate a certain distance, having units of blows per length; can be derived from **Set**.

- **Equivalent blow count** – A blow count measured over one penetration length and then converted to another penetration length (e.g., 10 blows per inch converts to an equivalent blow count of 120 blows per foot; 10 blows per 25 mm converts to an equivalent blow count of 120 blows per 300 mm).

Boot plate – Same as **Toe plate**.

Capacity (ASD) – The maximum (ultimate) load capable of being resisted. It is the lesser of the geotechnical or structural capacity. Comparable LRFD term: **Resistance, nominal**.

- **Assigned capacity** – The capacity determined from a load test; it depends on the type of load test, and the method of data interpretation. It is the lesser of the geotechnical or structural capacity.
- **Bearing capacity** – Same as **Compression capacity**.
- **Compression capacity** – The maximum (ultimate) compression (downward) load capable of being resisted. It is the lesser of the geotechnical or structural capacity.
- **Geotechnical capacity** – The maximum (ultimate) load capable of being resisted by soil and/or rock.
- **Initial capacity** – The maximum (ultimate) load capable of being resisted immediately at end of initial drive. It is the lesser of the geotechnical or structural capacity.
- **Lateral capacity** – The maximum (ultimate) lateral (horizontal) load capable of being resisted. It is the lesser of the geotechnical or structural capacity.
- **Long-term capacity** – The maximum (ultimate) load capable of being resisted at some specific time after end of initial drive. It is the lesser of the geotechnical or structural capacity. It may be more (e.g., geotechnical: set-up; structural: concrete fill), or less (e.g., geotechnical: relaxation; structural: corrosion, deterioration) than the initial capacity.
- **Shaft capacity** – The maximum (ultimate) load capable of being resisted by a pile's shaft.
- **Structural capacity** – The maximum (ultimate) load capable of being applied to a pile that does not exceed its nominal material strength or buckling limit.
- **Tension capacity** – The maximum (ultimate) tension (upward) load capable of being resisted. It is the lesser of the geotechnical or structural capacity.
- **Toe capacity** – The maximum (ultimate) load capable of being resisted by a pile's toe.
- **Ultimate capacity** – same as Capacity.
- **Uplift capacity** – same as Tension Capacity.
- **Usable geotechnical capacity** – The maximum (ultimate) load capable of being continuously resisted (long-term) by soil and/or rock resistance. It may be more (e.g., set-up), or less (e.g., liquefaction, relaxation, scour) than the initial geotechnical capacity.
- **Usable structural capacity** – The maximum (ultimate) load capable of being continuously applied (long-term) to a pile that does not exceed its nominal material strength or buckling limit. It may be more (e.g. concrete fill), or less (e.g. corrosion, deterioration) than the initial structural capacity.

Cushion – Material(s) used to dampen and more-evenly distribute forces due to impact.

- **Hammer cushion** – Material(s) placed in a pile-driving helmet.
- **Pile cushion** – Material(s) placed on a concrete pile head to reduce pile stresses.

Downdrag – 1. Downward movement of soil relative to a pile. 2. Pile settlement due to dragload (see next).

Dragload – Load transferred to a pile at some location above the neutral plane due to downward movement of soil relative to the pile.

- **Maximum dragload** – The cumulative dragload transferred to a pile from the pile head to the neutral plane.

Driving stress, allowable – The maximum stress that is permitted to occur anywhere in the pile during driving, determined as the pile

nominal material stress multiplied by a reduction factor.

Driving stress, maximum – The maximum stress occurring anywhere in the pile during driving. It should be less than or equal to the allowable driving stress.

Dynamic method of analysis – Evaluating capacity, impact force, integrity, transferred energy, etc. by simplified equations using the measured strains and accelerations induced by high-strain impacts on a pile.

Dynamic monitoring – Recording impact-induced strain and acceleration in a pile (e.g., during driving), with the data presented in terms of stress and transferred energy in the pile, as well as capacity estimates.

Elastic shortening – Downward pile movement resulting from compression of the pile material under compression (downward) loading. The head movement will be larger than the toe movement.

Elastic lengthening – Upward pile movement resulting from elongation of the pile material under tension (upward) loading. The head movement will be larger than the toe movement.

Embedment length – The length a pile penetrates into geomaterials.

Estimated embedment length – The length it is estimated a pile will penetrate into geomaterials, generally for bidding purposes only.

Design minimum embedment length – The minimum length into geomaterials a pile must penetrate to satisfy design requirements (e.g., lateral concerns, liquefaction, scour, settlement control, tension) before other termination criterion or criteria are applied.

End of initial drive ("EOID") – The last full blow of pile installation.

Follower – A structural section placed between the hammer and the pile during driving.

Foundation – A structural system that transfers loads to geomaterial.

Foundation unit, deep – A structural unit that transfers the majority of its load or stress to geomaterial at a depth (or depths) considerably larger than the unit's width.

Geomaterial – Material (native or fill) through which a pile penetrates, or on which a pile terminates. Water is not a geomaterial.

Impact force – The force at the time of the first velocity peak, delivered by a pile driving hammer to the pile head; it can be measured by dynamic monitoring.

Inclined pile – A pile driven at an angle to the vertical.

Load – Force applied to a pile.

Allowable load (ASD) – The lesser of the allowable geotechnical load or the allowable structural load.

Allowable geotechnical load (ASD) – The maximum permissible pile load, generally determined as the usable geotechnical capacity divided by a safety factor. For lateral loads, it is generally determined as the load corresponding to a maximum allowable deflection.

Allowable structural load (ASD) – The maximum permissible pile load, determined as the usable structural capacity multiplied by a reduction factor.

Applied load – The load actually acting on a pile.

Design load (ASD) – The maximum load calculated to be applied to a pile based on expected loading conditions (dead, live, soil, wind, snow, rain, flood, and earthquake) and foundation geometry; it is not permitted to exceed the allowable geotechnical load or the allowable structural load. Corresponding LRFD term: Load, nominal.

Factored load (LRFD) – The sum of nominal loads from different load sources multiplied by their applicable load factors.

Nominal load (LRFD) – The maximum load calculated to be applied to a pile based on expected loading conditions (dead, live, soil, wind, snow, rain, flood, and earthquake) and foundation geometry.

Service load – same as Load, applied.

Sustained load – A load whose application duration is longer than the surrounding soil requires to consolidate/settle (e.g., dead load or long-term "live" load such as furnishings or tank contents).

Transient load – A load whose application duration is shorter than the surrounding soil requires to consolidate/settle (e.g., live load such as wind, impact, or traffic).

Load and Resistance Factor Design ("LRFD") – A reliability-based design method in which force effects caused by factored loads are not permitted to exceed the factored resistance of the components.

Load Factor – A multiplier applied to force effects accounting primarily for the variability of loads, analysis inaccuracy and the probability of simultaneous occurrence of different loads.

Load test – A procedure during which load is applied to the pile.

Dynamic load test – A procedure during which one or more impact loads are applied to a pile, while measuring strain and acceleration, for the purpose of evaluating pile resistance.

Rapid load test – A procedure during which a force pulse (with a duration between 10 and 1,000 times the ratio of the length of the pile and the wave speed) is applied to the pile, while measuring load and displacement, for the purpose of evaluating pile resistance.

Static load test – A procedure during which measured loads are applied relatively slowly to a pile, while measuring pile movement.

Manufacturer's rated energy – The manufacturer's specified energy of a powered hammer. ▼

Desert Deep Foundations

Carving a niche in the industry

By Jim Chliboyko

Though Utah businessman and long-time piledriver Eric Hendriksen has been in the construction business since the mid-1970s (almost 40 years), after 30 years with one company, Build, Inc., he has only recently struck out on his own.

According to the company website, "Desert Deep Foundations' founder started working in the construction industry in 1976, operating a crane and pouring concrete for a pre-stressed concrete company." From there, Hendriksen went to work for the aforementioned Salt Lake City-based company. But, recently, he found himself an opportunity to go into business for himself.

"There seemed to be opportunity; I worked for another family-owned firm for 30 years but they shut down and it left a void," said Hendriksen, Desert Deep Foundations' owner and general manager. "We're a small company trying to fill that niche."

Hendriksen's new firm, Desert Deep Foundations, currently has eight employees, is based in Salt Lake City and does work in Nevada and Idaho, in addition to local Utah projects. In business terms, it's a bit of a newborn, having come into existence only in June of 2012.

When asked about the changes he's seen in the industry since the 1970s, Hendriksen replies that there hasn't been much change with the goals of the job itself.

"Pile driving is a centuries-old process," he said, but added, "The changes are in the safety requirements, things of that nature. There is a lot more emphasis on safety. The safety stuff is always a challenge; it's a never-ending battle."

Of course, Hendriksen has found – like with any business venture – there are challenges in helming his own company, like there are in any industry.

"In our area, the Department of Transportation (DOT) work has become so large, it precludes a lot of work for smaller firms," he said. "Recently, most of the state DOT work are huge contracts, and they've gone to huge companies, and gone to design-build firms, so that's another challenge.

"Overcoming the big general contractors that do their own work, that's the biggest challenge for small firms like us."

But if you're going to start a new venture, Utah is not a bad place to begin for someone in an industry devoted to building and maintaining infrastructure. A report released earlier in 2013 by the American Legislative Exchange Council suggested that Utah had the best economic outlook of all 50 states, while another study, this one done by University of Utah students, suggested that the state would need $18 billion in infrastructure investments over the next 20 years. That's a good combination for someone in Hendriksen's position.

The company website states, "We have experience on the smallest of residential jobs, to large private and public works projects with over 100,000 linear feet of driven piles, or PS/PC concrete piles up to 120 feet long with no splices."

Hendriksen said, "We're apt to go for smaller type jobs… We work for general contractors, the DOT work, refineries; we also have a good relationship with Union Pacific Railroad."

Amongst some of the jobs Hendriksen's company has overseen in the past year and a half have been projects on Union Pacific Railway bridges, pipe piles and sheet pile shoring projects for local oil refineries, driven piles for bridges across the state of Utah, sheet pile shoring at the Las Vegas Wash (a channel feeding into Lake Mead) in Nevada, amongst others.

Though Hendriksen has done work in as many as 10 different states, Desert Deep Foundations has concentrated mainly in Utah, Nevada and Idaho. Locally, opportunities abound, like with the burgeoning refinery industry in Utah. (There are plans to build the first new U.S. oil refinery in 40 years in Utah, for instance.)

His firm also does some earth-shoring work. "Our extensive shoring experience includes projects for excavations up to 60 feet deep requiring 80-foot-long sheet piles," according to the website.

"We do sheet pile installations – we've got a pretty good sheet pile inventory," said Hendriksen.

And despite the name of his firm evoking the desert, the conditions that Hendriksen and his employees observe aren't wildly exotic.

"The conditions can vary state by state. In the Salt Lake City area, it tends to be lakebed, very soft with high water tables," he said. "While soil conditions in other areas of the state vary greatly."

Hendriksen also happens to be an active member in PDCA, including helping with the Professors' Driven Pile Institute (PDPI) program held every two years. His new firm became a PDCA member in 2012, but his previous firm, Build Inc., also helped out with the PDPI.

"I have been involved from the beginning of the PDPI. In years past, Build Inc. provided a crane, hammer and pile materials, as well as labor assembling static load test frames at no cost to PDCA," said Hendriksen. "This year, we provided a crane, pipe pile materials and crew to demonstrate a pile being installed and also perform re-strike tests on existing piles; a couple of days of active site work. The hammer was provided by ICE®."

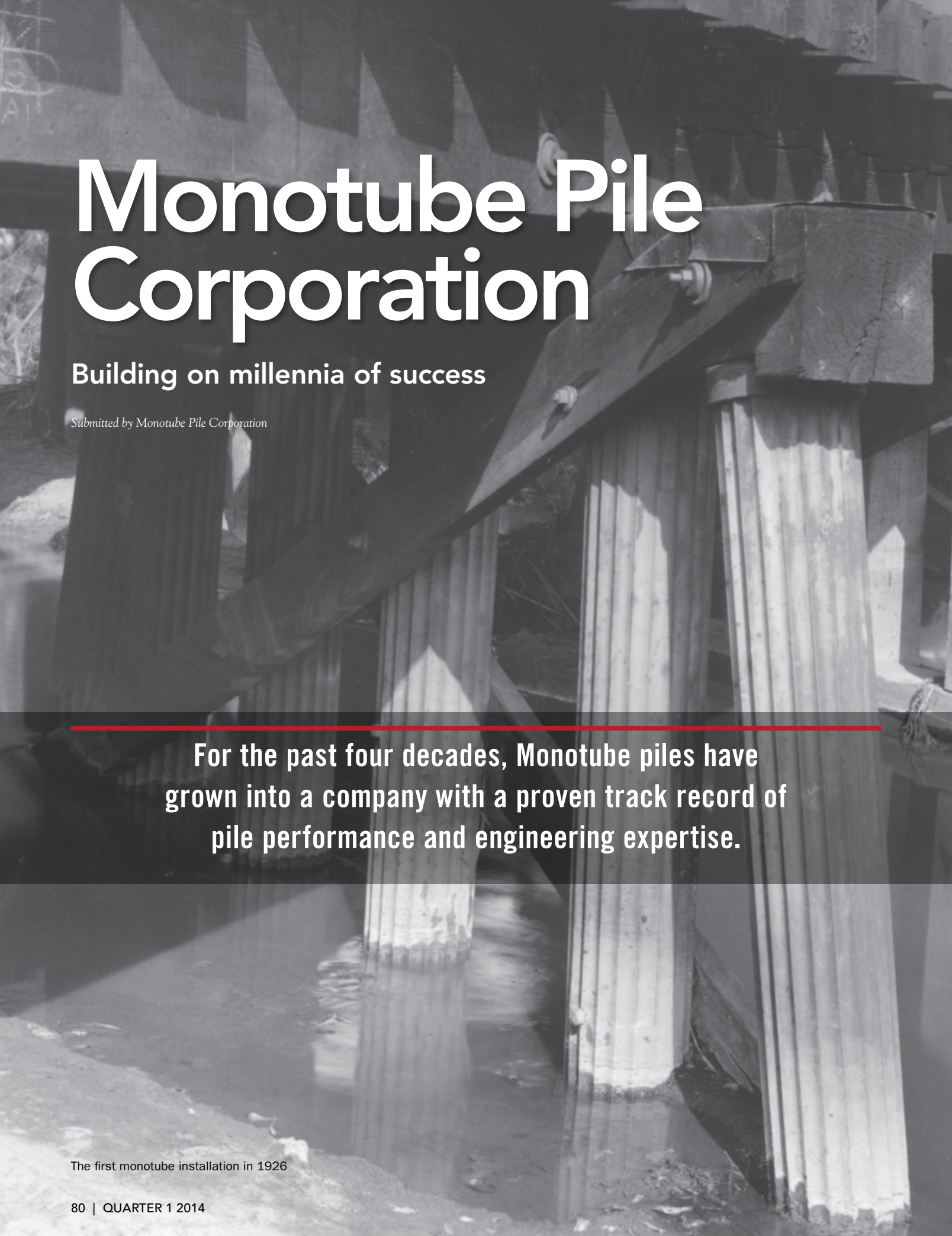
"[PDCA is] a good resource for both material suppliers and engineering consulting-type contacts," said Hendriksen. "Educationally, it's helpful. We have made quite a few friends and contacts through PDCA." ▼

Monotube Pile Corporation

Building on millennia of success

Submitted by Monotube Pile Corporation

For the past four decades, Monotube piles have grown into a company with a proven track record of pile performance and engineering expertise.



The first monotube installation in 1926

0.375-inch x 14-inch x 65-foot 100-ton design-load Monotube piles

History

Monotube piles have continued to evolve since their inception in 1926. The pile was developed in Canton, Ohio and has been manufactured in one plant through its existence.

Historically, tapered piles are thousands of years old. Timber piles have shown the advantages of the tapered pile since before the Egyptians. In the late-1800s, Alfred E. Raymond developed a smooth steel shell taper. In the 1920s, the Monotube pile evolved to fluted steel columns. The result was the beginning of decades of competition between the Raymond pile and the Monotube.

The original Raymond pile was limited to the length of its taper only, whereas Monotube developed a means of extending their taper to deeper strata by means of their straight-sided N-extensions. Thus began the advent of the Raymond step-taper to compete for these lower bearing strata. Now, the mandrel-driven Raymond step-taper could go even deeper than the Monotube. After World War II, Monotube had to reinvent their N-extensions so that they could be spliced together end-to-end, resulting in pile lengths that exceeded 100 feet.

In the post-war years, Monotube and Raymond competed head-to-head for projects across the U.S. and internationally. The advantage that Monotube had was it could be driven with smaller equipment without a mandrel. Many pre-design pile test programs pitted Monotube against Raymond. Since Raymond drove their own piles with their own equipment and Monotube piles could be driven by other pile drivers with their own equipment and their experience, Monotube won many projects for this competitive and financial advantage.

By the end of the 1900s, the Raymond step-taper was no longer a major competitor in the tapered pile industry. For the past four decades, Monotube has grown into a company with a proven track record of pile performance and engineering expertise. Monotube piles have been driven from Massachusetts to California, from Florida to Alaska and various international sites. Projects range from small, two-abutment bridges to nearly 900,000 linear feet of piling at JFK International Airport in Queens, N.Y. to baseball stadiums in Wisconsin and New York. Monotube design load pile capacities can now reach 200 tons in the right soil conditions.

Product

The Monotube is available in three different wall thicknesses: 0.1793-inch, 0.2092-inch and 0.2391-inch. Its 16 longitudinal flutes act like 16 stiffeners along the outside of its steel shell, making the Monotube perform much stiffer than a similar wall thickness pipe.

The above picture shows a 100-foot long, 16-inch diameter Monotube being lifted at one point with no appreciable bending, due to those longitudinal flutes.

All Monotube tapers have a nominal eight-inch diameter, forged steel conical pile nose. The tapers are cold-formed on 16-flute mandrels and have three different rates of taper. This cold-forming process develops minimum steel yield strengths of the Monotube pile in excess of 50,000 psi. The F-taper rate of diameter change is 0.14 inches per foot, the J-taper rate is 0.25 inches per foot and the Y-taper rate is 0.4 inches per foot. Butt diameters of each of these tapers are available in 12-inch, 14-inch, 16-inch and 18-inch.

The purpose of these various rates of taper and resulting taper lengths offer the piling engineer the opportunity to match the taper, pile diameter and wall thickness to the optimum pile configuration for the specific project site strata.

All Monotubes are fabricated from steel made and melted in the U.S.

7.625-inch x 16-inch x 100-foot-long Monotube pile

Engineering

Monotube has a staff of engineers well versed in evaluating soil borings and their interaction with Monotube piles. The company's engineering procedures include performing static and wave equation analyses to verify our conclusions.

Publications of the Highway Research Board, ASTM, ASCE and many textbooks have documented that the taper significantly increases the side friction over straight-parallel sided piles in both cohesionless and cohesive soil strata. Empirically, this increase ranges from 200 percent to over 400 percent, dependent on the specifics of the soil. Experience has found static load testing to failure more accurately represents this increase. Also, adding time between test pile installation and the actual static load test increases the advantage of the taper over straight-parallel sided piles. The resultant of higher pile capacities and shorter driven lengths offer significant savings over straight-parallel sided piles.

The increase in side friction due to the taper results in the Monotube being an exceptional tension pile. Contrary to the shape of the taper, attempts to pull out Monotube piles have been futile in many cases. Uplift pile load tests have documented this performance.

To properly evaluate the most cost effective piling solution, the company recommends dividing the specific pile design load in tons by the total pile material and installation cost per that pile. This will equate to a cost per ton supported for each type of pile being evaluated.

Conclusion

Our years of documented Monotube pile performance have provided us with the ability to best represent the performance potential of our Monotube piles. These experiences have resulted in Monotube being able to evaluate prospective project sites and provide knowledgeable recommendations as to the most appropriate and cost effective piling solution, whether it be the Monotube pile or another piling product.

Our technical publications and engineering are provided at no cost to the project. We only want the opportunity to evaluate potential friction-pile sites to determine if the Monotube pile may be the most economical piling solution for the project.

It is the Monotube mission to provide accurate information as to when and where the Monotube can perform economically with the purpose of developing a trust in the industry and subsequent repeat business. ▼

Photos courtesy of Monotube Pile Corporation

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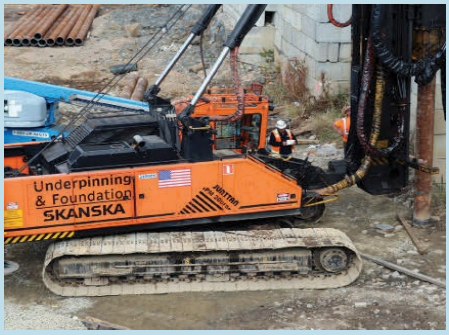

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A Foundation to BUILD ON

Hercules Machinery celebrates 50 years

Submitted by Hercules Machinery Corporation

There's something magical that happens when you mix the right people and personalities with the right ideas. Companies are founded, products are invented and lives are changed forever. That's what transpired 50 years ago when Doc Jinnings was building bridges for a construction company. He observed that every time the company needed a pile hammer, they'd have to buy one – no one rented them at the time. From that observation grew the idea for a company that helped transform the pile driving and construction industries over the last half-century.

In 1964, Jinnings founded Hercules Machinery, one of the first companies in the U.S. to rent pile driving equipment. He rigged a toolbox in the back of his 1960 Pontiac Catalina, and visited job sites across the Midwest, helping customers set up equipment and repairing it when needed.

Word began to spread that contractors could rent pile driving equipment from Hercules and soon the company was serving customers from as far away as New Orleans and Florida. The company had found its niche and it was catching on. As business grew and it became less practical to drive to job sites, Jinnings earned his pilot's license and flew wherever he was needed.

But as with most successful entrepreneurs, life was not without its challenges. Jinnings became seriously ill in 1973 and wasn't able to run the company for several months. His son John, then a senior in college, left school to help his father and, along with his mother Pat, took over the reins of the company during Jinnings' recovery.

While he'd been helping his father at the family business since he was a teenager, John was unsure exactly what to do when he first started out.

"I'd go meet with the contractors, our customers, and several of them took me under their wing and showed me how they did things. So a lot of it was on-the-job training," John recalled. He's been president of Hercules for 30 years and now owns the company along with Justin Reed, who joined Hercules 13 years ago as the company's chief financial officer.

In 1984, John visited a division of ICE® – International Construction Equipment in Europe. While there, he met a sales manager for Komatsu Western Europe who explained the excavator industry would soon be saturated and the only alternative was to find a way to make the machine a versatile tool carrier that could serve multiple purposes. The conversation was a turning point for Hercules as John and his team spent the next five years designing and testing attachments for excavators that could be used in driving pile.

Another significant point in the history of Hercules came in 1998 when John met the manufacturers of the Sonic SideGrip® Vibratory Pile Driver, an excavator-mounted attachment with an articulating side grip that speeds the pile driving process. Hercules purchased the rights to manufacture the Sonic SideGrip in the U.S. It was a move that differentiated Hercules from the competition, which were still using conventional pile hammers.

"By offering attachments that make the pile driving portion of the contractor's job more efficient, we've managed to carve out a niche that's pretty specific," explained John. "That helped turn us from strictly a rental house into a manufacturer."

It also allowed the company to expand by bringing design teams and manufacturing groups in-house, which meant Hercules could do things that other companies weren't doing. Most recently, in 2013, Hercules announced it's now the exclusive dealer of HPM foundation drills in North America, Central America and the Caribbean. HPM, owned by world-renowned drill design engineer Giuseppe Cartechini, manufactures drill mast assemblies that are mounted exclusively on Caterpillar® chassis. As it expands its product offerings, Hercules has also broadened its reach to customers with the opening of a West Coast location in Rocklin, Calif.

With all the attachments Hercules has developed, the company's goal has always been to help customers become more efficient than their competitors, which gives them a distinct advantage. John is quick to point out that increased efficiency doesn't mean fewer workers.

"Our equipment allows the contractor to spread his people out and do more than one job at a time," he explained. Instead of having six or seven people tied up on one job, a contractor can use Hercules equipment and split up his crew among multiple jobs, getting more work done at once. "That's what we enjoy doing…coming up with an idea that will let a contractor do his job more efficiently," says John. "It's all about providing something that's value-added."

After 50 years, Hercules continues to deliver an outstanding level of customer service. Jinnings himself grew up watching his father, a doctor, tend to his patients day and night, whenever they needed him. That became the foundation upon which he built his company's superior customer service. Today, John continues that tradition.

Hercules Machinery Corporation manufacturers, wholesales and leases construction equipment such as diesel pile driving hammers and foundation-related machinery

Hercules Machinery Corporation

Manufactures, wholesales and leases construction equipment

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Headquarters: Fort Wayne, Ind.

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Products:

- Pile driving
- Solar foundation equipment
- Foundation drilling equipment

Hercules Machinery founder, Doc Jinnings (left), with his son and company president, John Jinnings, celebrate 50 years in business

"Our policy is when you have a piece of our equipment, wherever you are, whether you purchased or rented from us, we'll do everything in our power to have you up and running as quickly as possible," stated John.

So it comes as no surprise that the service team at Hercules has always been larger than the sales team.

That focus on customer service has earned the company many loyal customers. While the rental business is often based on geography due to it being more economical to rent equipment that's closer to a jobsite, Hercules has customers who will rent from them even if their site is 1,000 miles away. John attributes this to the fact that they've treated their customers well over the years and as a result, they return to them time and again when they need equipment.

An example of just how far Hercules will go to serve its customers comes from a contractor who needed to drive pile on a jobsite, but didn't see any way he could comply with the state criteria and engineering requirements. He turned to John, who quickly assembled a team and ran computer simulations until they had a solution. They told the customer what he needed to do, and he was able to finish the project to everyone's satisfaction. Sixteen years later, the customer contacted Hercules after he'd moved to a different company because he wanted to work with Hercules again. He appreciated the fact that John and his team had saved him all those years ago.

When a company has achieved 50 years of success, especially in today's world, it begs the question: how'd they do it?

"We've been able to grow because we've never relied on other people to dictate our future," said John.

Hercules hasn't had to rely on anyone to tell them how much of something they could make, what they could sell and what they could do. John also attributes the company's success to the fact that they've stayed on the cutting-edge by finding ways of doing things that other companies haven't done or didn't want to do.

When it comes to driving pile, John said, "Without the foundation, the structure on top is worthless."

The same could be said for a company. The foundation upon which Hercules was established is as strong as its namesake. As for the next 50 years, the company will continue doing what has worked so well for them: innovate new equipment that increases efficiency and versatility, and serve its customers. ▼

Photos courtesy of Hercules Machinery Corporation

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3M GOING STRONG

Fusion bond epoxy coatings from 3M have protected infrastructure for more than 50 years

Submitted by 3M Company

The protection of pipelines, pilings, valves and fittings from corrosion is necessary to ensure long-term operation, minimize maintenance and to prevent costly service disruption, loss of life and injury. 3M coatings offer a solution to the protection of a wide variety of components in many applications. This is why 3M products have become the cornerstone of corrosion protection around the world.

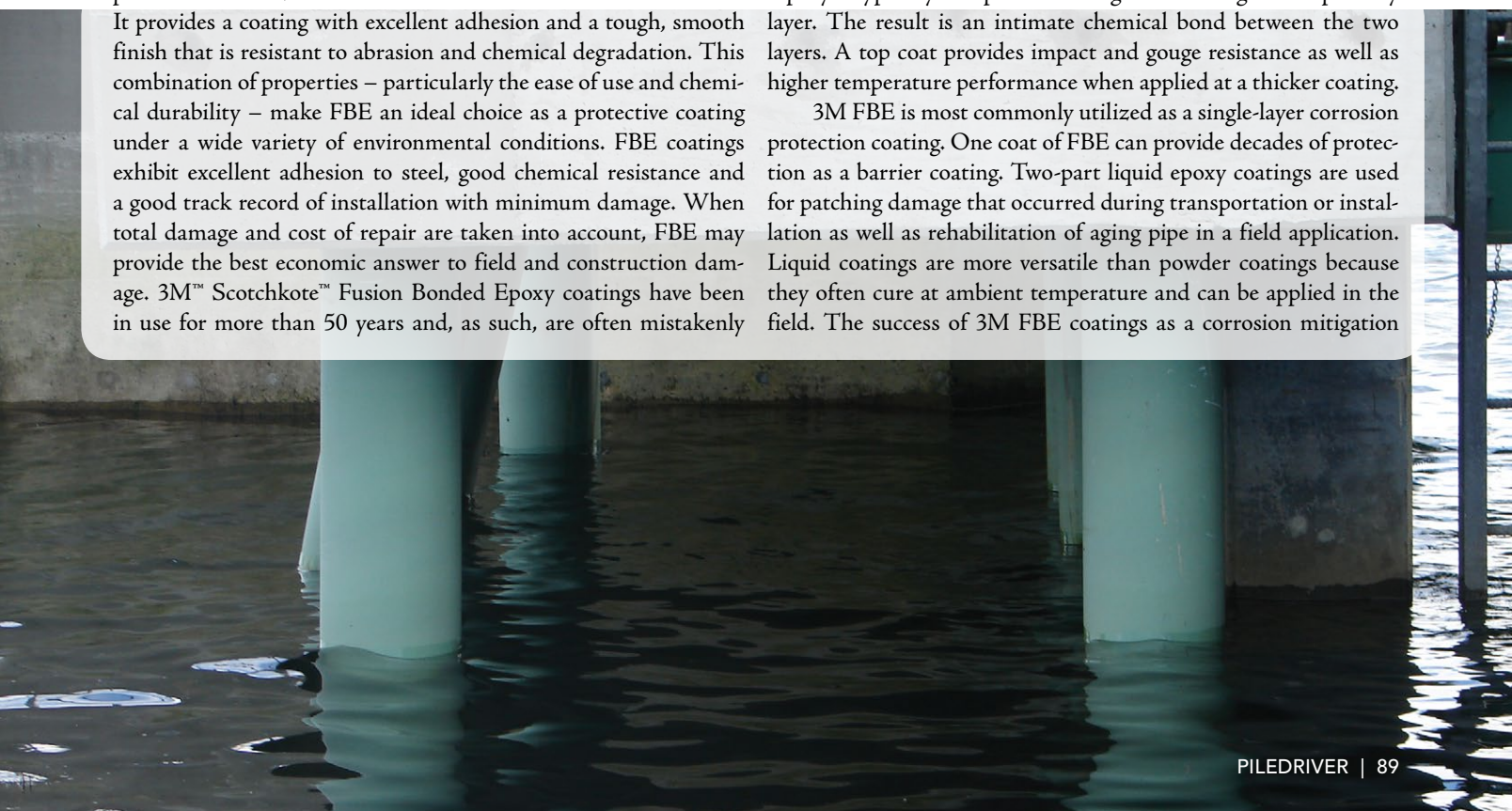
3M first introduced fusion bonded epoxy (FBE) technology for pipeline corrosion protection in 1960 with the introduction of 3M™ Scotchkote™ Fusion Bonded Epoxy 101. 3M was the originator of single-layer FBE coatings used for oil, gas and water pipelines. In fact, 3M built and operated the first two large-diameter pipe plants and the first commercial internal FBE application system for large diameter pipe. 3M also developed FBE field joint weld coating technology.

FBE is a one-part, heat-curable, thermosetting epoxy resin powder that utilizes heat to melt and adhere to a metal substrate. It provides a coating with excellent adhesion and a tough, smooth finish that is resistant to abrasion and chemical degradation. This combination of properties – particularly the ease of use and chemical durability – make FBE an ideal choice as a protective coating under a wide variety of environmental conditions. FBE coatings exhibit excellent adhesion to steel, good chemical resistance and a good track record of installation with minimum damage. When total damage and cost of repair are taken into account, FBE may provide the best economic answer to field and construction damage. 3M™ Scotchkote™ Fusion Bonded Epoxy coatings have been in use for more than 50 years and, as such, are often mistakenly viewed as an established, unchanging technology. This couldn't be farther from the truth. FBE formulations of today are substantially different from their predecessors of even five years ago. Environmental conditions and performance expectations of pipelines and pilings change over time. 3M FBE coatings continuously evolve to meet these new challenges.

FBE is not only used on pipelines and pilings. 3M has been manufacturing FBE for coating reinforced steel for concrete structures since 1972. Our coatings have been used in more than 100,000 concrete structures in North America alone. The first bridge to be installed with FBE-coated rebar was the Schuykill Bridge near Philadelphia. Now more than 60,000 bridges have been built with steel rebar treated with FBE coating. Over 600,000 tons of rebar is coated with FBE in North America annually.

In 1999, 3M introduced a two-layer FBE system that utilizes the application of a second coating on top of the base coating. The top layer typically is deposited during the melt stage of the primary layer. The result is an intimate chemical bond between the two layers. A top coat provides impact and gouge resistance as well as higher temperature performance when applied at a thicker coating.

3M FBE is most commonly utilized as a single-layer corrosion protection coating. One coat of FBE can provide decades of protection as a barrier coating. Two-part liquid epoxy coatings are used for patching damage that occurred during transportation or installation as well as rehabilitation of aging pipe in a field application. Liquid coatings are more versatile than powder coatings because they often cure at ambient temperature and can be applied in the field. The success of 3M FBE coatings as a corrosion mitigation



system has led to a steadily increasing global market share that continues to grow. FBE coatings have consistently met the demands placed upon them in a wide variety of industrial or environmental applications. The desire for increased service life through corrosion control systems has driven, and will continue to drive, further advancements in coatings. 3M is capable of meeting the needs through the use of novel chemistries and intelligent coating design.

Company history

3M was founded in 1902 in the Lake Superior town of Two Harbors, Minn. Five businessmen set out to mine a mineral deposit for grinding-wheel abrasives. But the deposits proved to be of little value, and the new Minnesota Mining and Manufacturing Co. quickly moved to nearby Duluth to focus on sandpaper products.

Five industrious and tenacious northern Minnesota businessmen with diverse occupations founded 3M. They financed the company to mine mineral for grinding wheel abrasives. Like many others in the early 1900s, 3M's founders incorporated first and investigated later. In the face of failure, they persevered and turned their investment into a lucrative venture.

Years of struggle ensued until the company could master quality production and a supply chain. New investors were attracted to 3M, such as Lucius Ordway, who moved the company to St. Paul in 1910. Early technical and marketing innovations began to produce successes and, in 1916, the company paid its first dividend of six cents a share.

Long pipe

The first bridge to be installed with FBE-coated rebar was the Schuykill Bridge near Philadelphia. Now more than 60,000 bridges have been built with steel rebar treated with FBE coating.

- The world's first waterproof sandpaper, which reduced airborne dusts during automobile manufacturing, was developed in the early 1920s
- A second major milestone occurred in 1925 when Richard G. Drew, a young lab assistant, invented masking tape – an innovative step toward diversification and the first of many Scotch® pressure-sensitive tapes
- In the following years, technical progress resulted in Scotch® cellophane tape for box sealing and soon hundreds of practical uses were discovered
- In the early 1940s, 3M was diverted into defense materials for World War II, which was followed by new ventures, such as Scotchlite™ reflective sheeting for highway markings, magnetic sound recording tape, filament adhesive tape and the start of 3M's involvement in the graphic arts field with offset printing plates
- In the 1950s, 3M introduced the Thermo-Fax™ copying process, Scotchgard™ fabric protector, videotape, Scotch-Brite™ cleaning pads and several new electro-mechanical products
- In 1969, 3M products are used in the first moon walk on July 20; Astronaut Neil Armstrong leaves a footprint on lunar dust in boots made from Fluorel™ synthetic rubber from 3M
- In 1980, 3M introduced Post-it® notes, which created a whole new category in the marketplace and changed people's communication and organization behavior forever
- 3M earned the ENERGY STAR® award for the sixth consecutive year in 2010 as more energy-saving operational practices continued, not to mention more innovative products delivering eco-advantages in support of the company's commitment to sustainability

3M is a global innovation company that never stops inventing. Over the years, our innovations have improved daily life for hundreds of millions of people all over the world. We have made driving at night easier, made buildings safer and made consumer electronics lighter, less energy-intensive and less harmful to the environment. We even helped put a man on the moon. Every day at 3M, one idea always leads to the next, igniting momentum to make progress possible around the world. ▼

Photos courtesy of 3M

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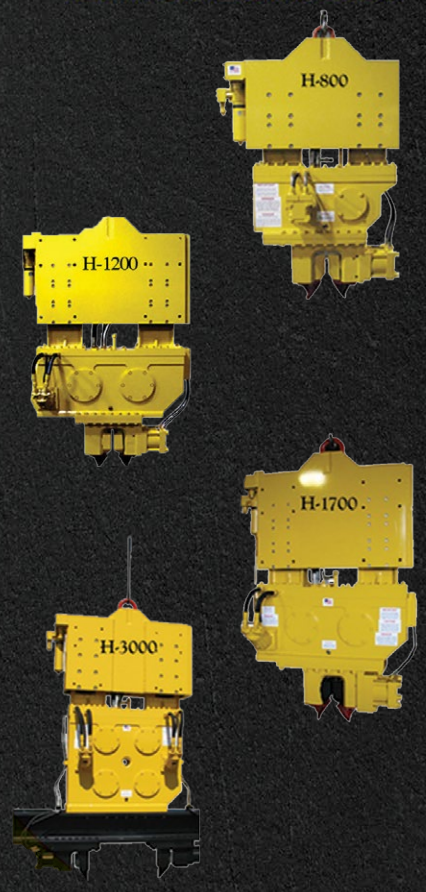

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LoClear® Piling Systems is Here to Help

New Jersey businessman invents device to help restore the shore

Submitted by LoClear®

Necessity has always been the mother of invention and Hurricane Sandy produced the mother lode of necessity. Thousands of homes along the New Jersey shore were damaged in the storm. In order to restore those homes and make them safe for the future, it will be necessary to raise them above the new high water mark set by Superstorm Sandy. Such a solution is both time consuming and expensive. New Jersey businessman Harold "Hal" Schmidt looked at the situation and developed the patented LoClear® Piling System that saves both time and money.

It all started when a friend called Schmidt about his home in Holgate on Long Beach Island. Even though the home was raised on timber pilings, water had come within inches of the first floor. The friend was looking for a cost-effective remedy that would offer protection against future storms. Schmidt advised against removing the existing piles and replacing them with longer piles, wood framing or structural steel. There had to be a better way. Front and center in his mind was the need to design a way to make the old piles longer, and so that's what Schmidt accomplished with the LoClear® system – making it

Photographer: Zina Seletskaya / Photos.com

Photographer: Anna Lisa Yoder / Photos.com

Front and center in his mind was the need to design a way to make the old piles longer, and so that's what Schmidt accomplished with the LoClear® system – making it cost-effective and time-efficient to add length to existing pilings while retaining structural integrity.

cost-effective and time-efficient to add length to existing pilings while retaining structural integrity.

Traditionally, a building being raised is moved temporarily from its original footprint while a new foundation is constructed, since large pile driving equipment cannot otherwise gain access. Many of the Jersey Shore homes are owned by families unable to afford such costly upgrading. With thousands of homes needing repairs, the construction industry has been unable to meet the need with traditional methods and equipment. The LoClear® system is about to change all of that.

The LoClear® Topp Machine® (The Original Pile Planer) mills the butt ends of new and existing nine to 11-inch piles to a perfect cylinder and planes the end surface. The system connects the newly milled piles with structural steel sleeves utilizing bolts or epoxy resin and steel rebar. All of this can be accomplished in a low clearance work site – regardless of whether the existing foundation is timber pilings or is being replaced by timber pilings. The TOPP Machine® is paired with a pneumatic driving hammer capable of running off a small air compressor.

The LoClear® system can be used to remediate foundations on any raised structure, to repair butt ends of timber piles under bridges and buildings and in marine construction. The best and most economical solution for replacing a traditional foundation in flood zones is still, and always will be, timber pilings. With the new LoClear® system, the tradition continues.

At the age of 69, Schmidt comes to the pile driving industry with a varied background of life experience. He worked his way through the Industrial Arts Education program at Trenton State (now the College of New Jersey) and taught metalworking and woodworking for 11 years in New Jersey public schools. During that time, Schmidt established a construction business that provided jobs for a number of his former pupils. In 1981, he left teaching for Wall Street and started an investment advisory business in which he continues working along with his wife, Elizabeth, CEO of LoClear® Piling Systems. In 2006, he put his tool belt back on and built a home on Long Beach Island.

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BAUER- Pileco's

This worldwide leader and provider of foundation construction equipment has origins dating back two centuries

By Lisa Kopochinski

Few companies today have been in operation for more than 200 years, but then again, BAUER-Pileco is no ordinary company.

With origins dating back to 1790, this leading global provider of foundation construction equipment has garnered a first-class worldwide reputation.

"We are recognized for our technological advances and innovation," said David Sweetin, director of the Hammer and Rammtechnik GmbH (RTG) business unit. Sweetin joined the company in early 2012 on the heels of a 30-year career as a senior warden with the Texas Department of Criminal Justice.

In his position with BAUER, Sweetin's duties involve providing oversight on equipment sales for the hammer products and RTG-variable application pile rigs, engineering and computer graphics. In addition, he is responsible for business planning and product strategies, new product introduction, maintaining relations and setting goals with BAUER's manufacturing groups in China, Germany and the U.S.

"The transition for me into this industry has been difficult at times, but very rewarding," said Sweetin. "The group at the main office in Houston, and abroad, are true professionals and are willing to help in any circumstance. This has been exemplified daily when interacting with people in the deep foundation industry. The bottom line is people, in general – regardless of their current situation – want to be treated with respect, honesty, integrity and self-worth. BAUER-Pileco is a representative of these virtues in every aspect of our business."

Global history

The BAUER Group, based in the town of Schrobenhausen in Upper Bavaria in Germany, has a long-standing family tradition. Founded in 1790, it has grown into an international construction and machinery-manufacturing leader. The company's traditional core competency in specialist foundation engineering has been expanded to encompass three distinct business segments: construction, equipment and resources. A publicly listed corporation since 2006, the company is headed by Thomas Bauer, who represents the seventh generation of the family to operate the business.

"Having more than 110 subsidiaries in over 70 countries, with more than 10,000 employees, there is literally nothing that we can't do in the deep foundation industry," said Sweetin. "That speaks volumes regarding our diversity and ability."

In 2005, The BAUER Group acquired Pileco which, with an already established

Left: Dan Dragone, CEO, BAUER-Pileco

Right: David Sweetin, Director of the Hammer and Rammtechnik GmbH (RTG) Business Unit, BAUER-Pileco

Global Reach

The new D800-12 diesel hammer for large-diameter monopiles

The D800-12 diesel hammer from BAUER-Pileco

The company's latest innovation in China

reputation, brought nearly 50 years of experience in service, rentals and technical support for a fleet of products that include pile driving equipment, piling tool manufacturing, diesel hammers, hydraulic hammers, vibratory hammers, lead systems, foundation drills and other specialty equipment to the venture. BAUER-Pileco currently has two U.S. offices – the main office in Houston with a staff of approximately 80 people, and a satellite location in Livermore, Calif. with a staff of eight.

Specialty area

As a world market leader in the developing and manufacturing of specialist foundation engineering and mining equipment, the corporation is a holding company for a number of subsidiaries. It also designs and builds heavy-duty drilling rigs, trench cutters, grab systems, vibrators and deep drilling rigs at its Germany plants in Schrobenhausen, Aresing and Edelshausen. The company also operates manufacturing facilities in the U.S., Russia, China, Malaysia, Italy, Singapore, Turkey and Sweden.

"Together we provide a full range of specialist foundation engineering equipment and equipment for exploration, mining and safeguarding of valuable natural resources," explained Sweetin. "Customers are provided with complete solutions from a single source."

These applications range from offshore, on land, bridges and buildings.

"We are also involved in the new product introduction of the D800-12 diesel hammer," he said. "Designed and manufactured specifically for the mono-pile jobs within the wind energy market, this hammer will consistently deliver 1.9 million foot pounds energy per blow and at a fraction of the cost of comparably rated hydraulic hammers."

PDCA involvement

Shortly after coming on board with BAUER-Pileco, Sweetin joined PDCA due to its strong efforts in the pile driving industry.

"I quickly realized there were many benefits of being part of this organization. PDCA has given me the opportunity to interact within this industry of professionals to gain insight and knowledge from their perspectives, which helps me to understand this new profession that I have embarked on," said Sweetin.

In fact, Sweetin has become so involved with PDCA that he was selected recently to chair a sub-committee of the association's Education Committee. He has been tasked with leading the development of the Pile Driving Professionals' Development Course, designed to introduce the profession to newcomers in the industry. The inaugural eight-hour course will take place in St. Louis, Mo. on April 1, 2014, at

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D. Dragone

Chief Financial Officer
T. Jarboe

Pileco Board of Directors
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C. Gress
R. Gruneberg
D. Dragone,
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Director of Sales Administration:
G. Thompson
Director of Sales: M. Baxter
Director of Sales: M. Drier
Director of Business Unit: D. Sweetin
Director of Human Resources: A. Alaniz

"Having more than 110 subsidiaries in over 70 countries, with more than 10,000 employees, there is literally nothing that we can't do in the deep foundation industry."

– David Sweetin, Director of the Hammer and Rammtechnik GmbH (RTG) Business Unit, BAUER-Pileco

the beginning of the PDCA 18th Annual International Conference & Expo 2014. Sweetin jumped into the task with both feet.

"It originated as a result of my own daily struggles of trying to learn the industry standards," he explained. "As I entered this occupation, I was immersed into a whole new world of terminology, methods, sciences and understandings. As I continued to struggle with these concepts, what I found is that there were many different well-written resources available and, more importantly, industry members were willing to share these with me. However, there did not appear to be one location where one could retrieve this information. I wasn't the only person in this predicament, as the industry is routinely bringing in new individuals."

Sweetin approached PDCA executive director Steve Hall with the idea to "fill the gap" by offering a place for newcomers to obtain all the basic concepts of the industry and present it in a manner that was inviting to all positions throughout the industry. Hall agreed and offered PDCA as the catalyst for delivery. The following week, Sweetin drafted a rough outline that would become a new course. Since that time, the course has been finalized with segments broken down and assigned to Education Committee members to complete the necessary curriculum.

The future

As for the next few years for BAUER-Pileco, Sweetin says the future will remain bright and be filled with anticipated extraordinary accomplishments.

"We are currently introducing the D800-12 diesel hammer for large-diameter monopiles. This hammer was designed and manufactured specifically for the wind energy market for offshore piles. In addition, we are working to revolutionize the ability of all our diesel hammers and our ability to control and communicate with the equipment wirelessly."

The company also has plans to incorporate BAUER's B-Tronic capabilities into its hammer product line for real-time monitoring on the job. In addition it will release its new line of drive plate technology, which decreases the weight of the plate while allowing for more energy transfer into the pile.

"And, we will also be hosting our first open house in China at our new manufacturing facility," added Sweetin. "We will observe the D800-12 in actual operation and observe the detail that is placed into the manufacturing of all of our hammer product line."

Ah yes, the future looks bright indeed. ▼

Photos courtesy of BAUER-Pileco

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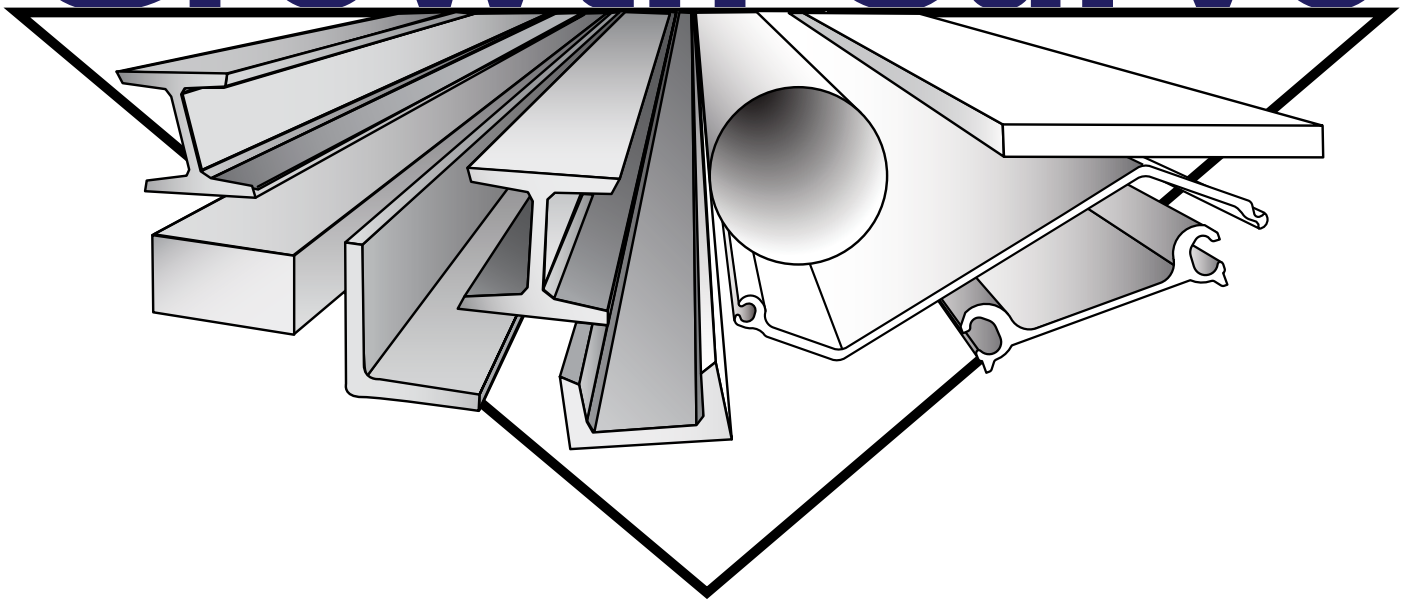

Triad Metals continues to soar in steel and piling businesses in 26th year

By Heather Hudson

Profitable for 26 years running, with $350 million in sales in the last year alone.

One of the largest structural steel, tubing and mini mill distributors east of the Mississippi River.

The only steel distributor east of the Rockies on the Ohio River that can discharge barge under roof (to protect cargo from the elements) directly into their own facility.

Ranked in the Top 50 steel service centers by *Metal Center News*.

With statistics like that, it's no wonder Triad Metals International has been booming for a quarter century. What's their secret?

According to piling manager Ed Brodsky, they have a multi-pronged approach to running a thriving business. "We run a lean ship, we treat our employees right and we're always looking for new opportunities," he said.

And one other detail: "We are one of the most efficient movers of steel on a per ton/per man-hour basis."

Indeed, Triad Metals, an associate member of PDCA, works hard for every scrap of success they've achieved. Having conquered the steel distribution world, the last five years have seen them expand into the piling industry with a separate division. They've been making major headway selling to contractors and pile drivers.

"We stock all wide flange beams, angles and channels, which other piling distributors don't. We've definitely got more of a full line of product to offer contractors," said Brodsky.

Getting started

Today's operations are a far cry from Triad Metals' humble beginnings in Philadelphia, Pa. with a small sales office and three employees. The late '80s market

Triad Metals' Petersburgh, Va. facility

Pittsburgh warehouse – barge dock view from the Ohio River

Top: Barge dock inside the Pittsburgh, Pa. facility
Bottom: Empty barge dock in Pittsburgh, Pa.

was a tough one to crack, but while they imported materials they gradually built relationships with domestic steel mills, primarily selling to other steel service centers, large original equipment manufacturers and structural fabricators, including a full range of beams, angles and strip flats.

In 1988, they caught wind that a new mill was opening in Arkansas, located on the Mississippi River, and promptly decided to move operations and open a warehouse in Pittsburgh with barge unloading.

"Our first facility is on the Ohio River. Back when we opened it, we were able to take advantage of the waterway for freight savings, bringing up longer material lengths with virtually no difference in freight costs," said Brodsky. "This continues to be an advantage today."

The next big growth came about 12 years ago when Chaparral Steel Company (now Gerdau Steel) started construction on a mill in Petersburg, Va. Triad opted to open a second facility close by.

"We have our own rail line coming into the facility with a huge stockpile for customers in that area," said Brodsky.

A couple of years ago, Triad opened their third facility in Columbia City, Ind., located strategically near the Steel Dynamics mill. It boasts a full line service center.

In all of their three locations, the company maintains a wholesale posture for distribution. Maintaining this discipline is important to the many service centers Triad sells. Brodsky says a trusting relationship with customers is a key component to Triad's business.

And when it comes to the decision to expand into piling, Brodsky says it was almost a no-brainer. "We always received calls for piling because we stocked parallel flanged products. It was a natural fit.

"However, in realizing the nuances of piling distribution, it quickly became apparent that a new business unit was necessary. We deal more with contractors and pile drivers and accommodate their unique needs. We stock piling at our three facilities, serving the Midwest and the entire east coast."

Besides H-pile, Triad Metals distributes sheet and pipe piling as well as a full range of wide flange beams, angles, channels and low carbon structural piling.

Secrets to success

How does Triad Metals keep expanding and turning a profit at the same time? Brodsky says it comes down to organizational efficiency.

"We're an extremely efficient operation. We sell a commodity product just like our competitors but we feel as though, with our systems and economies, we set ourselves apart."

That includes competitive advantages like the aforementioned facility right on the water, where Triad employees unload and deliver materials.

Three shifts run a minimum of 24/5 at each facility. The third shift is dedicated to processing material, such as cutting to size with various saws, cambering and tee splitting for fabricators.

The only processing they typically need to do for pile drivers is to cut the material to length.

"We don't torch cut our piles – everything is cut on a band or cold saw on automatic feed tables. It's pretty sophisticated equipment," said Brodsky.

It's what happens in those facilities and the corporate office in Horsham, Pa.

"We don't torch cut our piles – everything is cut on a band or cold saw on automatic feed tables. It's pretty sophisticated equipment."

– Ed Brodsky, Piling Manager, Triad Metals International

PZC sheet piles in Petersburg, Va.

Laser-guided automatic feed band saw in the Columbia City, Ind. warehouse

that make all the difference to Triad's success, says Brodsky. All employees are paid a base salary with a bonus system, which amounts to a higher than average industry wage.

"Everyone has a vested interest in performance, from the workers to the administrative people to sales reps. We have very little turnover and we're all extremely efficient. Incentives and respect are the key to that."

For pile drivers only

Though the piling division is one of the newest additions to Triad, they take their commitment to customer service seriously.

Part of that means they maintain high inventory levels for quick delivery and are capable of cutting to size quickly. And what sets them apart may be the constant stock of wide flange beams for jobs like shoring or retaining walls. "We've definitely got a full inventory of complementary products for the piling business."

Brodsky says they're also taking the time to learn more about the piling industry.

"We're getting new information every day and are constantly meeting new people and looking for new markets."

Milestones

This past November marked 26 years in the business. It was a quiet milestone, maybe because everyone is still recovering from the huge black-tie affair that commemorated Triad's 20th anniversary.

Brodsky says the event that included all employees from every facility and their customers was emblematic of the type of culture Triad offers, with great camaraderie and team spirit.

"We're a fair and generous company in which everybody shares the wealth. We recognize that all the credit for our success goes to our employees, and we make sure they know that. It might be why we have such longevity."

What does the future hold for Triad Metals? Two new facilities are in the planning stages and will feature piling, structural steel and also some new products.

You can be sure of one thing: they'll always be growing. ▼

Photos courtesy of Triad Metals International

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Terracon Consultants, Inc.

Delivering quality geotechnical services to clients from below-ground-up

By Alfred H. Hartley, Jr., M.S., E.I., Terracon Consultants, Inc.

Terracon Consultants, Inc. (Terracon) is a 100 percent employee-owned consulting engineering firm that provides high quality services to our clients. Since 1965, Terracon has evolved into a successful multi-discipline firm specializing in environmental, facilities, geotechnical and materials services. Over its history, Terracon has achieved significant expansion through both internal growth and acquisitions.

Terracon's growth model has been successful, even during challenging economic times. We currently have 3,000 employees in 140 offices and 40 states nationwide. Our company personnel perform services on thousands of projects each year for both private industry and public agency clientele.

Our firm's success is further evidenced by a current ranking of 38 in Engineering News-Record's 2013 listing of the Top 500 Design Firms, as compared to a ranking of 58 a decade ago.

The success of Terracon is built on a philosophy of providing quality services, controlling project costs and managing risk, while being responsive, resourceful and reliable to our clients. Our culture, systems and structure enable us to excel at both small and large projects. By combining our national resources with specific local area expertise, we consistently overcome obstacles and deliver the results our clients expect. Whether you do business down the street or across the country, we offer a variety of related services through a nationwide network of offices to meet your single- or multi-site needs.

Terracon's geotechnical services

Before highways, dams, buildings and other structures can be built, owners, contractors and construction managers need a trusted partner to help them determine how the characteristics of the soil conditions on the site will react under the "stresses" caused by the weight of the structure. Terracon performs geotechnical services support on all phases of a project, from preliminary design through completion of the building process. Our geotechnical services include:

- Making judgments and advising owners on the structural and economic feasibility of a project from the standpoint of subsurface conditions
- Determining the physical and engineering characteristics of the soil/rock and their probable behavior under stress, interpreting this data and recommending design parameters
- Observing conditions during construction and recommending, when necessary, modifications to the design of the project

Terracon participates as a vital member of the project team, focusing on project objectives and using innovative technologies to provide practical design recommendations.

Deep foundation services

Deep foundation testing has become an important part of the construction process for major infrastructure projects. Skyrocketing materials costs, along with Federal Highway Administration (FHWA) guidelines, are now requiring deep foundation testing to reduce construction costs, to confirm a foundation's integrity and to verify long-term performance.

Deep foundation testing programs often consist of pre-construction, during-construction and post-construction evaluation with a program of load testing, construction monitoring and non-destructive testing. Terracon's professional staff provides extensive knowledge in planning and performing deep foundation evaluations.

Our experience and expertise allow us to provide the versatility and capabilities to tailor our services to provide success for your project. Terracon services are performed utilizing state-of-the-art equipment and techniques, which make us one of the industry leaders in the geotechnical field.

Non-Destructive Foundation Testing services

Non-Destructive Testing (NDT) has become an important part of the construction and management of infrastructure systems. Integrity of new and existing structures is critical for maintaining public safety. NDT is often utilized during construction for determining compliance with specifications and FHWA guidelines, as well as forensic investigations when a structure does not perform as expected.

NDT is also an important process for determining the integrity of structures with unknown foundations for future safety and/or retrofits. NDT can be applied to most common construction materials (e.g., concrete, steel and wood) for determination of construction quality control, detection of concrete voids or identification of foundation length.

Many types of NDT exist for infrastructure projects and are chosen by the type of foundation, construction method, and/or previous planning. Terracon professionals are experienced in various types of NDT that cover any type of pile, shaft or abutment foundation. Terracon offers a variety of NDT services that include Pile Integrity Testing (PIT) utilizing the Sonic Echo/Impulse Response (SE/IR) method, Crosshole Sonic Logging (CSL), Crosshole Tomography (CT), Thermo Integrity Profiling, Standard Penetration Test (SPT) Rig Calibrations and Dynamic Pile Testing, which is highlighted in the following section.

Dynamic pile testing

Dynamic pile monitoring is a quick and versatile test that uses the Pile Driving Analyzer (PDA) to evaluate the pile capacity during pre-construction and to monitor pile driving stresses during pile installation.

Terracon conducts NDT of deep foundation installation utilizing PDA methods. Our personnel have been trained on and use state-of-the-art equipment and software developed specifically for dynamic pile testing.

This process helps prevent pile damage and allows formulation of pile driving criteria. Real-time information is provided on driving performance of the hammer and soil resistance. Dynamic Pile Monitoring also confirms that pile driving conforms to established project criteria.

The procedure includes pre-drilling the pile for the instrumentation, lifting the pile into the hammer leads, and installing the strain and accelerometer transducers below the pile top and their leads. These tasks are easily accomplished by the contractor.

Data on soil resistance and pile acceleration during driving is analyzed at the PDA unit in real time, and converted to velocity and force values.

The data is later used to determine bearing capacity (using CAPWAP™ software) and developing a driving criteria (using GRLWEAP software). Terracon also performs SPT rig calibrations utilizing PDA methods.

PDA is based on the Case Method of pile testing and further information can be obtained in Standard Test Method for High-Strain Dynamic Testing of Piles, ASTM D 4945-00.

Expanded PDA and other geotechnical capabilities

Terracon has experienced significant expansion through an acquisition strategy. This business approach has benefitted the company and the Geotechnical Service Line, which expanded its PDA and related services through the acquisition of three well-known companies: Gallet & Associates, Inc.; WPC, Inc.; and Nodarse & Associates. This growth has brought Terracon a larger national presence, highly qualified personnel, and an increase in our geotechnical capabilities. Two notable projects that utilized PDA technology and other geotechnical services are summarized below.

Florida I-95 Project

Terracon performed subsurface exploration, a geotechnical engineering evaluation, PDA, EDC and vibration monitoring services during the construction of the I-95 design-build project in Florida. This effort included the widening of approximately 15 miles of I-95 to include an additional lane in the north and southbound directions from Cocoa to Titusville.

This segment of I-95 also included upgrades to bridges, interchanges and ramps to improve traffic operations. In addition, span and overhead cantilever sign structures were designed to accommodate the roadway widening.

One notable upgrade on the project included bridge widening for dual structures at the SR 50 (Cheney Highway) interchange, utilizing driven 18-inch steel pile foundations, Florida I-beams, cast-in-place deck, parapets and approach slabs. A new bridge structure was also included in the project design – the existing three-span dual structures over the Addison Canal were demolished and replaced with a single-span structure.

Keystone Pipeline

Terracon is currently performing geotechnical engineering, drilling and PDA services for the Keystone XL TransCanada Pipeline project. During this large-scale effort, Terracon has and will continue to perform these services along the pipeline route for pump stations, terminals and the main pipeline construction.

Terracon's Lenexa, Kan. office has managed and coordinated work for geotechnical and drilling services for the entire project, providing the client with a single-point-contact. Terracon's Birmingham, Ala. office has been contracting with Michels Construction to perform PDA services along the pipeline route during construction activities. Terracon is also providing geotechnical exploration, analysis and recommendations.

Deep foundation services

- Static load testing
  - Axial compressive, axial tensile and lateral loads
  - Automated data collection, load, deflection, pressure and strain
- Dynamic pile testing
- Vibration and noise monitoring
- Crosshole Sonic Logging (CSL)
- Crosshole Tomography (CT)
- Thermo Integrity Profiling
- Sonic Echo/Impulse Reponses
- CAPWAP analysis
- WEAP analysis
- SPT rig calibrations
- Pile Integrity Test (PIT)
- Drilled shaft inspection w/ Mini Sid
- Strain measurements

Benefits of dynamic pile testing

- Less damage to driven piles
- Real-time capacity monitoring during installation
- Decreased installation time
- Improved LRFD reduction factors
- Lower construction costs by reducing pile lengths
- Increased confidence in foundation capacity

Delivering success for clients

We deliver success to our clients in a variety of ways that include a broad geographic footprint (140 offices in 40 states), a large national staff (over 3,000 employees), use of new technology and innovations and a solid commitment to provide responsive, resourceful and reliable services. Terracon can make your construction project more successful from "below-ground-up" with various service lines that include environmental, facilities, geotechnical, and materials services.

For more information about Terracon services, experience and personnel, please visit: www.terracon.com. ▼

About the author

Alfred H. Hartley, Jr., M.S., E.I., is a geotechnical engineer for Terracon and has 15 years of experience in engineering consulting and construction, dealing directly with clients in design, load testing, compliance and inspection issues. His experience in the geotechnical and structural arenas gives him a working knowledge of issues in deep foundation testing and analysis, bridge design, construction and mitigation. Hartley's design and construction experience includes design and analysis of proposed and existing structures, as well as design and rehabilitation of fixed bridge projects. He has performed load tests, integrity tests and analysis on deep foundations throughout the U.S.

Photos and images courtesy of Terracon

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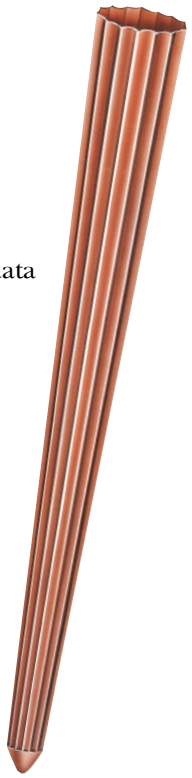

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The PDPI Demonstrations

By Frank Rausche, Pat Hannigan, Van Komurka and Joe Caliendo

Much to learn from the results

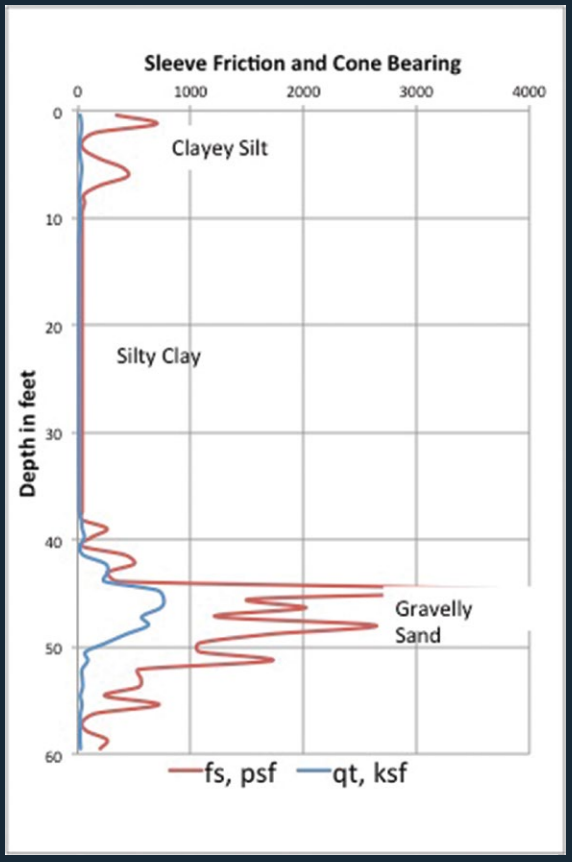
We reported in the Quarter 1 2010 issue of *PileDriver* on "Pile Driving Demonstrations – Then and Now," going back as far as 1972 to describe some of the challenges that organizers of pile driving demonstrations face. Unexpected weather conditions, unknown soil conditions, non-cooperating driving or testing equipment are all reasons for organizers being very cautious. However, the pile driving and pile testing demonstrations conducted as a part of PDCA's Professors' Driven Pile Institute (PDPI) every two years in Logan, Utah have been flawless for the seventh consecutive time, the most recent being this past summer. Since 2002, approximately 175 university professors have enjoyed not only the beautiful campus and surroundings of Utah State University, including its famous Aggie ice cream, but also the hands-on field demonstrations of pile driving and pile testing. These demonstrations provide some rather unique opportunities to observe the behavior of a few piles driven within a limited area to the same depth, and repeatedly tested both dynamically and statically. The authors believe that such unusual results should be of interest to, and shared with, the profession. As mentioned earlier in *PileDriver*, many people and organizations contributed to this data collection, and thanks are again in order to the suppliers of materials and in particular the pile driving equipment and operation.

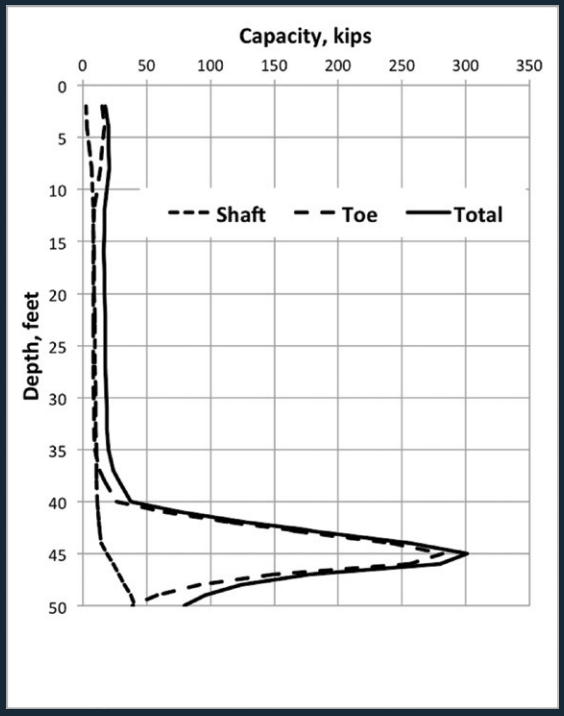
During the PDPI, after three and a half days in the classroom, where static and dynamic analysis and introductions to field testing were presented, the field demonstrations always included: driving a 50-foot pile, restrike testing of an existing pile, static axial compression and static lateral load testing. The attendees also learned how to perform standard in-situ (CPT and SPT with energy monitoring) and surface wave soil testing. In addition, after two pre-stressed concrete segmental piles were installed in 2009, low-strain integrity testing also could be demonstrated. The variety of test demonstrations obviously yielded many different and interesting results. However, for the sake of clarity and brevity, this article will only deal with axial analysis and testing issues, both static and dynamic. While not complete (some driving records and static load test results are not available anymore), the available data provides ample opportunity for studying various methods of drivability prediction, capacity determination and pile behavior over long time periods. Comparisons between measured and predicted blow counts and capacity values will be demonstrated.

Test details

The demonstration site is located in a large mountain valley in Northern Utah, surrounded by 10,000-foot mountains, and it is not surprising that the site is under some artesian pressure. In fact, carelessly drilling too deep may cause some flooding of the site if the borehole is not quickly plugged. The soft predominantly silty clay soil profile at the site consists of lakebed sediments from ancient Lake Bonneville. Soil properties were identified by a 1998 CPT test (Figure 1) showing roughly 10 feet of very stiff silty clay over about 30 feet of soft varved silty clays. A layer of dense gravelly sand with a thickness between five and 10 feet was then encountered at a depth of approximately 43 feet. Below the dense gravelly sand followed layers of silt and clay. The gravelly sand layer was an ideal bearing layer for load test demonstration purposes and care was always taken not to punch through this layer or most of the pile capacity would be lost.

All images and photos courtesy of PDCA and authors





Left: Figure 1: Soil information. Above: Figure 2: Pile capacity based on CPT-Schmertmann

Piles tested statically were always vertically driven 12.75-inch-O.D. closed-end pipe piles of either one quarter or 0.375-inch wall thickness. They were roughly 50 feet long. The pile installed in 2003 was repeatedly restrike tested and statically loaded.

Static geotechnical analysis

Using the Schmertmann Method incorporated in GRLWEAP, shaft, toe and total pile capacity vs. depth were calculated (Figure 2). Other interpretation methods are available and would probably lead to different assessments of the pile bearing capacity. The Schmertmann method indicates a peak capacity of 300 kips at a depth of 45 feet. Typically though, piles were driven to depths between 42 and 44 feet where capacities between 120 and 260 kips would be expected. Obviously, small changes in pile toe depth would produce significantly differing toe and total capacities. Like all static analysis methods, the resulting capacity values are thought to occur long-term. Disturbances caused by pile driving would be expected to reduce the shaft resistance, while toe resistance is generally assumed to be unaffected. However, with the pile toe in the bearing layer, about 90 percent of the long-term resistance would be expected at the pile toe so that shaft resistance losses during driving would not be significant.

Different hydraulic and diesel hammers were used at the test site in different years. The first tests in 2002 were done with an IHC S90 hydraulic hammer (ram weight Wr=9.9 kips, maximum rated energy Er=65.9 ft-kips), a very powerful hammer for the required driving. However, it was run at an equivalent stroke of two feet to provide enough hammer blows for a meaningful demonstration. Frequently used was a Kobelco K13 open-end diesel hammer (Wr=2.9 kips; Er=25.4 ft-kips) that was run at a relatively low efficiency thereby providing the most hammer blows. Most recently, during the 2013 demonstration, a pile was installed and another restrike tested with an ICE® Pilemer IP3 hydraulic hammer, also referred to as a DKH-3U, (Wr=6.6 kips, Er=26.4 ft-kips). This hammer was run at a two-foot stroke for the driving of a pile, and at maximum stroke (about four feet) for the restrike test.

Pile driving demonstration in 2013

The 2013 test procedures were very similar to those of previous demonstrations. On the morning of Friday, June 28, a restrike test was first performed on the test pile driven during the 2003 PDPI. This same pile (12.75-inch O.D. × 0.375-inch wall, 48.4-foot long, 42.5-foot penetration depth) also had been statically tested in the afternoon of the previous day (see below). With a stroke of four feet, the IP3 transferred at first rather low energies (less than 10 foot-kips or 38 percent of rated), but improved to about 18 foot-kips (68 percent of rated); it appeared that the variability of the hammer output was primarily caused by hammer misalignment. This is frequently a problem with restrike tests; during extended driving sequences, hammer-pile alignment is generally more easily maintained. In general, this problem makes restrike blow counts rather unreliable and that affects then, of course, the reliability of bearing capacity by dynamic formulas or wave equation analyses. In the present case, the first four blows advanced the pile only a quarter inch, while the next three blows produced a set of three quarters of an inch (seven blows for the first inch). At the end of the 20-blow restrike, the blow count was two blows/inch, and the total movement of the pile during the restrike was four and a quarter inches.

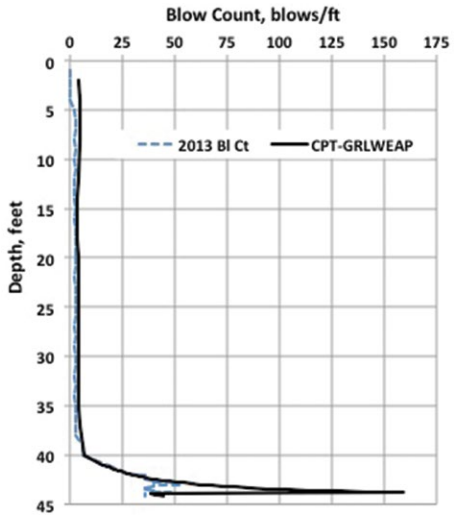


Figure 3: Driving resistance – measured and predicted

Plate 1: The instrumented 2003 pile under the IP3 hydraulic hammer

Next, a new pile (12.75-inch O.D. x 3/8-inch wall, 50 feet long) was driven by the IP3 hammer with a two-foot stroke to a depth of 41.5 feet. During a half-hour driving interruption, sensors for a Pile Driving Analyzer® (PDA), as well as for other equipment, were installed (Plate 1). When resuming driving, the blow count, which had been four blows for six inches (eight bl/ft) before the temporary stop, was now 15 blows for six inches (30 bl/ft). The pile was then driven to a penetration depth of 43.9 feet, with a final equivalent blow count of 48 bl/ft. To protect them, the sensors of the PDA, which had now reached the pile gate at the bottom of the leads, were removed during a short interruption. Then 12 more blows were applied to the pile with a four-foot stroke, yielding a four-inch penetration for an equivalent blow count of 36 bl/ft.

Drivability is normally checked by means of a wave equation analysis based on a calculated unit shaft resistance and end bearing distribution. CPT-based soil information is often considered the most reliable way of predicting pile capacity and thus blow counts. However, when we used the above described hammer-pile-soil system using the GRLWEAP program, then for a depth of 43.8 feet, the predicted blowcounts were much larger than observed (159 vs. 48 bl/ft for the two-foot stroke). Surprisingly, for the four-foot stroke, the agreement was much better (44 vs. 36 bl/ft, equivalent). Detailed comparisons are shown in Table 1 and Figure 3.

Given such differences in blow count, the energy provided by the hammer might be questioned. But Table 1 shows that the

Depth	Stroke	CPT Capacity	GW* Predicted Blow CT	Actual Clow CT	Transferred Energy GW	Transferred Energy PDA	Pile Top Stress GW	Pile Top Stress PDA
ft	ft	kips	Bl/ft	Bl/ft	ft-kips	ft-kips	ksi	ksi
43.8	2	231	159	48	10.1	10.8	23.4	23
44.2	4	253	44	36	20.5	17-19**	33.3	26-28**

Table 1: Summary of drivability results – 2013 pile. * GW – GRLWEAP ** Based on end of restrike measurements

PDA-measured transferred energy values for the two-foot stroke were very close to the GRLWEAP-calculated values (10.8 vs. 10.1 ft-kips). Surprisingly though, for the four-foot stroke operation, the energies were not quite as expected, and these differences were even greater for the compressive pile top stresses. So while the hammer performance for the continuous driving sequence was well predicted, for the four-foot stroke the hammer output may have been somewhat low. One therefore has to conclude that the resistance during driving was lower than predicted from CPT records. While we normally expect that shaft resistance is lower during driving than long-term predicted by the CPT or other static method, in the present case, shaft resistance was insignificant which means the toe capacity was lower than expected during driving. The reason could be high pore water pressures, either pile driving-induced or artesian.

Pile capacity results

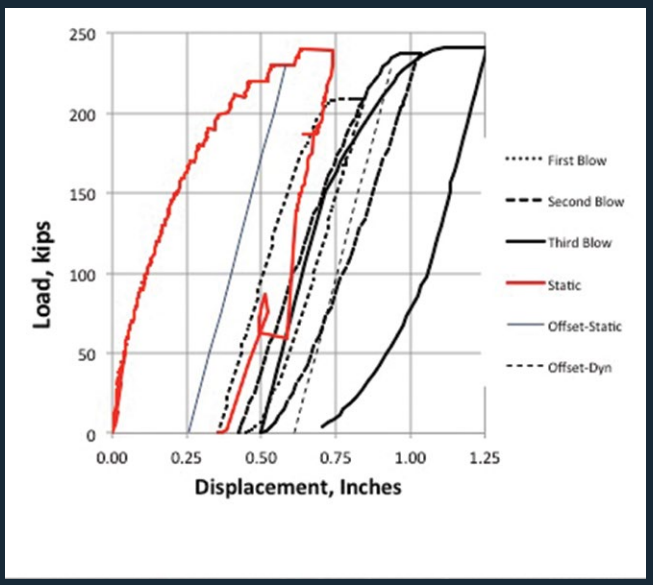
Bearing capacity was calculated by

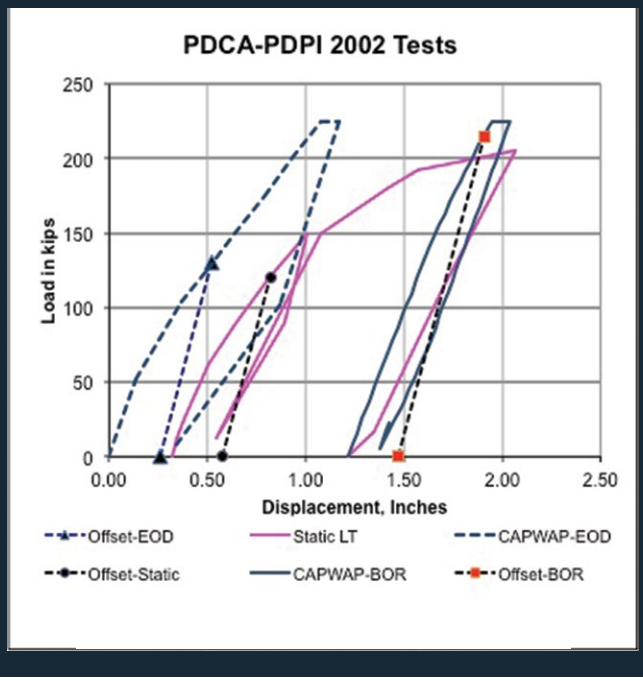
- The Schmertmann CPT Method
- GRLWEAP wave equation based on blow count and hammer stroke
- Dynamic formulas (Modified Gates and Engineering News)
- CAPWAP® signal matching (performed following the test)
- iCAP® real-time signal matching (normally performed during the test)

Complete records are not available for all demonstration tests conducted through the years. For selected tests from 2002, 2009 and 2013, representing all three hammer types employed and for which we had sufficient data available, we calculated the results and listed them in Table 2. Pile capacity values calculated by the Schmertmann method are also shown Table 2. The highest CPT-calculated capacity of almost 300 kips was expected for a depth of 45 feet, which was not reached by the various demonstration piles since there was concern that the piles would break through the bearing layer and lose most of their resistance, and that the piles would potentially penetrate the confined artesian aquifer below. (Note that for an actual project, it may not be advisable to have pile groups terminate in this relatively thin layer which is underlain by soft materials).

The load test performed on June 27 on the 2003-installed test pile resulted in a maximum load of 240 kips, and an Offset Criterion (also called Davisson Criterion) capacity of 230 kips. For the first three blows of the restrike test (June 28), evaluated and plotted by the signal matching method CAPWAP, the corresponding values were 209, 237 and 241 kips. Figure 4 shows the load-set curves from both the static load test (which preceded the dynamic test) and the three dynamic restrike test analyses (the displacements

Below: Figure 4: Load-set curves from restrike and static load tests, performed on June 27 and 28, 2013 on 2003 driven pile. Right: Figure 5: 2002 dynamic and static load set curves





Test Year Test Type Pile Year	Equiv. Blow Count	Static Offset / Max*	Hammer	Stroke	CAPWAP Offset / Max	iCap	Wave Eq. GRLWEAP	Mod. Gates	EN-Ru
	Bl/ft	kips		ft	Kips	kips	kips	kips	Kips
2002 EOD – 2002	40	N/A	IHC S90	2	125/225	N/A	160	276	596
2002 BOR – 2002	60	120/225	IHC S90	2	200/225	N/A	252	N/A	N/A
2009 EOD – 2009	50	N/A	K-13	4.5	153	N/A	160	222	456
2013 EOD – 2013	48	N/A	IP3	2	163	150	170	222	453
2013 EOD – 2013	36	N/A	IP3	4	N/A	N/A	240	320	731
2013 BOR – 2003	84***	230/240	IP3	4	237/241	223**	342	N/A	N/A
2013 EOD – 2003	24	N/A	IP3	4	205	205	183	270	528

Table 2: Ultimate capacities from static and dynamic tests, and from Modified Gates and EN formulas. *Offset Criterion/Maximum Load; **Average over first 6 blows; ***1st inch of restrike

are cumulative in this presentation). The automatic signal matching method iCAP, which is operator independent, was also performed on this restrike test and yielded a capacity prediction of 229 kips when averaging the first six restirke blows.

It is also of interest to review the results obtained during earlier tests. For example, compared to other test results available, the static test of 2002 indicated relatively large settlements (Figure 5). This pile had been installed the day prior to the static test and, therefore, had only a 28-hour setup time. According to the offset criterion, it failed at a low 120 kips, while supporting a maximum load of 225 kips. Similarly, the EOD dynamic test reached the offset criterion at 125 kips while indicating a maximum load support of 225 kips (Figure 4). Probably due to the consolidation caused by the static test and the additional waiting time, the restrike indicated a much stiffer behavior and thus an offset capacity much closer to the maximum load.

Pile capacity was also evaluated by blow-count-based methods such as dynamic formulas and wave equation analyses (Table 2). We selected the FHWA-endorsed Modified Gates Formula and the surprisingly still popular Engineering News (EN) Formula. For uniformity, ultimate capacities were calculated with the EN formula by removing the theoretical safety factor of six, yielding ultimate rather than "safe load" values. Note that early restrike blow counts are not applicable to dynamic formulas,

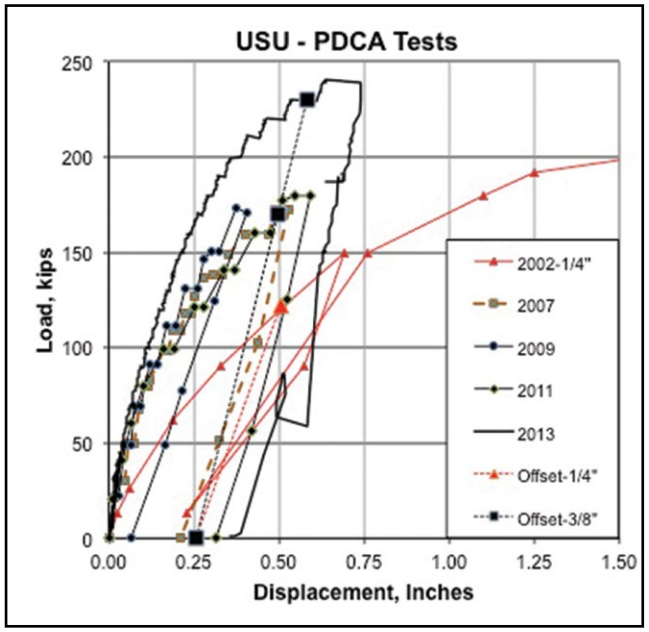
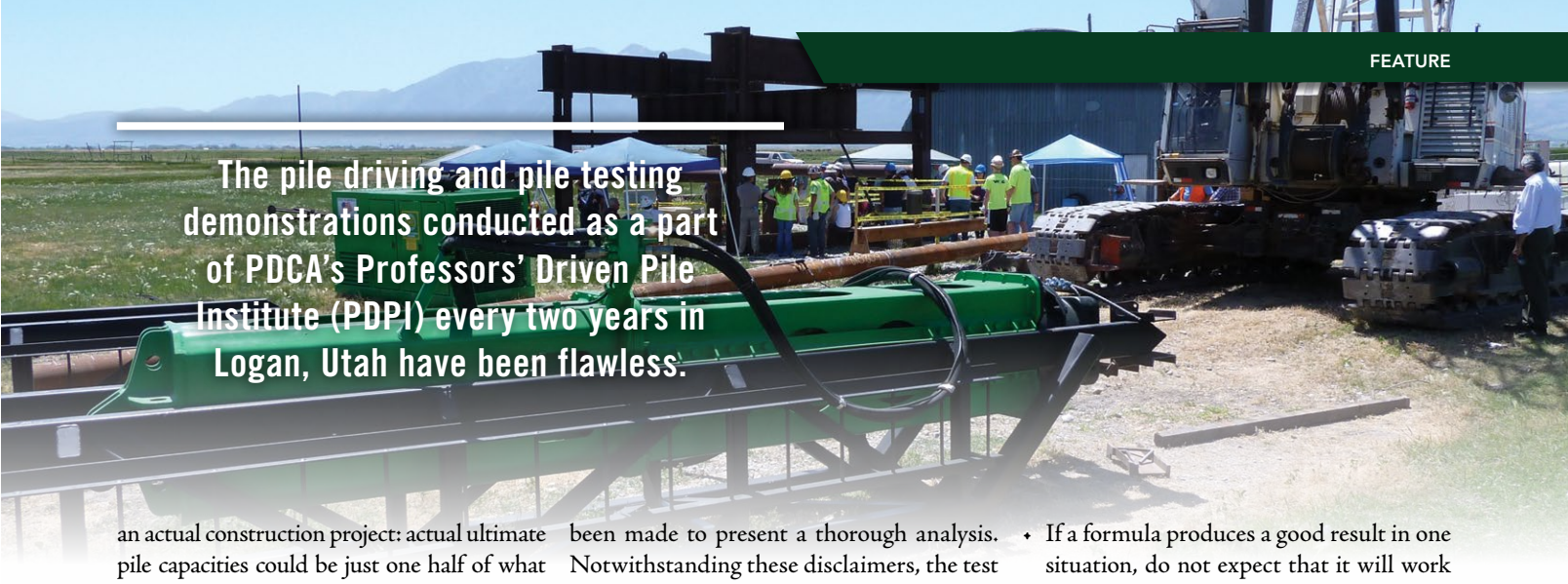


Figure 6: Several static load test results and offset lines

because their results already include an estimate of soil set-up. Only if it can be assured that at the end of restrike soil set-up effects were not present can the end of restrike (EOR) blow counts be used for formula evaluation. In Table 2, this was done for the 2013 restrike test of the 2003 pile. The Modified Gates results varied between 222 and 320 kips, while the EN formula suggested pile capacity values of between 453 and 751 kips. Actually, even the wave equation analysis cannot be trusted when used with restrike blow counts. Table 2 reports that wave equation analysis of the 2013 restrike of the 2003 pile indicates 342 kips capacity, much higher than the static test value. The reason is the low transferred energy during the early restrike mentioned above. In general, it has been observed that the variability of both transferred energies and blow counts during an early restrike cause unreliable wave equation predictions. This is the case not only for diesel hammers but, like in the present case, also for hydraulic hammers.

Of the seven static load tests performed at seven PDPI demonstrations, five load-displacement curves were available and are presented here (Figure 6) to give an impression of the variablity of pile capacity at the same site and for similar piles. Corresponding offset lines were also included; they indicate the following capacity values: 2002: 120 kips; 2007 and 2011 about 170 kips; 2009: did not fail according to the offset criterion; 2013: 230 kips. Again, the 2002 test stands out as one with considerably larger displacements than the other tests, and the 2013 load set curve reaches much higher capacities than the others, although the 2009 test could have reached a relativley high capacity, but it was stopped early. As mentioned, the larger-than-usual settlements in 2002 may have been due to a shorter set-up time period. The high 2013 capacity was explained by Utah State University professor emeritus Loren Anderson as a reduced artesian pressure since the previous year (2012) was much drier than other years. So it is also possible that the 2002 large settlements and thus low offset capacities were caused by unusually high rainfalls. Imagine if this were not recognized for



The pile driving and pile testing demonstrations conducted as a part of PDCA's Professors' Driven Pile Institute (PDPI) every two years in Logan, Utah have been flawless.

an actual construction project: actual ultimate pile capacities could be just one half of what was determined during a static test conducted during a dry time period!

Conclusions

The PDPI test demonstrations produced a large number of results. Only a few of those results could be presented here. However, we believe that the results presented are not only interesting, but they can add to our general knowledge about pile behavior in sand under artesian pressures. This article was written to summarize pile driving and axial test results. No effort has been made to present a thorough analysis. Notwithstanding these disclaimers, the test results described in this article support a number of conclusions.

- Do not expect that all static tests at a given site indicate the same long-term capacity (even for piles of the same section, driven to the same depth and terminal blow count), or that long-term capacity is a constant
- Never expect that piles driven in sand, even predominately end-bearing piles, do not exhibit soil set-up
- Never expect that two piles driven to the same depth exhibit the same capacities.
- If a formula produces a good result in one situation, do not expect that it will work equally well under all circumstances, even at the same site
- Based on restrike tests, even the wave equation analysis does not always yield reliable results because of the uncertainty of hammer performance
- Static and dynamic loading tests produced comparable results in this case, and dynamic tests helped explain what is happening ▼

Rotation-resistant Wire Rope and Design Factors

What you need to know

Submitted by Crane Tech

Many terms have been used to describe wire ropes with characteristics that either reduced or prevented wire rope spin. To this point, an 8 x 25 construction is generally referred to as rotation-resistant, while ropes such as 19 x 7, 19 x 19, 35 x 7 and others are thought of as non-rotation or non-spin. However, all of these ropes are cross laid and fall in the category of rotation-resistant as defined by ASME B30.5 and the Wire Rope Technical Board (WRTB).

Not to confuse the functioning characteristics of these ropes: an 8 x 25 rope does not have the same ability to prohibit rope spin like a 19 x 7, 19 x 19 or 35 x 7 yet; because they have an internal set of wires that wind in a direction opposite of the outer strands, they are all classified as rotation-resistant.

This is not an attempt to define how well rotation is prevented by any of the rotation-resistant type hoist ropes – that conversation is long and extensive. This addresses the issue of rotation-resistant rope and the required design factor that must be applied when a cross laid rope is used in "load hoisting." Load hoisting excludes personnel lifting and boom hoist ropes and applies to wire rope rigged to an overhaul ball or load bock.

The critical issue relating to the use of rotation-resistant rope is derived from ASME B30.5 as follows:

"Rotation-resistant ropes shall have a design factor of five or greater," unless very specific provisions are followed (see ASME B30.5-3.2.1.1(d)). Whereas, ASME B30.5 specifies a design factor of 3.5:1 for standard (not rotation-resistant) load hoisting ropes.

According to the WRTB, "rotation-resistant" describes all ropes with characteristics designed to prevent or limit rope spin: "a wire rope consisting of an inner layer of strands laid in one direction covered by a layer of strands laid in the opposite direction." This characteristic means that inner and outer strand groups provide counteracting torque. When a load is applied, the inner strand group attempts to rotate in one direction while the outer strand group attempts to rotate in the opposite direction. The counteracting rotations are what's referred to as rotation-resistant (or spin-resistant or non-spin).

Changing to a rotation-resistant rope with a higher design factor may result in more load being applied to the rope than authorized or intended.

The lifting capacity specified on a mobile crane load rating chart conforms to the various types of wire ropes allowed by the crane manufacturer. The crane manufacturer ensures you can safely apply the ropes they specify and list all authorized ropes by the rope's application on the load chart.

What's the big deal?

The big deal happens when a rotation-resistant rope is installed on a crane where the crane manufacturer specified a standard rope. The 3:5:1 design factor of the standard rope corresponds to load ratings and line-pull. Changing to a rotation-resistant rope with a higher design factor may result in more load being applied to the rope than authorized or intended.

The following example compares three ropes of the same diameter; one has Standard Construction 6 x 19 class rope, one is an 8 x 25 rotation-resistant and the third is a compact construction called Flex-X 19 high performance rotation-resistant rope. All ropes are 0.875-inch diameter designed for load hoist application.

Standard Construction – Breaking Strength
6x19 Class, Breaking Strength = 79,600-lbs.

Rotation-Resistant – Breaking Strength
8x25, Breaking Strength = 70,000-lbs.

High Performance – Breaking Strength
Flex-X 19, Breaking Strength = 87,600-lbs.

First, we apply the appropriate design factor, and then reeve each rope to 4-parts.

Standard Construction 6x19; BS = 79,600-lbs.
79,600-lbs. ÷ 3.5 equals 22,743-lbs. per part
22,743-lbs. x 4-parts = 90,972-lbs.
Rotation-Resistant 8x25; BS = 70,000-lbs.
70,000-lbs. ÷ 5 equals 14,000-lbs. per part
14,000-lbs. x 4-parts = 56,000-lbs.

Rotation-Resistant Flex-X 19; BS = 87,600-lbs
87,600-lbs. ÷ 5 equals 17,520-lbs. per part
17,520-lbs. x 4-parts = 70,080-lbs.

This basic example illustrates the significant different in load lifting capacity for the rotation-resistant rope as compared to a standard rope using a 3:5:1 design factor.

Summary

Many high performance rotation-resistant ropes are available that answer the need for a 5:1 design factor that maintains the crane's original working load limits. Users must make certain they do not change to a rope with spin-resistant performance without considering the potential for overloading the rope or violating OSHA and ASME regulations. Always consult your crane distributor before changing to a new style rope, and make certain the rope matches the performance you expect. ▼

This article was originally published in Crane Tech Tips, a periodic newsletter from Crane Tech. Sign up to receive Tech Tips at www.cranetech.com.

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Heat-related Accidents and OSHA Citations

It's never a bad time to think about keeping workers safe

Now is probably not the time of year that your business is thinking about heat-related accidents at the job site; however, it is not too early to be thinking about implementing an adequate and effective heat stress program for 2014 in an effort to eliminate any potential heat-related incidents.

Recently, the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) cited an electric company for one serious safety violation following the June 25 death of a 36-year-old worker who developed heat stroke at a job site in Chicago. The company was installing electrical conduit in an uncovered trench on the Chicago Transit Authority's Dan Ryan Red Line project when the worker became ill on his first day on the job.

"This worker died from heat stress on his first day on the job. This tragedy underscores the need for employers to ensure that new workers become acclimated and build a tolerance to working in excessive heat with a program of water, rest and shade," said Dr. David Michaels, assistant secretary of Labor for OSHA. "A worker's first day on the job shouldn't be the last day of their life."

OSHA's investigation found that the electric company did not implement an adequate and effective heat stress program and failed to ensure a newly employed worker was acclimatized to effects of heat and physical exertion. The worker was carrying heavy electrical conduit piping in non-shaded conditions when he collapsed on the job site. He died from his illness the following day.

The serious violation was cited as a result of failing to implement an adequate and effective heat stress program. A serious violation occurs when there is substantial probability that death or serious physical harm could result from a hazard about which the employer knew or should have known.

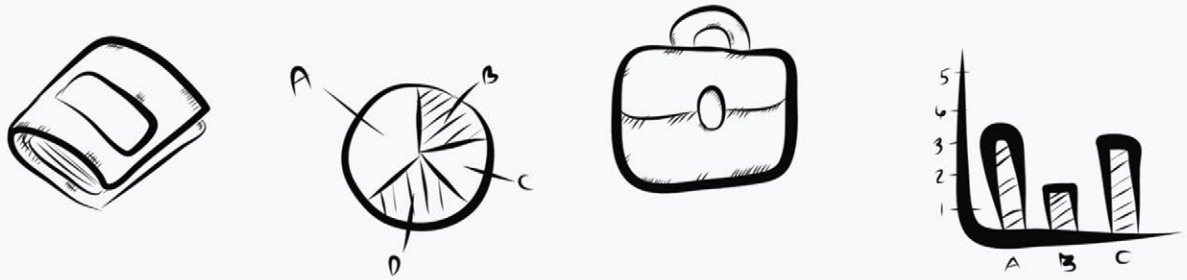
Information and resources for employers on heat illness, including how to prevent it and what to do in case of an emergency, are available in English and Spanish at http://www.osha.gov/SLTC/heatillness/index.html.

OSHA also has a free application for mobile devices that enables workers and supervisors to monitor the heat index at their work sites, which can be downloaded at http://www.osha.gov/SLTC/heatillness/heat_index/heat_app.html. The application displays a risk level for workers based on the heat index, as well as reminders about protective measures that should be taken at that risk level.

Proposed penalties for this incident total $7,000.

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing safe and healthful workplaces for their employees. OSHA's role is to ensure these conditions for America's working men and women by setting and enforcing standards, and providing training, education and assistance. For more information, visit http://www.osha.gov. ▼

Photo by serkanozalp/Photos.com



There is No Good Way to Manage People

But we have to try anyway

By Tron Jordheim, StorageMart

"People are people" the old saying goes. That means everyone brings their own personal baggage with them to work. People make poor choices, act rashly and defend their own comfort zones. They have their own agendas that often have nothing to do with the work agenda that you, as the manager, are promoting.

Sometimes the selfish and petty things people do are no surprise. Some employees repeat a behavior that has been seen before many times if you let them. Infighting, jealousy, jockeying for position and defending turf are pretty normal behaviors. Sometimes, the selfish and petty behavior is quite a surprise.

In contrast, every workplace has people who perform well, take care of themselves, are supportive of others on the team when needed and keep below the radar.

The best managers try hard to motivate and guide their people to meet agreed-upon goals. Procedures, protocols and guidelines are put in place to help keep things fair and organized. Feedback, motivation and direction are given. But at the end of the day, good managers realize that there is no good way to manage people.

But since managing people is the key to any business success, you have to try anyway.

There are many books on people management, and you may have practiced all the different styles. If you boil down all the great people management advice as much as you can, there are really only two things to do. One is to make sure your staff is getting ongoing training, feedback, correction and motivation for all their work-related behaviors. The other is to leave your people alone and let them work. The trick is to know when to do which with each person.

Here are some ways you can try.

Best practices

Try to create models of best performance and best practices for employees to learn, to copy and to aspire to. You can create goals, requirements and performance thresholds to use as measurement tools. Be fair and consistent in enforcing performance requirements and work rules and be honest with them in your assessment of business conditions, in your communication of company policies and your feelings about their performance.

Know your people

Try to get to know each of your people so you can find the right way to approach, motivate and correct each of them. Spend a little time with each of your direct reports and encourage them to spend time with each of theirs. Spending time together helps solidify teamwork,

helps clarify any issues and helps to make sure you and your people are being accountable to each other.

Communicate

Stop relying on email and memos; have personal conversations with the people in your group. Allow your people to be honest with you. Spend at least a little personal time with each person every month if you can. Learn to be a good listener. You will learn a lot about how to deal with your people if you hear what they say.

Leave well enough alone

Sometimes managers feel that people can perform better and can produce more, but if employees have found a comfortable and satisfactory balance it is best not to disturb. Resist the temptation to over-manage them.

There are times your people just need to be left alone to do their jobs. Some days you will work hard to mold people's behavior and performance when what they really needed was to be left alone to do their jobs. Some days you will leave people alone when what they really needed was to be working with someone. Try to ask yourself each day, who needs time from me today? Who needs to be left alone?

If you allow yourself to admit that there is no good way to manage people, you can do your company a lot of good by trying to be a better manager every day. Work on best practices, get to know your people, communicate personally and above all, leave well enough alone. If you try too hard to manage people or if you go too far in attempting to manage behavior, you'll end up throwing your hands up in the air and declaring there is no good way to manage people! ▼

About the author

Tron Jordheim is the CMO of StorageMart, one of the world's largest privately held self-storage companies with locations across the U.S. and Canada. He has helped lead the company to double-digit revenue growth for the last four years by embracing digital marketing and call center support. Jordheim has consulted for companies and spoken at trade events in the U.S., Canada, the U.K., Spain and Mexico. Prior to StorageMart, Jordheim managed one of Culligan Water's top U.S. bottled water franchises. With more than 40 years of experience in sales, marketing and training, he continues to be sought after as a public speaker, sales trainer and consultant.

For more information, please visit www.tronjordheim.com.

The Charleston Midtown Development

The landmark Charleston Midtown development is a milestone in the rebuilding and revitalization of a once run-down part of downtown Charleston, S.C.

Once completed, the Charleston Midtown will be the site of a nine-storey hotel complex, 37,000 square feet of office and retail space – inclusive of renovated buildings – and a 398-space parking facility
Courtesy of John King

By Nash Soonawala, Ph.D.

Dignitaries gathered for a groundbreaking ceremony in Charleston, S.C. in September 2013 for an $85-million development called the Charleston Midtown. Scheduled for completion in the spring of 2015, the Charleston Midtown will be the site of a nine-storey hotel complex, 37,000 square feet of office and retail space – inclusive of renovated buildings – and a 398-space parking facility.

It was back in 2006 when a four-acre parcel of land in downtown Charleston was rezoned by the City Planning Commission for development that would allow hotels, condominiums, apartments and retail shops. In 2008, the Charleston Board of Architectural Review ruled on which heritage buildings at the site were to be left standing, and which of the older buildings could be demolished, as first written in Charleston's *Post and Courier*.

The site location plan of the project
Courtesy of S&ME

The project is expected to revitalize the area
Courtesy of the *Post and Courier*

The project is expected to jumpstart further development
Courtesy of the *Post and Courier*

Pile Drivers, Inc. and Parker Marine joined forces to drive the piles on the site
Courtesy of the *Post and Courier*

The Charleston Midtown development has been hailed as a pillar in the redevelopment of a once-blighted part of peninsular Charleston. John King of Pile Drivers, Inc. and a past president of PDCA, remarked, "The big thing about this project is that it jumpstarts the development of the upper part of downtown Charleston, so it has a high profile."

The developers of the Charleston Midtown are Regent Partners, LLC of Atlanta and Clement Crawford and Thornhill of Charleston. The architectural work was done by Cooper Carry Inc. The general contractor is DPR Hardin, who sub-contracted the pile driving to Pile Drivers, Inc., a specialty subcontractor based in the Low Country of South Carolina. The geotechnical work was done by S&ME Inc., while Davis and Floyd are responsible for the civil engineering and Uzun and Case Engineers performed the structural engineering.

In addition to Pile Drivers, Inc., other members of the pile driving industry also contributed significantly to the Midtown project. Charles Duffy of Engineered Foundations Inc. designed the test piles, and Parker Marine Inc. manufactured, delivered and (along with Pile Drivers, Inc.) drove the piles. The latter also provided the trucking services.

Piles were driven for the Hyatt House and Hyatt Place hotel buildings, the freestanding parking garage and one other building. The five test piles, made of pre-stressed concrete, were each 81 feet long and 14-inch square. Each of the 732 production piles is 72 feet long. Even though the piles were driven up against two buildings under renovation, as well as a theater and a restaurant, no vibration problems were observed.

The equipment used for driving piles by Pile Drivers, Inc. consisted of a Kobelco CK850 crane with fixed ICE® leads and a J&M – APE 115 hydraulic hammer, while Parker Marine used a

"The big thing about this project is that it jumpstarts the development of the upper part of downtown Charleston, so it has a high profile."

– John King, Estimator, Pile Drivers, Inc.

Bucyrus Erie Series IV Super 30B crane with fixed leads and a 115 Conmaco air hammer.

King reports that the pile driving part of the project execution went almost flawlessly with production averaging about 30 piles per day.

A full suite of geotechnical tests and surveys at the site of the Charleston Midtown were performed by S&ME Inc., another PDCA member. Geotechnical information, provided to PileDriver by Greg Canivan of S&ME – also the president elect of the PDCA of South Carolina Chapter – can be summarized as follows.

- Because of some its geotechnical characteristics, driven pre-stressed concrete piles are a common and economical means of foundation support in the Charleston area. A shallow-foundation alternative to piling would have to contend with unknown surface conditions in the three- to six-foot depth range, in part because of the debris associated with structures that existed in the past at the site, including a railroad.
- Geotechnical exploration at the Midtown site included cone penetration test soundings and soil test boring. These data were used to determine soil parameters and create a vertical soil-stratigraphy section. This section shows debris and fill in the first five to ten feet below the surface, followed by alternating layers of sand and clay-silt, until the contact with the stable

Courtesy of the Pile Drivers, Inc.

geological formation, the Cooper Marl, is reached at a depth of about 60 feet. The piles were driven deep enough to penetrate the Cooper Marl.

- The International Building Code and seismic zoning information for this area were used to assess the seismic risk at the site. Site-specific seismic-response analysis was performed using shear-wave velocities determined from data gathered by a cone penetrometer instrumented with geophones. The design earthquake for this area is a 7.3 magnitude event with a probability of occurring once every 2,500 years. Tests showed that, if such an earthquake were to occur, liquefaction would be likely in the top 40 feet of the soil column, which would cause three to six inches of settlement resulting in moderate to severe damage to the structures if they had foundations terminating in this zone.

The Midtown project highlights the pile driving industry's role in the development and rebuilding of Charleston. The project has resulted in increasing property values. Daniel James of Prospect Real Estate Partners, who knows a thing or two about property values, told the Charleston *Post and Courier*, "Every pile they drive increases our property value." ▼

"Every pile they drive increases our property value."

– Daniel James, Prospect Real Estate Partners

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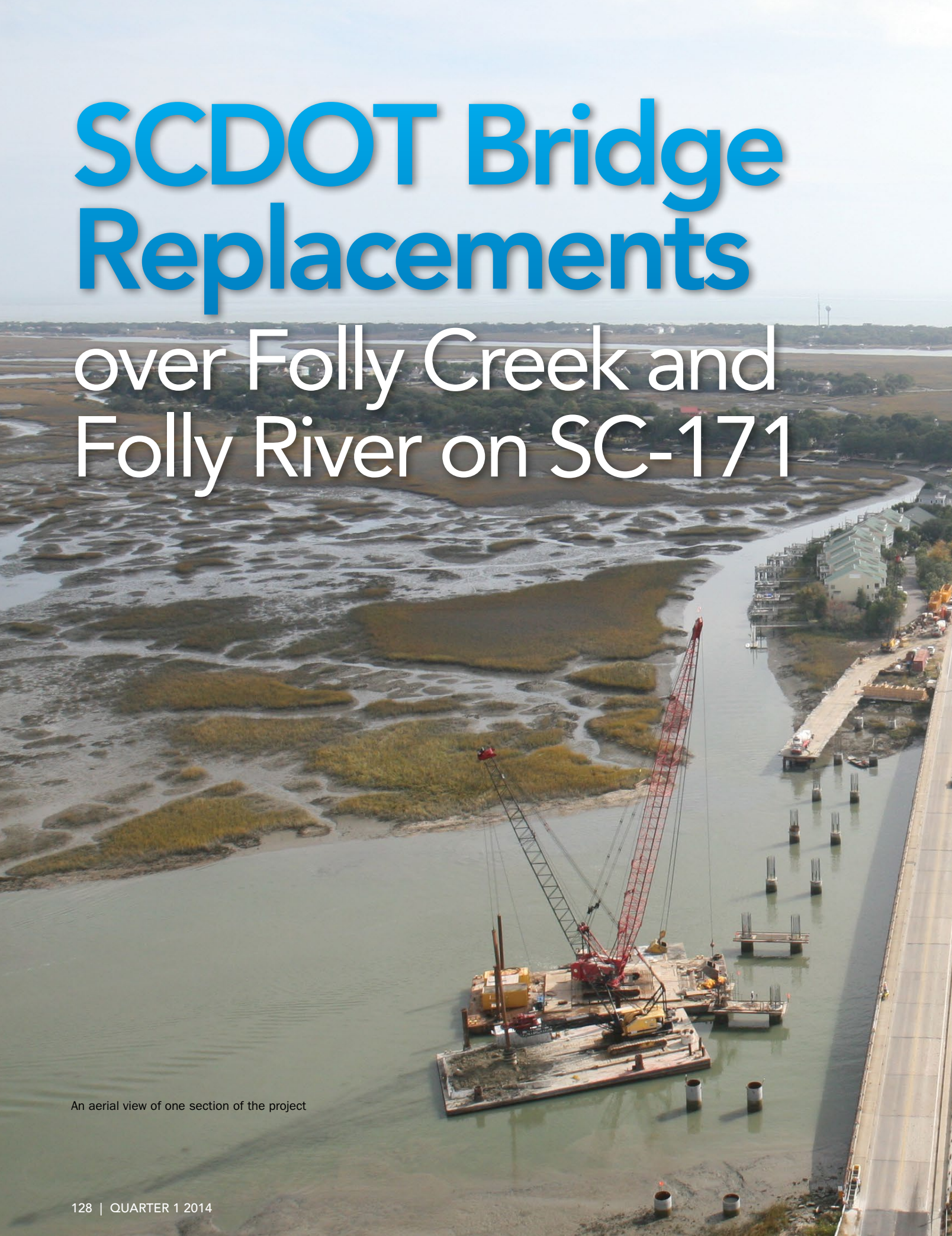
SCDOT Bridge Replacements

over Folly Creek and Folly River on SC-171



An aerial view of one section of the project

Pile driving was the answer to critical construction concerns

Submitted by Cape Romain Contractors, Inc.

Folly Road (SC-171) in Charleston County, S.C. is a two-lane combination of salt-marsh causeways and bridges that connects the Town of Folly Beach, locally known as the "Edge of America," to the rest of the U.S. In April 2012, the South Carolina Department of Transportation (SCDOT) awarded a $32-million dollar Folly Road bridge replacement contract to Cape Romain Contractors, Inc. of Wando, S.C. The contract replaces two very aged structures, one being an existing 850-foot bridge across Folly Creek, and the other a 1,050-foot bridge across the Folly River. Both structures were built nearly 60 years ago and are severely deteriorated, due to their age and exposure to the saltwater environment. The existing structures consist of precast octagonal concrete piles, a combination of steel and concrete beams and a reinforced concrete deck.

Foundation layout

Vibration of a steel H-pile

One interesting facet of the project is the requirement to improve the poor soils at the bridge ends. The Charleston area sits atop a seismic fault line, therefore SCDOT is required to comply with new seismic design guidelines in order to protect new roads and bridges that it builds within this area, especially on major roadways, bridges and evacuation routes. The original plans and specifications called for Deep Soil Mixing (DSM) – "This work shall consist of using deep soil mixing (DSM) techniques to improve weak subsurface soils by mixing a binder material with in-situ soil…." This soil improvement methodology required a highly specialized contractor, with a highly regulated, confusing and stringent set of quality controls.

Sonny DuPre, president of Cape Romain, sought to Value Engineer (VE) this particular scope of work right from the outset.

"Soil mixing with cement concerned me in several ways – environmentally, project schedule, cost and just the overall feasibility of it," said DuPre. "I turned my attention to construction means and methods that we deal with on an everyday basis; means and methods that we have control over".

Driven pile was the answer.

Value engineering with SCDOT is a process that DuPre had been through before.

"Eight to ten years ago, we value-engineered a bridge approach, changing it from stone columns to driven pile, and so I focused on that approach again."

With both the earlier VE, and with this Folly project, Cape Romain called upon F&ME Consultants out of Columbia, S.C. Together with Zane Abernathy, P.E. and Shawn Epps, P.E., Cape Romain set out to value-engineer a $10-million dollar set of soil improvements.

The SCDOT Value Engineering specification requires a two-step approval – preliminary and final. Among the affects the proposal is to involve are "Service life." "Reliability," "Economy of Operation" and "Design and Standardized Features." Both Cape Romain and F&ME felt it had much to offer in meeting these criteria. However, the decision to propose such a significant change is risky and arduous. The SCDOT reserved the right to reject the proposal, and there are no time extensions given for their review time. The entire process, for both preliminary and final approval, took 12 months.

Although the contract duration was nearly three years, the 12-month VE process did place the bridge approaches on the critical path to an on-time contract completion. Currently the VE construction is underway, nearly 30 percent complete and is being performed by Cape Romains's own forces.

"Having control of such an integral part of the project is key," said DuPre.

The site for the SCDOT Folly project is typical for coastal South Carolina. There are vast expanses of marshes, creeks and rivers, which lead from the mainland to the barrier islands. Both Folly Creek and Folly River have long, earthen causeways leading out to the waterway crossings. Down about 40 feet from the existing road surfaces is the Cooper Marl, a stiff calcareous soil, which is an excellent bearing stratum. What is on top of the marl around the Charleston area, however, is typically very poor soils – loose sands and silts. In order to improve the bearing capacities of the soils, the marl needs to be reached, whether it's by creating columns with stone or cement that are bearing on the marl, or by driving piles into the marl.

What the pile-driving industry brings to the table is reliability, familiarity and a proven track record.

Cape Romain knew that it could improve the end product by improving the poor soils and protecting the new bridge abutments. Mixing cement into the soils posed serious environmental challenges, quality-control challenges and was extremely expensive. Driving piles and then installing a heavy reinforced concrete slab atop those piles addressed all of those challenges in a positive way. Environmental and quality-control risks were greatly reduced, and a savings of approximately $1.7 million dollars was realized.

In all, there are two bridges and therefore four bridge ends and areas associated with the value-engineering scope. Approximately 400,000 linear feet of soil mixing was replaced with nearly 1000 HP 14 x 73 piles, 5000cy of concrete and 600,000 pounds of reinforcing. The piles range in length from 65 feet to 85 feet, are being supplied by Skyline Steel and produced by Skyline's parent company, Nucor Yamato Steel, out of their Armorel, Ark. mill. One challenge is delivering the piles in one length, direct to the jobsite. This was achieved through special permitting and special equipment, and close relationships that Skyline has with specialized haulers.

An extensive pile testing program was performed by Cape Romain and S&ME out of Charleston, as a part of the value-engineering proposal. Four piles at each location were installed utilizing different hammers, as well as testing for installation full length with a vibratory hammer (MKT V22) versus installing part way with a vibratory hammer, and then completing the driving with an impact hammer (Delmag D19). All piles were PDA tested on a restrike basis, which is common with the Cooper Marl and the "setup" that is achieved over time. With approximately 15 feet of penetration into the Cooper Marl with the HP 14 x 73 piles, the average calculated "ultimate" pile bearing resistance was 123 tons. Additionally, test piles were installed full length with a vibro hammer, as well as full length with an impact hammer, to test the affect that each installation method may have on capacity.

"We wanted to prove that installing these HP piles full length with the vibratory hammer would not have a negative impact with respect to both capacity and vibration," stated DuPre. Indeed, the piles that were installed full length with the vibro hammer tested well with the PDA restrikes, as well as testing well with vibration monitors setup throughout the site.

"This was key for us," said DuPre, "because we knew when it came time for production piles, being able to install the piles with the vibratory hammer was going to greatly improve our efficiency."

A heavily reinforced concrete slab, ranging from two and a half to three feet thick, is then cast on top of the driven piles. There is a top and bottom mat of reinforcing, four dowel bars

Driving piles and then installing a heavy reinforced concrete slab atop those piles addressed job site challenges in a positive way

that penetrate each and every pile and reinforced concrete walls at the edges of the slab to hold the roadway fill in place. Each bridge-end area ranges in length from 225 feet to 300 feet in length, with the concrete pours divided into approximately 50-foot-long areas, with multiple pours required to complete one area of ground improvement. A one-foot deep lift of #57 stone is called for atop the slab for drainage purposes, and then fill dirt is placed up to the sub grade. Specially designed stainless steel expansion joints are required at the interface of the VE pile-supported slab and the end wall and pile cap at the bridge ends.

Both engineering and construction complexities were overcome. With respect to engineering obstacles, meeting seismic design requirements and complying with the new geotechnical design manual was difficult. In the case of a seismic event, dealing with liquefaction of the soils and how those forces affect the VE slab, piles and the bridges ends is extremely tedious. A tremendous effort was required with both the original soil-mixing design, and the pile-supported-slab design. Experts from across the country were consulted with respect to proper usage of seismic-design software, soil properties and affects of liquefaction. Construction challenges are working in direct contact with an extremely environmentally sensitive area, working immediately adjacent to an active roadway and working within the tidal zone.

It is exciting to see driven piles used for soil improvement. In coastal South Carolina, improving poor soils and dealing with seismic issues is big business. It's business that the pile driving industry should strive to be a part of. What the pile-driving industry brings to the table is reliability, familiarity and a proven track record.

"Soil improvements are indeed big business around here, and it is business that I am convinced the driven-pile industry has a significant part in," concluded DuPre. ▼

Photos courtesy of Cape Romain Contractors

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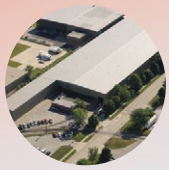

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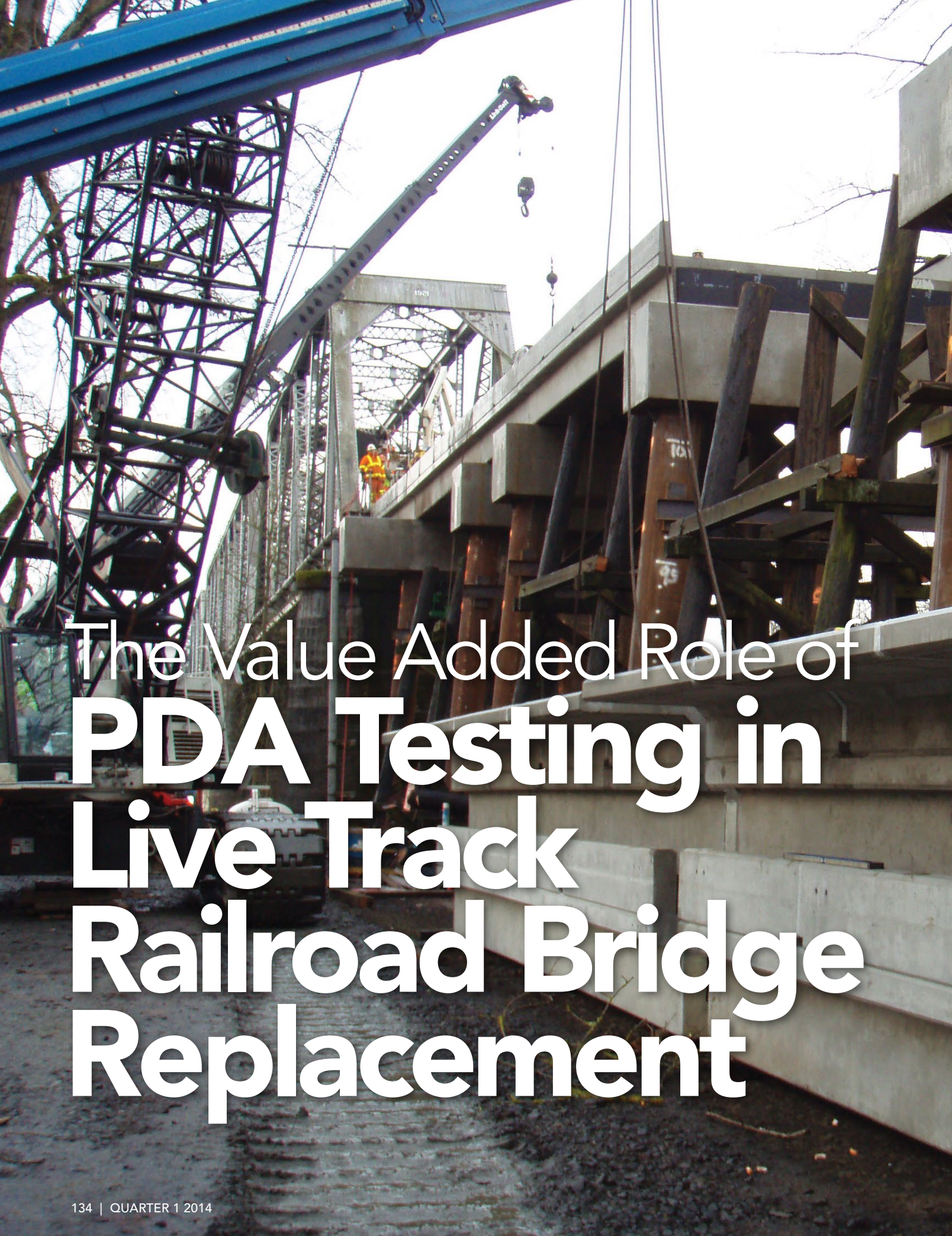


The Value Added Role of PDA Testing in Live Track Railroad Bridge Replacement

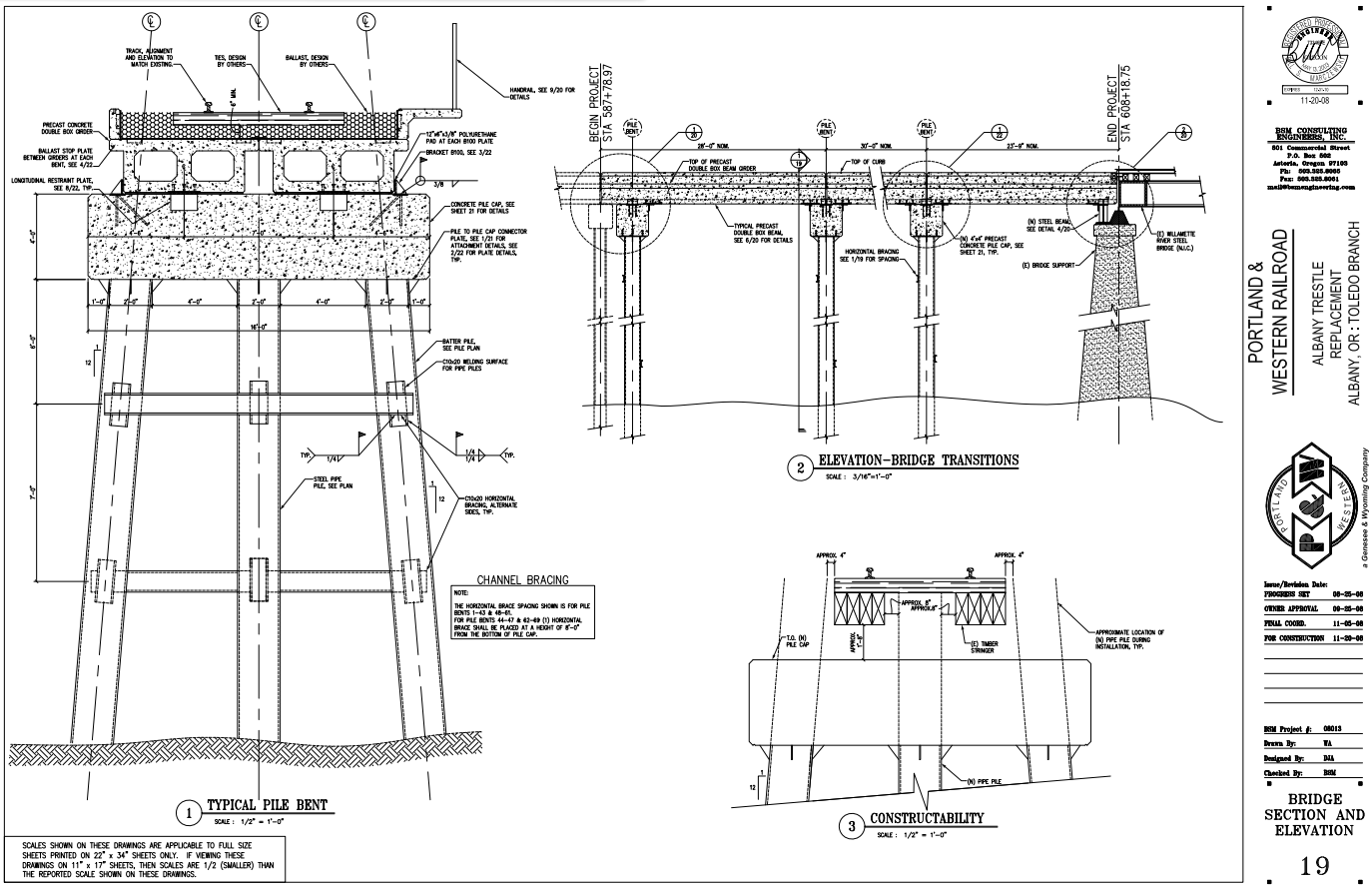
A powerful tool to assist designers and contractors

By Bill Marczewski, P.E., M.ASCE, BSM Engineering, Inc.

Introduction

The Portland & Western Railroad (P&W), a division of Genesee & Wyoming (G&W), owns, operates and maintains approximately 500 miles of track on grade, and nearly 12 miles of elevated track (bridge structures) in the State of Oregon. P&W needed to replace an existing 2,100 linear feet of timber pile supported trestle carrying daily freight traffic to Albany, Ore. Adding to the need to replace the existing timber trestle quickly, a requirement to not interfere with daily freight traffic was included in this request. A live track replacement technique was required.

In the summer of 2008, the Owner requested that BSM Consulting Engineers (BSM) contract with P&W to serve as the Engineer of Record for the P&W Albany Golf Course Trestle Replacement Project. Through a competitive bid process, the Owner selected Hamilton Construction Company from Springfield, Ore. to serve as the General Contractor for the project. The Owner retained the services of GeoEngineers, Inc. from Portland, Ore. to perform the sub-surface investigation and K&D Surveying from Albany, Ore. to provide the existing site and structure geometric surveys.



Live track replacement technique

Site conditions

The existing timber trestle was supported on five-pile timber bents spaced at 15 feet on center, using large timber pile caps and multi-ply timber girders beneath the rail to form the open deck trestle. The lengthy trestle consisted of approximately 1,100 linear feet of curved track and girder with another 1,000 linear feet of tangent track and girder in the approach to their 585-foot Willamette River Bridge Crossing in Albany. The elevation of the trestle varied from 20 feet above grade at the beginning of the project to 40 feet above grade at the Willamette River Bridge transition.

The geotechnical site conditions were determined through nine soil borings reaching depths below ground surface on the order of 100 feet at each location. Soil profiles A through C, located on the north side of the Willamette River, included Borings 1-5 and were used to develop the deep foundation design. The soil layers generally consisted of an upper layer of medium stiff to very stiff silt approximately 25 feet thick, underlain by a layer of medium dense to very dense sand with traces of silt and gravel approximately 30 to 50 feet thick, which was further underlain by a deep layer of medium stiff to very stiff clay with traces of silt and sand. The standard penetration test (SPT) data indicated that the lower region of the middle layer of soil had potential to support an end bearing pile toe condition with SPT N-values on the order of 55 bpf; however, the upper region of the bottom clay soil layer generally had low SPT N-values on the order of 10 to 22 bpf. Because of these reported SPT N-values at the transition between the middle and bottom soil layer, BSM elected to use a closed end displacement pile. The depth of pile embedment was anticipated to decrease as the construction effort moved away from the Willamette River.

Design for constructability

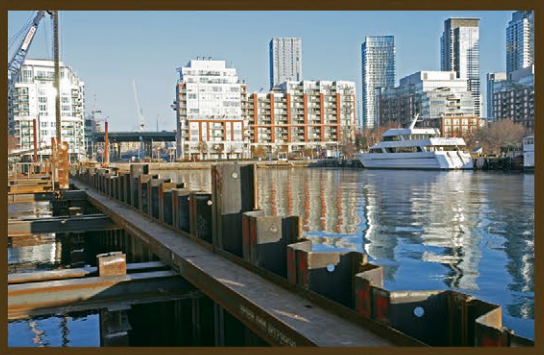
The need for a live track replacement technique meant that we would most likely deviate away the standard design methods used by Burlington Northern Santa Fe (BNSF), whose standards are adopted and utilized by P&W. As a result, BSM was asked to perform a comparison of alternatives in order to demonstrate that the forthcoming proposed pile bent configuration would indeed be the best approach for replacement.

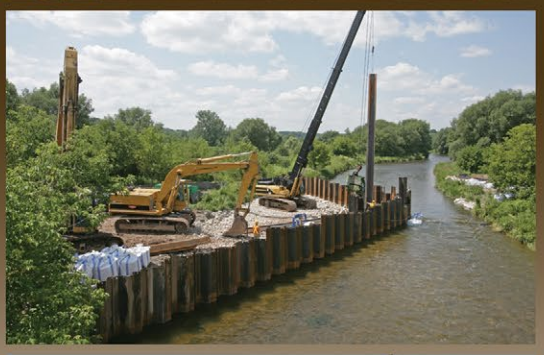
A total of five different pile bent configurations were evaluated that included H-piles, concrete drilled shafts and driven pipe piles. The selected pile bent configuration consisted of three 24-inch diameter by 0.5-inch-thick wall pipe piles, to be driven from 65 feet to 90 feet below ground surface, depending on the particular soil profile at each pile bent. Each new pile bent would be driven at the mid-span of the existing timber pile bents for two main reasons: first, to avoid the costly expense of shoring the existing pile bents with live traffic, as is often done in the industry, but also because the engineers at BSM wanted the new piles to be driven into undisturbed soil. The existing timber displacement piles were not to be extracted, but to be broken off three feet below grade and backfilled to prevent loosening of the soil. The proposed construction of the three-pile bent system would accommodate the daily freight train traffic (every eight to 12 hours) and was determined to be the least cost of installation.

The complete replacement concept consisted of a total of 69 pile bents using three 24-inch diameter by 0.5-inch-thick wall closed end pipe piles spaced at 30 feet on center that support four-

(continued on page 139)

Piling Solutions





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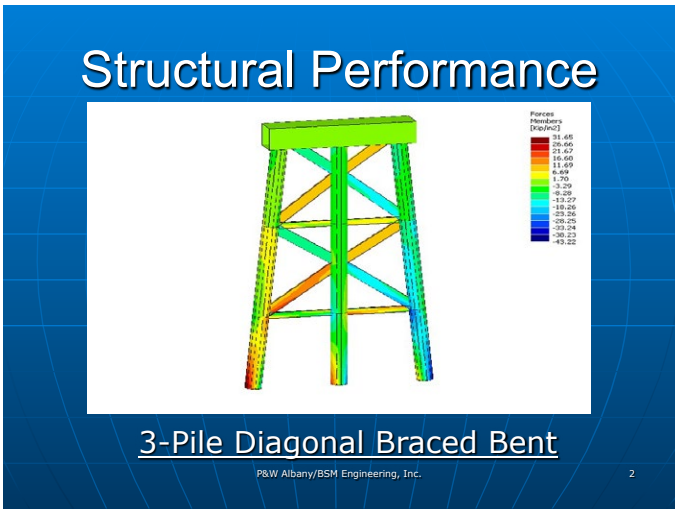


Stress contour plot of the pile bent under AREMA Code required loading

foot-square by 16-foot-long precast concrete pile caps. Steel embedment plates were installed on the underside of the pile caps to make a welded connection between the steel piles and concrete caps. Precast, prestressed concrete double box girders having a single walkway and handrail were used to construct the closed deck ballasted trackway for the entire length of the new bridge structure.

The replacement structure was designed using the 2008 AREMA Code per the Owner's request, and the design moving load was required to accommodate the axle loading of two Cooper E-80 locomotives in tandem, trailed by a 12,000 plf uniform live load. The ultimate axial load to be achieved by the closed end driven displacement piles was on the order of 1,200 kips per pile, using a factor of safety of 2.0 that was justified based on sub-surface investigation, and WEAP™ analysis followed by dynamic testing using a Pile Driving Analyzer® (PDA).

Execution

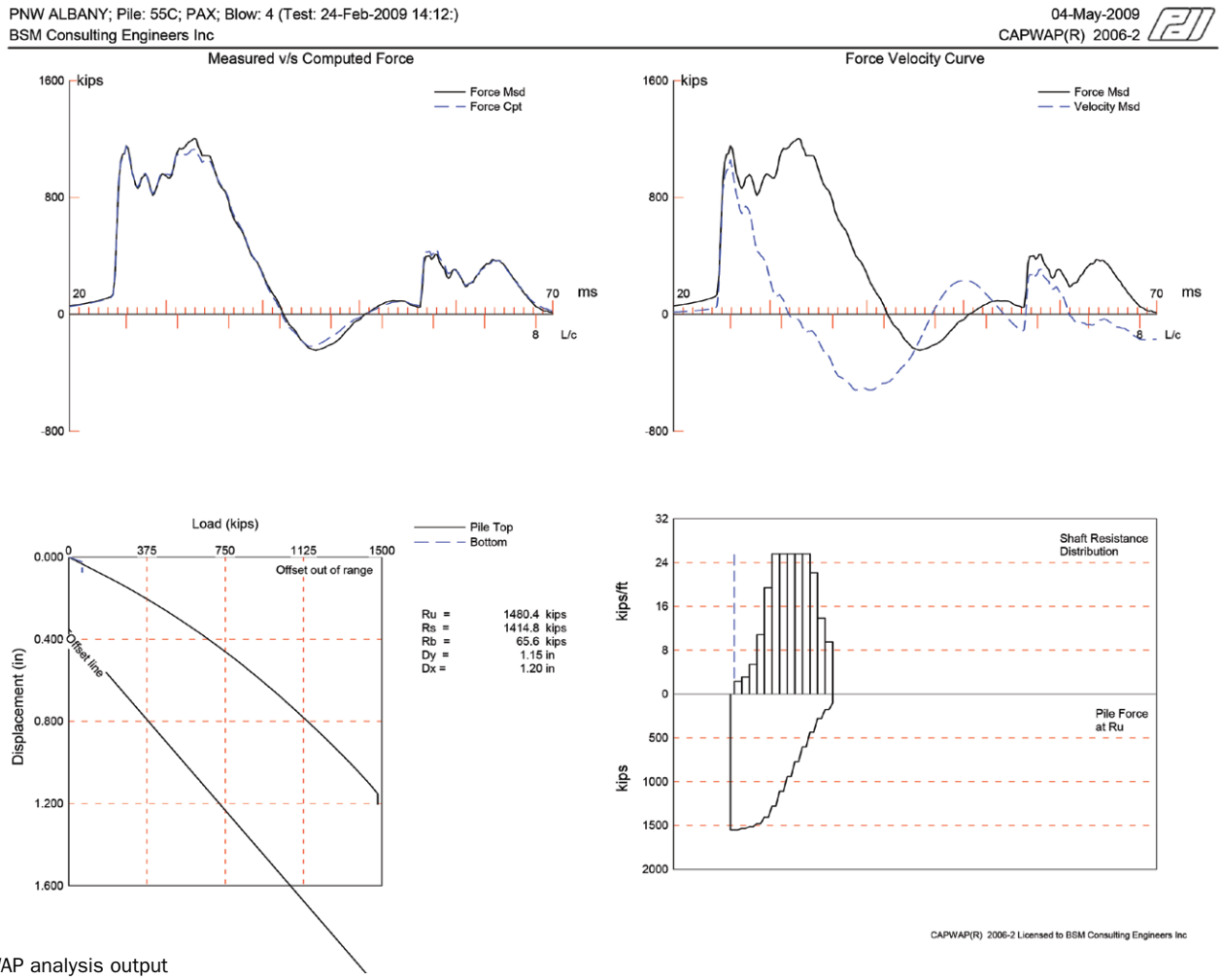
A wave equation analysis using GRLWEAP™ was performed using the soil parameters provided in the GeoEngineers report and the APE 30-32 diesel impact hammer intended to be used by Hamilton Construction. The Owner had secured an order for 22,000 linear feet of 24-inch pipe pile and BSM knew this quantity of pipe piling was a fixed value. BSM responded by requesting to perform high strain dynamic testing using a PDA to not only verify the hammer performance and measure soil resistance, but also to reduce the factor of safety to the responsible minimum value in order to reduce pile consumption.

Hamilton's original proposed hammer, an APE 30-32, was capable of driving the piles to the predicted embedment depth but would not be able to produce a force large enough to test the piles up to 1,200 kips. Hamilton suggested using an APE 50-42 having an 11,000-lb ram with a modest stroke capability of around 12 feet. The APE 50-42 is capable of producing 124,000 ft-lbs of energy on fuel setting #4, and an energy rating capability of 144,000 ft-lbs in the maximum setting. In addition to being able to test the required ultimate capacity of the piles with the APE 50-42, the drivability analysis indicated a total driving time on the order of 25 minutes using this hammer, which was a considerable time savings for Hamilton.

Installation sequence

By cutting out the timber ties between the large existing multi-ply timber girders, the vertical center pile for each bent was able to be installed without concern of the train schedule. Using half-pipe templates lined with UHMW and mounted to the outside of the timber girders, Hamilton was able to drive the inside and outside radius piles on the 1:12 batter for each pile bent. The live track replacement technique allowed the contractor to drive all the piles and set the new concrete pile caps after obtaining pile capacity approval, without interfering with the existing timber structure carrying the daily freight traffic.

Coordinating with the Owner, Hamilton was able to secure 24-hour shut down windows where the construction crews worked around the clock to tear out 500-foot sections at one time of the existing timber structure and set new concrete box girders, place gravel ballast and ties and install new continuous welded rail (CWR). The ability of Hamilton to achieve their objective during the 24-hour shut downs was a result of their pre-planning effort to lift out long sections of existing timber



CAPWAP analysis output

pile caps, girders and ties in one pick, as well as their utilization of 80-foot long, pre-assembled "track panels" consisting of new concrete ties, rail ties and fastened 135-lb rail that could be picked and set in place rapidly. A custom pipe spreader was fabricated to handle these track panel lifts.

In summary, the construction sequence used to replace the existing timber trestle structure with new steel pipe piles and pre-cast concrete pile caps and double box girders is summarized in the following list:

1. Drive piles at each bent through the timber structure at mid-spans
2. Begin conducting PDA restrike tests at seven-plus days
3. Cutoff piles and set concrete pile caps
4. Assemble predetermined length track panels
5. Coordinate track shut downs with Owner
6. Begin tear out of existing timber structure
7. Set new precast concrete box girders
8. Place gravel ballast and bulkhead transitions
9. Set track panels, ties and rail ties in one pick
10. Tidy up the track work and attach the new rail to existing rail

Repeat this process for each planned tear out segment as coordinated with the Owner's authorized shut down schedule.

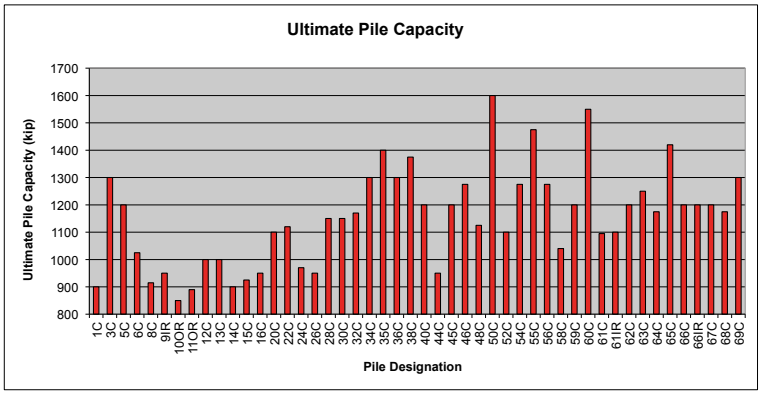
Proofing piles with PDA

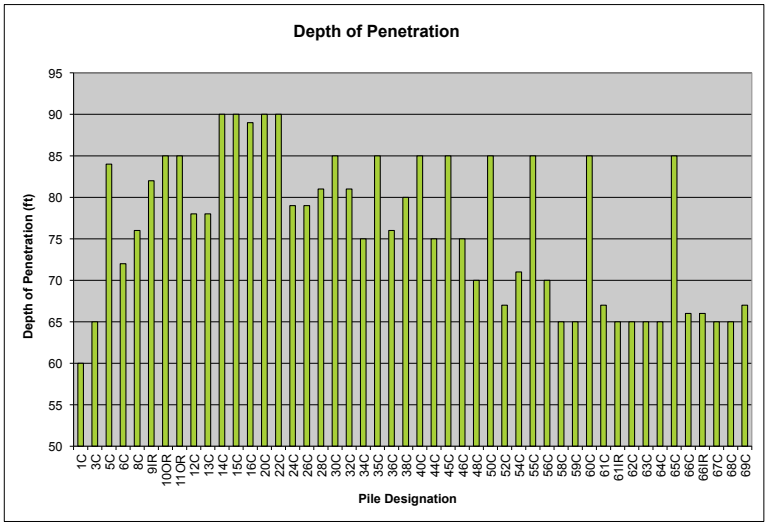
The Owner elected to monitor the pile installation process and faxed the pile installation logs to BSM's office each evening and BSM followed up with a call to the contractor on the following day. This occurred until there were enough piles installed to the minimum embedment depth, at which time BSM mobilized to the site to conduct as many restrike tests as possible. Only the vertical piles in each bent were monitored and tested until driving criteria was clearly established, and then outside batter piles were tested at random for comparison to the vertical piles. Our contractor coordinated quality control program for piles consisted of full depth monitoring at every third pile bent, and seven-plus day restrikes on every other pile bent. Static load tests were not an option due to the daily train schedule and the limiting width of the railroad right of way.

Because of the construction sequence coordinated with Hamilton, BSM was able to conduct PDA restrike tests on 33 of the 210 total piles installed, at varying time intervals, leading to the reported pile capacity associated with one to two weeks of soil setup time. This allowed the testing personnel from BSM to measure the changes in porewater pressure from the end of initial driving (EOID) operation and compare them to seven-plus day restrikes. The number of PDA tests conducted increased our confidence and confirmed our design intent.

PDA measurements were analyzed using the signal matching software CAPWAP™ which indicated that pile capacity was

Test. No	Pile Mark	Ultimate Capacity (Kips)	Penetration Depth (ft)
1	1C	900	60
2	3C	1300	65
3	5C	1200	84
4	6C	1025	72
5	8C	915	76
6	9IR	950	82
7	10OR	850	85
8	11OR	890	85
9	12C	1000	78
10	13C	1000	78
11	14C	900	90
12	15C	925	90
13	16C	950	89
14	20C	1100	90
15	22C	1120	90
16	24C	970	79
17	26C	950	79
18	28C	1150	81
19	30C	1150	85
20	32C	1170	81
21	34C	1300	75
22	35C	1400	85
23	36C	1300	76
24	38C	1375	80
25	40C	1200	85
26	44C	950	75
27	45C	1200	85
28	46C	1275	75
29	48C	1125	70
30	50C	1600	85
31	52C	1100	67
32	54C	1275	71
33	55C	1475	85
34	56C	1275	70
35	58C	1040	65
36	59C	1200	65
37	60C	1550	85
38	61C	1095	67
39	61IR	1100	65
40	62C	1200	65
41	63C	1250	65
42	64C	1175	65
43	65C	1420	85
44	66C	1200	66
45	66IR	1200	66
46	67C	1200	65
47	68C	1175	65
48	69C	1300	67





The geotechnical site conditions were determined through nine soil borings reaching depths below ground surface on the order of 100 feet at each location.

achieved when transferred energy from the hammer was on the order of 60 k-ft for 1,200 kips of axial resistance. Additionally, the curve data observed from the PDA tests indicated that most of our pile resistance was occurring in skin friction as was BSM's prediction at the onset of the project.

Closing remarks

The use of a wave equation analysis combined with PDA testing is a powerful tool to assist designers and contractors in achieving success with driven pile capacity determination. It is recommendation that all piles tested using a PDA should conclude with a CAPWAP™ analysis and an evaluation of the soil capacity using the Davisson Offset Limit or other techniques as required in ASTM 4945 for High Strain Dynamic Testing.

The live track replacement technique used on this existing timber trestle replacement project was a great success to the Owner for several reasons. Communication and project understanding between the Owner, Engineer and Contractor was exceptional. Hamilton's pile driving experience combined with BSM's ability to implement dynamic testing with a PDA expedited the pile approval process, and positively endorsed the wave equation analysis and static pile design predictions.

The replacement of the Portland & Western Albany Golf Course Trestle project was funded in part by a Connect Oregon Grant from the Oregon Department of Transportation and matching funds and capital contributions from the Owner. The total replacement cost was on the order of $10 million dollars for direct construction costs. The total time for construction activities was less than one year, with the precast concrete order on the critical path of the construction schedule. ▼

About the author

Bill Marczewski, P.E., M.ASCE is the founding principal of BSM Engineering, Inc., a specialty engineering consulting firm in Oregon providing technical and professional services to the heavy civil/marine construction community. PDCA members are welcome to contact the author at bill@bsmengineering.com or directly at 503-325-8065 if you have any questions or would like to further discuss this subject.

Images courtesy of BSM Engineering, Inc.

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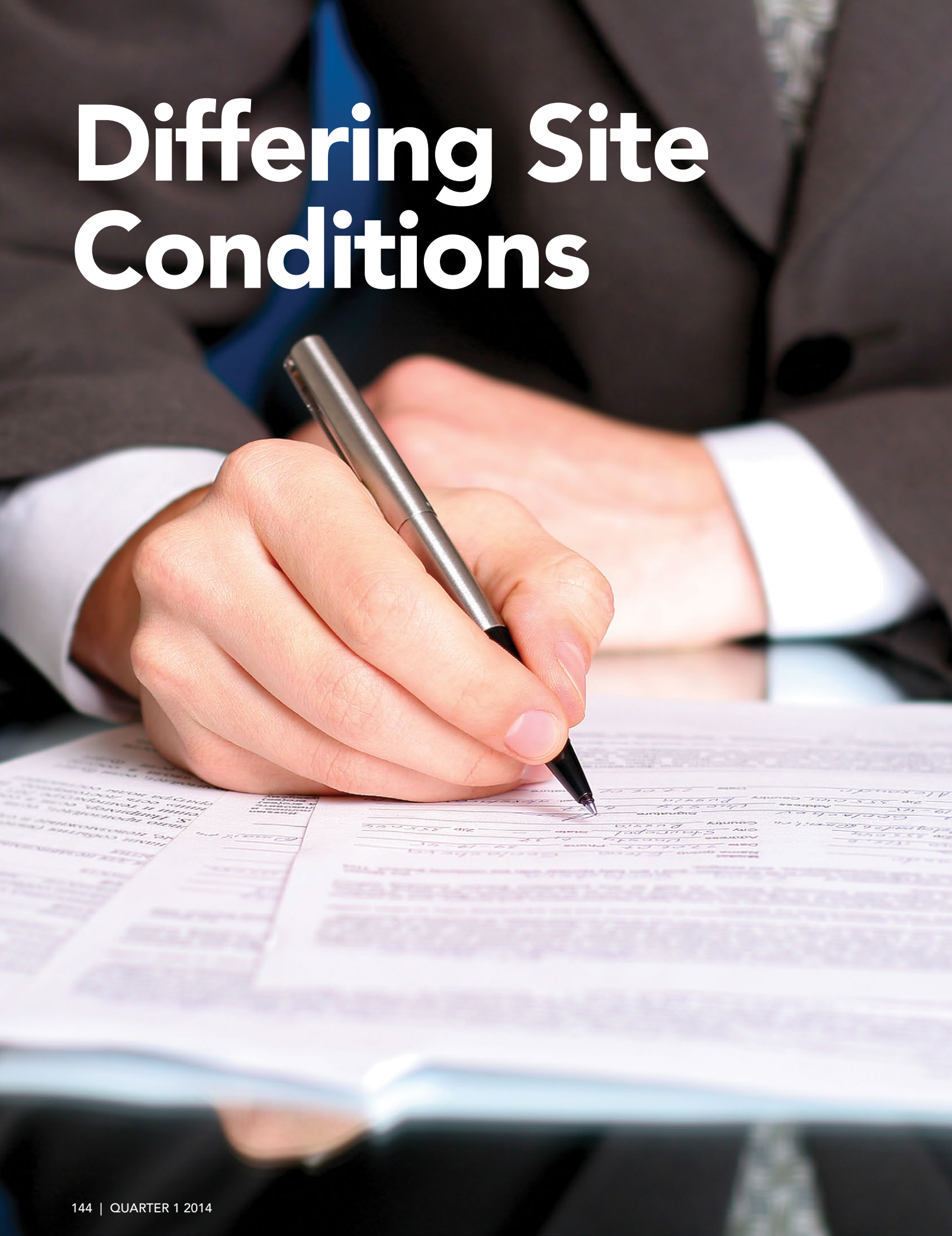
Differing Site Conditions



Putting your best foot forward at the notice of potential claim stage and getting paid in a timely manner

By Mark J. Rice, Esq., McNeil, Silveira, Rice & Wiley

One of the biggest problems facing deep foundation and piling contractors is getting the owner to recognize extra work when it's based on a differing site condition. A book of psychology probably could be written on why that is – but instead, this article focuses on project management techniques to turn that around and get paid by timely recognition of a changed site condition event adding cost to the project.

On many projects, a piling subcontractor will have the claim for differing site conditions ("DSC") denied out of hand by the owner's resident engineer or contracting officer, only to have to wait months or years for a final review at time of project close out. Sometimes, both the owner and prime contractor may prefer to wait to see what the total time impact of the change is, before grappling with the claim. Then often at the end of the project, the arguments that took place at the outset of the project when building the foundation system are pulled out of project archives. By then, momentum is lost. Worse, often it is only then that the owner concedes the merit of the claim, but then starts on a critique of the untimely submission of the claim, or inadequate cost presentation and back up. Often, by the end of the project, to address such critiques it is many times more difficult to retrieve project documentation; the claim is literally stuck in the mud.

Sound familiar? Tired of losing your shirt when impacted by a valid DSC? Here are some general and specific tips that might help the pile driving contractor in early claims recognition, preparation and documentation, for a successful, early change order.

Pay attention to the claim and notice specifications

More and more, courts are requiring strict compliance with notice and claims notice provisions in public works contracts. Contractors should know if the "notice of potential claim" is due within 24 hours, 48 hours, five days, seven days… whatever. The onsite project management should know these deadlines and be keyed to communicate to home office any unexpected conditions – broken concrete piles from hard driving, blow counts that are at odds with the soils report given at bid, the Owner's onsite engineer forcing idle time waiting for remote analysis of WEAP readings, requirements of extra moves, cobbles, productivity drops, walk-offs and pile tolerance issues – anything not per bid expectation. Do not let a good claim "break bad" by missing these notice deadlines.

Pay attention to the costing methods permitted by the claims specification

Some public owners want their costs a certain way, and most have specified mark ups, equipment rate reference guides and some description of how costs and time impacts are presented. This becomes important right away since your project team needs to begin a method on day one to capture what is truly extra costs incurred due to a DSC versus scope costs, or even bid error and work error costs. Most owners will not want to see a total cost claim, even if the specifications do not prohibit it; and the standards for a total cost claim are fairly strict – no other way to cost the change, bid shown to be reasonable and entire scope of work impacted by the change.

Photographer: Alexandr Denisenko / Photos.com

Sit the Project Team down right away and develop a claim-specific cost capture document system

Daily inspection logs of the construction participants – owner, prime contractor, piling subcontractor and any project or quality control engineer – are often critical evidence in court or arbitration as to what happened. If they say nothing about the claim, or make no effort to isolate parts of the work affected by the claim and those not, the piling contractor is throwing away his hard-earned money. Too often, the onsite foreman is not instructed to craft a detailed way on a daily basis to show claim impact costs and time, from base contract work. This can be fatal to a claim.

Some old-school techniques, but still worthy of use, are counting blow counts where the pile is driven past refusal to reach a specified tip; downtime waiting for owner decision; extra moves; cost of added equipment or hard driving-caused hammer breakdowns; restrikes and retaps for set up, and the like.

In a "measured mile" approach, the contractor making a claim seeks to isolate productivity rates for piling in an area unaffected by the DSC, compared to the claim-impacted areas of the site. Like in "Force Account" work, it behooves the claimant to show the owner upfront how it is measuring the extra costs. This can do two things – engender a comment for more information, and improve all the daily reports from each project participant; and secondly, some owners may be more inclined to relax their specifications if they can understand early on what the true cost delta is for overdriving or prohibiting predrilling, when site conditions prove different than expected.

Too often, the onsite foreman is not instructed to craft a detailed way on a daily basis to show claim impact costs and time, from base contract work. This can be fatal to a claim.

Mark J. Rice, Esq., McNeil, Silveira, Rice & Wiley

Get an engineering expert involved early

Owners typically have registered professional engineers reviewing your claim – often the same structural, civil or geotechnical engineer that drafted the structural specifications, determined the uplift and bearing capacities of the pile or authored the soils report. That engineer, no matter how well intentioned, may be affected by client relations concerns or budget, and be defensive – maybe not, and let's hope not. But, to avoid the risk of bringing a knife to a gun fight, I strongly recommend that piling contractors retain an engineer familiar with pile design, soils reports and

Photo courtesy of Mark J. Rice

claims – with credentials that the owner will recognize as superlative – to help frame the claim analysis. This will help get the owner's attention, and make sure more nuanced issues are addressed, such as type of soil boring mechanism, impact of surcharge, water table representations, size and thickness of pile, hammer choice and the like.

I have seen some expert engineers build software models for a claim that both prove a claim condition exists, that the bid hammer choice would work for represented conditions, but not for claim conditions. Such negates the "means and methods" defense many owners assert – that you, the contractor, picked the wrong hammer, wrong crane, wrong leads and so forth. A third benefit is the outside engineer can often dialogue in a peer review way with the owner's engineer and enhance your credibility, and get traction to money. Finally, the engineer can look at your cost capture, adjust it and be a negotiator in mediations, Disputes Resolution Board meetings and face-to-face meetings.

Have ready access to FAR differing site conditions standards and key court decisions

Ever since the seminal decision Spearin v. United States (1918) 248 US 132, a well defined body of court cases has developed that can help you in making a claim. These cases address when disclaimers apply and when they do not overcome or trump affirmative representations in the specifications. Here is the famous quote from Spearin that created "The Spearin Doctrine" of the Implied Warrant of Plans and Specifications – that they will work:

"But if the contractor is bound to build according to plans and specifications prepared by the owner, the contractor will not be responsible for the consequences of defects in the plans and specifications. MacKnight Flintic Stone Co. v. The Mayor, 160 N.Y. 72; Filbert v. Philadelphia, 181 Pa. 530; Bentley v. State, 73 Wis. 416. See Sundstrom v. New York, 213 N.Y. 68. This responsibility of the owner is not overcome by the usual clauses requiring builders to visit the site, to check the plans and to inform themselves of the requirements of the work, as is shown by Christie v. United States, 237 U.S. 234; Hollerbach v. United States, 233 U.S. 165, and United States v. Stage Co., 199 U.S. 414, 424, where it was held that the contractor should be relieved if he was misled by erroneous statements in the specifications."

The Federal Acquisition Regulations (FAR) 52.236-2 requires on fixed price contracts with the Federal Government a differing site conditions clause. So do many state Public Contract Codes.

For goodness' sake, visit the site before bidding

While most underground soils conditions are not visible, one would assume a site visit might be superfluous or irrelevant legally if the indications of the soils borings prove incorrect. However, Federal Courts are making a site visit, as part of the representation of familiarity with the site, almost mandatory for presentation of a DSC claim – as evident from two recent Appeals Board decisions, Top Painting Co., Inc., ASBCA No. 57333, 12-1 BCA 35,020 and D&M Grading, Inc. v. Dept. of Agriculture, CBCA No. 2625, 12-1 BCA 35,021, where the contractor lost his claim for failing to do a pre-bid site visit, which arguably could have put the contractor on notice of conditions claimed to be new. I once had an extra drilling case to defend, and went to the project file with the owner and found photographs of the hillside full of large nested boulders, revealed once the contractor's welder had lit the hillside on fire. We used these photographs to show that boulders were there, and anyone walking the site meaningful would know that.

Concluding thoughts

With public coffers tighter than ever, do not expect to be greeted with open arms when you submit your claim. So, get it down early, within the proscribed notice deadlines, with the right expertise and with your team all on the same page in terms of tracking claim events, cost impacts and time impacts. This puts you in a winning posture on the project, and for resolution of the claim early and fairly – not years later in a muddled legal proceeding, after spending days in depositions and Fort Knox on your lawyer. ▼

INDEMNITY CLAUSES

What to look for and how to minimize risk

By C. Ryan Maloney and Sharon McDonald, Foley & Lardner LLP

One would think that as a notion of fundamental fairness, one should only pay for one's own mistakes, and not those of others. However, under many construction contracts, there is a real and substantial risk that a contractor or subcontractor could end up paying for someone else's negligence on the job. How could this happen? The answer lies in the indemnity provisions contained in some form in almost every construction contract.

An indemnity clause is an agreement by which one party to a contract assumes responsibility for loss or damage incurred by the other party under certain circumstances. The party agreeing to accept responsibility is called the indemnitor, and it "indemnifies" or "holds harmless" the indemnitee.[1]

The importance for contractors to be aware of the risks in connection with indemnity provisions cannot be overemphasized. These clauses are in almost every construction contract and could lead to unexpected and potentially disastrous financial consequences if the risk is not appropriately recognized and planned for by the contractor. This article is designed to provide a brief overview of the basic types of indemnity clauses and their effect, issues related to the enforceability of the clauses and key insurance considerations related to indemnity clauses. Keep in mind that the

Contractors should try to avoid agreeing to the broad form of indemnity if at all possible.

Photographer: Comstock Images / Photos.com

In all cases where the contract contains an indemnity clause, the contractor also needs to take precautions to ensure that whatever indemnity obligation it is assuming in the contract is appropriately covered under the contractor's insurance.

interpretation of every contract depends on the unique circumstances of each particular situation, and this article is therefore not intended to provide specific legal advice. Rather, one should always consult with an attorney experienced in construction law for specific advice when negotiating and interpreting indemnity clauses.

Three basic types of indemnity clauses

There are three basic types of indemnity clauses: (1) limited form indemnity; (2) intermediate form indemnity; and (3) broad form indemnity. Under a limited form indemnity clause, the indemnitor agrees to indemnify the indemnitee(s) only for losses caused exclusively by the indemnitor's negligence (or the negligence of its employees, subcontractors, agents or others for whom it is responsible) arising out of or related to the performance of the work under the contract. In other words, the indemnitor agrees only to pay for losses caused by its own mistakes or the mistakes of those for whom it is responsible.

On the other hand, under an intermediate form indemnity clause, the indemnitor assumes all liability where both parties' negligence arising out of or related to the performance of the work contributed to the loss. Thus, while the indemnitor would have no liability for loss or damage caused solely by the indemnitee(s), the indemnitor would be liable to indemnify the indemnitee(s) for loss or damage incurred by the indemnitee(s), even if the loss or damage was caused in part by the indemnitee(s), as long as the loss or damage was also caused in part by the indemnitor.[2]

Finally, under a broad form indemnity agreement, the indemnitor is responsible for all losses or damages to the indemnitee(s) arising out of or relating to the performance of the indemnitor's work under the contract, even where the indemnitor was completely without fault and the sole fault lies with the indemnitee(s).

Contractors should try to avoid agreeing to the broad form of indemnity if at all possible. It is easy to understand why a broad form indemnity should be avoided, as the contractor could be held liable for losses caused entirely by others over which the contractor has no control.

Yet, a contractor still faces a significant risk even with an intermediate form indemnity clause. Recall that under this form of indemnity, the indemnitor is liable for all losses caused by both the indemnitor and the indemnitee. Thus, for example, in the situation where the indemnitor is one percent at fault and the indemnitee is 99 percent at fault for the loss or damage sustained, with intermediate form indemnity, the indemnitor would liable for the entire loss, regardless of the fact that the other party was far more at fault. All that matters is that the indemnitor's negligence contributed to the damage. Thus, contractors should also try to avoid agreeing to intermediate form indemnity provisions, or alternatively, try to modify such provisions in a manner to limit their indemnity obligation to be only for loss or damage to the extent actually caused by the contractor's own negligence.

Photographer: Federico Caputo/Photos.com

Anti-indemnity legislation

Of course, carefully negotiating one's exposure to broad or intermediate indemnity liability is not always an easy task. Contractors or subcontractors with limited ability to negotiate favorable indemnity provisions may nevertheless find some protection in anti-indemnity legislation passed in certain states. For example, Louisiana places extensive restrictions on indemnity provisions designed to protect indemnitors. In fact, in Louisiana, an indemnity provision is only enforceable if the contract requires the indemnitor to purchase insurance to cover the indemnity obligation.[3] The indemnitor's liability must be limited to the amount of insurance proceeds payable under that insurance policy. The statute also forbids indemnification of third parties with whom the indemnitor has no relationship.[4] Although many other states have not been as aggressive as Louisiana in controlling the types of enforceable indemnity provisions, many do provide some level of protection for indemnitors.

Another example is Florida, which specifically prohibits an indemnification clause that imposes liability on the indemnitor for the indemnitee's gross negligence or willful misconduct.[5] Moreover, Florida law prohibits all broad form indemnity agreements in construction contracts with state and local government entities, and prohibits them in private construction contracts unless the contract sets a limit on the amount of indemnification in a way that "bears a reasonable commercial relationship to the contract."[6] Other states, including Georgia, Texas and New York, have also passed legislation rendering broad form indemnity agreements in construction contracts unenforceable in certain circumstances.[7]

A party undertaking an indemnity obligation should discuss with an experienced construction attorney the anti-indemnity legislation that may be applicable in the state where the project is located. When modification of an unfavorable indemnity provision is not possible at the negotiation table, a contractor may succeed in arguing that it is unenforceable under relevant state legislation, depending on the state.

Insuring the indemnity obligation

In all cases where the contract contains an indemnity clause, the contractor also needs to take precautions to ensure that whatever indemnity obligation it is assuming in the contract is appropriately covered under the contractor's insurance. An indemnification obligation may be insured, in certain cases, under a Commercial General Liability (CGL) policy. Although CGL policies typically exclude coverage of "contractual liability," the exclusion may not apply to an indemnification agreement that is considered an "insured contract" under the contractual liability exclusion, and in such case there may be coverage. The standard definition of an "insured contract" includes most indemnification provisions. Nevertheless, insurance companies may modify this standard definition to exclude or limit the amount of coverage. Therefore, it is very important for contractors to consult with their insurance professional to ensure that whatever indemnity obligation the contractor is undertaking is covered under the contractor's insurance.

Conclusion

Understanding what can be a complicated minefield of indemnity provisions in construction contracts can be difficult for even the most experienced contractor. However, contractors that are aware of the issues and the importance of indemnity provisions may be able to limit their potential liability with careful negotiation and drafting in consultation with an attorney experienced in construction law. They will also be better able, in consultation with their insurance professional, to make sure that whatever indemnity obligation they do undertake is appropriately insured to protect the contractor from the significant financial risk of an uninsured indemnity obligation. ▼

References

1. As an example, the indemnity provision found at Section 3.18 of the AIA A201-2007 General Conditions provides, in part:
   To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder.
2. The indemnity clause quoted in the note above from the AIA A201-2007 General Conditions is an example of an intermediate form indemnity clause, but with an added limitation that the indemnitor is liable only to the extent of the loss or damage caused by the indemnitor.
3. L. Rev. Stat. Ann. § 9:2780.1(I)(1).
4. L. Rev. Stat. Ann. § 9:2780.1(C).
5. Fla. Stat. § 725.06(1)(c).
6. Fla. Stat. § 725.06(1).
7. See Fla. Stat. § 725.06(1); Ga. Code Ann. § 13-8-2(b); L. Rev. Stat. Ann. § 9:2780.1(B); Tex. Ins. Code. Ann. § 151.102 ; N.Y. Gen. Oblig. § 5-323.

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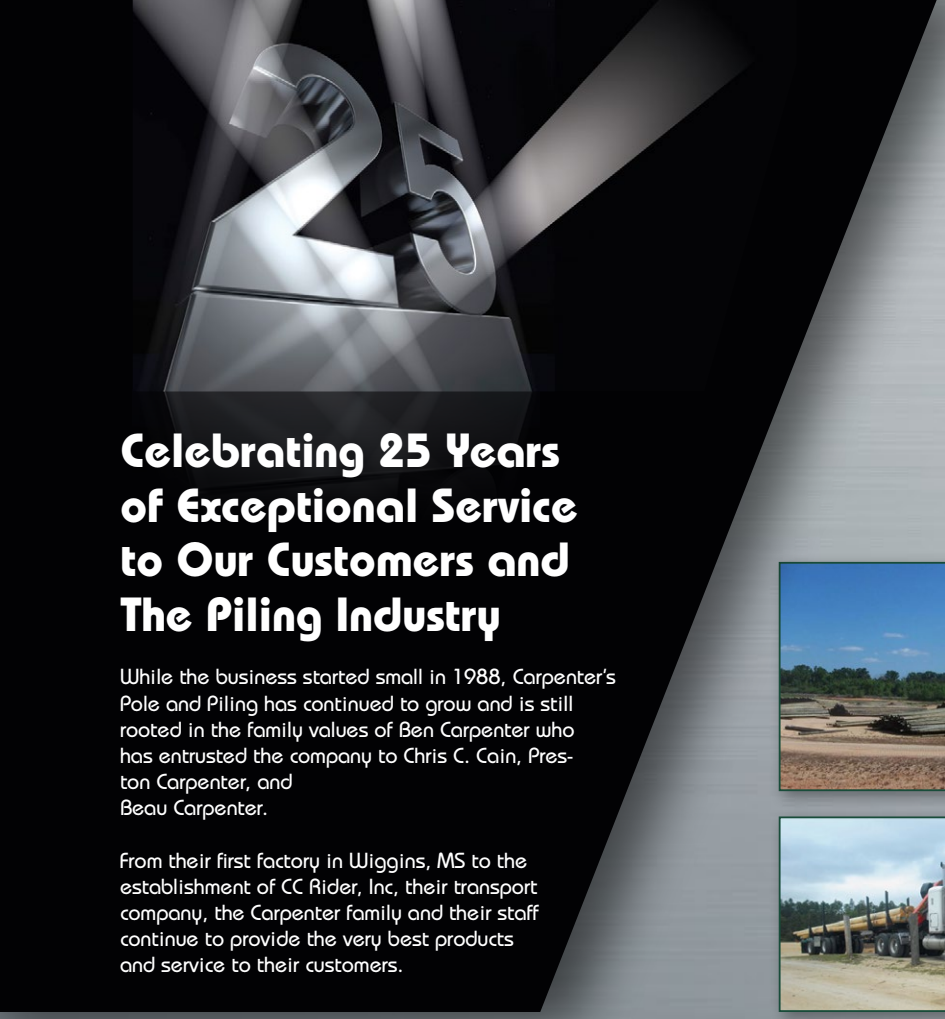

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25 YEARS

Continuing the Tradition

After following a family tradition, Anna Sellountou explains her role in the world of deep foundations

By Anna Sellountou, Ph.D., P.E., Pile Dynamics, Inc.

Coming from an engineering family with my father, five uncles, several cousins and in-laws all being engineers, it is not much of a surprise that I decided to follow engineering. Such a choice fit well with my analytical and down-to-earth way of thinking, strong inclination toward math and love for accuracy. There was only one element missing, and that was how to satisfy my creative and artistic quests, which made my decision bounce between architecture and civil engineering. For better or for worse, the more technical nature of civil engineering prevailed and one more engineer was added to the family roster.

As I was getting exposed to the various facets of civil engineering, the geotechnical field impressed me the most. Buildings had to stand today and tomorrow, although founded in soils with a mind of their own, and you, as a geotechnical engineer, had to predict its conceptually complex behavior. You have to deal with the many uncertainties of soil and its inherent variability. Therefore, human judgment is irreplaceable. If that's not job security, then what is? And that is how my journey started.

I completed my Master's degree in civil engineering at the National Technical University of Athens (NTUA) in Athens, Greece, and in January of 2000 I came to Houston, Texas to pursue my Ph.D. under Professor Mike O'Neill, a mentor that greatly impacted my developing view of the world and significantly contributed in my subsequent professional growth. Soon after my graduation from the University of Houston in December 2004, I started my career with Fugro. And although my Ph.D. was on augercast piles, driven piles became my main interest.

My years at Fugro were fascinating. I was exposed to several big national and international projects. My start at Fugro coincided with the construction boom of several major LNGs, both in the U.S. and abroad, and I had the luck to work on almost all of them (i.e. Freeport LNG, Golden Pass LNG, Cameron LNG, the Shell Motiva Refinery Expansion, which was one of the largest refinery expansion projects in the U.S. at the time, and the Skikda LNG Reconstruction project in Algeria). That presented the opportunity to experience hundreds of driven piles being installed daily. I remember working with Tim Roberts and performing numerous static load tests, dynamic load tests, hundreds of CAPWAPs, correlating our static analysis predictions with the results from our static load tests and dynamic load tests. It was so exciting when you would see all the pieces coming nicely together. Those were great years.

During tenure at Fugro, I had the chance to work with Frank Rausche and Garland Likins at GRL Engineers and Pile Dynamics, Inc. (PDI). Fugro sent me to GRL/PDI to get formal training on dynamic testing and CAPWAP. Obviously, with all of Fugro's exposure to pile driving, I had to continuously consult the experts, since dynamic load testing, CAPWAP and drivability studies were my bread and butter. Frank and Garland were very generous with their

"Working alongside PDI's R&D team means working in a pioneering environment where inventive minds come together to develop the next deep foundation testing method from conception to materialization."

technical support during my time there. They were spending all the time necessary to address my technical questions and help me with my analyses. They had genuine interest to all technical issues that arose (I guess that genuine interest is one of the reasons for their enormous accumulated experience), and would share all their valuable knowledge with me. I was wondering when I would get the bill for their advice…I never did.

Joining PDI was the next most meaningful step in my career (after a short break in-between, during which I explored the oil and gas industry a little, just to realize that staying away from my area of expertise was not fulfilling enough).

Joining PDI to work on the research and development side of deep foundation testing was the next big challenge I was thrilled to take. I was so excited about the prospect that they had me move all the way to Cleveland (where the corporate offices are) after 12.5 years of living in Houston. Driving in the snow was definitely a new experience, but working for PDI was worth the trouble.

Working alongside PDI's R&D team means working in a pioneering environment where inventive minds come together to develop the next deep foundation testing method from conception to materialization. Here, I have the opportunity to participate in a very rewarding process, which involves identifying an industry need and creating an engineering solution for it. As the creation process demands many engineering disciplines to work together, a team of civil engineers, electrical engineers, software and hardware people are joining efforts in order to accomplish a common goal; as you become an active observant of the various stages and angles of the development, you are called to participate with your contribution. It is an intriguing process.

If I have to draw one conclusion so far, it is that design of deep foundations is a complex matter, and perhaps that is the beauty of our profession. Many uncertainties are still to be resolved and many parameters should be considered for realistic analytical modeling, if that is possible at all. Universal pile design guidelines and databases do not exist and it is extremely difficult, if not impossible, to quantify all the parameters that affect pile performance. Simplified design methods cannot give us consistently reliable answers. Therefore, it is critical that testing is an integral part of safe and economical pile design.

When I am considering what is most important for our profession, I cannot convey anything better than to quote Dr. O'Neill's remark in his Terzaghi Lecture (1998) regarding the design of deep foundations:

> …it requires time and effort by individuals who are dedicated to excellence in foundation engineering – who consume higher engineering costs that at the end of the day will lead to greater economy and greater safety in the constructed foundation. I am alarmed to see a growing complacency among owners regarding the technical efforts and related investments that need to go into foundation design – the belief that foundation design is somehow a "solved problem," a "done deal" that can be relegated to former C students or related practitioners who have little appreciation for the complexities of the problem and the consequences of wrong decisions. Foundation engineers must do a better job of selling the benefits of their services to clients and return to the leadership role that once made them a valuable resource for society. ▼

Driven to Succeed

Eric Alberghini credits his successful career in pile driving to his mentors

By Eric Alberghini, Norwalk Marine Contractors, Inc.

Where and how I started

I started in deep foundations in 1993. I had graduated from the University of Massachusetts with a Bachelor of Science in civil engineering and was offered a job as a civil engineer with a geotechnical firm, Heller and Johnsen, out of Stratford, Conn. The caveat was that, although they had plenty of work at the moment, they couldn't guarantee full-time work. It wasn't the best of economic times, the job offered was what I had studied and been trained to do and it was not easy to consider turning down the job offer, but when I said I couldn't relocate without a guarantee of full-time employment, to my surprise, Lawrence Johnsen said, "I know someone who needs help." He gave me a phone number, told me to wait five minutes and then call that number.

As directed, I called and spoke with Louis "Skip" Gardella, president and owner of Norwalk Marine Contractors, Inc. (NMC). After a few minutes on the phone, Skip told me to be in his office at 7:00 a.m. the next day for an interview. When I arrived at the interview, the first thing he told me was to get rid of the coat and tie. The rest of the interview consisted of doing a quantity take off and sketching a drawing for what I later found out was an estimate and a submittal he was working on. After reviewing my work, Skip handed me a copy of a map with two areas circled and said that these were the areas I was going to want to look for an apartment. I asked to verify he had indeed offered me a job, and that was the beginning of my apprenticeship in pile driving.

Biggest influences

From that beginning to now, I have worked for two great companies, NMC and Blakeslee Arpaia Chapman (BAC). In that span I have been fortunate to work alongside many talented and dedicated people – operating engineers, carpenter/pile driver foremen, peers, superiors and owners. Though there are too many to list, there are three people who are at the top of the list.

Bob Bradley, who retired earlier this year, has been driving piles since he was about seven, I think. He taught me everything from rigging, to how to plan out a site or project, to what to look out for, to recognizing hazards and keeping yourself out of harm's way on a jobsite. He never failed to organize and have everything he needed for the job, he never had to stop or back up, and the last sheet to close a cofferdam always slid home. I only hope I remember a quarter of what Bob taught me.

I worked for Mike Stemborski, vice president of Marine Operations at BAC, for six years. He was incredibly knowledgeable in marine construction, but he was an even better manager. If he asked you five questions about a project or estimate you were working on, he knew the answer to the first four. He challenged me (and at times frustrated me to no end), but I think I knew then

"Over the time that I've been in the industry, I've worked on projects ranging from as few as three piles to as many as 2,400, ranged in capacity from 15 tons to 750 tons and ranged in depths from 10 feet to 210 feet."

"We worked closely with the local contractors, owner and engineers to coordinate our efforts and adjust to the changes and additions as they occurred. It was a great experience of cooperation, communication and coordination."

Eric Alberghini counts working on a dockyard project in Bermuda as top experience at Norwalk Marine Contractors, Inc.

and I definitely recognize now those were some of the periods of greatest development. He taught me many of my earliest lessons on being an effective manager, the first being to clearly define where each person's responsibility begins and ends. The second being that "I don't know" is an acceptable answer as long as it is followed by "but I'll find out." Also, you don't have to know everything, but you have to know how to find the answers, who to talk to and the right questions to ask. He was a great person to work for and I'm grateful for the time he spent, the lessons he taught and the advice he shared.

Skip Gardella, owner of NMC, has been my boss for approximately 14 years. He grew up on the water and has worked around boats, barges, trucks, trailers and cranes all his life. Skip started the company when someone asked him if he could install a pier and float. Eventually, one of his clients asked if he could drive the same timber piles used to support his pier to support a house he planned to build. So, Skip walked the crane off the barge and started the land operations. Skip's familiarity with boats, barges, cranes and rigging is such that it frees him to tailor methods and equipment to each project. He has taught me to never accept the notion, "This is how it has to be done because that is how it has always been done." Rather, he challenges you to ask, "Is there a better way?" He brought the first Junttan dedicated pile driving rig into the U.S. It is still working today, more than 20 years later. Its ability to walk off the transport trailer and be ready to install piles in 10 minutes revolutionized the residential market. Where it previously took multiple trucks and up to one day to set up and again to breakdown a traditional pile driving rig, NMC could be in and out on the same day. Likewise, over the years we have developed or modified pile rigs for specialized situations, including working inside malls, factories and difficult access areas such as the top of mountains, across marshes and beach landings. Skip's challenge to question methodology has led to innovation and greater efficiency, for both NMC and the pile driving industry as a whole.

Standout projects

A couple of the more interesting projects I've worked on were the Norwalk Water Pollution Control Facility (WPCF) in Norwalk, Conn., and the Heritage Wharf at Royal Naval Dockyard, located in Bermuda.

The Norwalk WPCF project consisted of constructing a new preliminary treatment building. As with most water treatment facilities, it is situated along a waterway. The building was to be built approximately 150 yards from the Norwalk River, the bottom of excavation about 40 feet below grade and about 35 feet below the water table. NMC was awarded the contract to design and build an approximate 70-foot by 140-foot by 40-foot deep cofferdam, then, once excavated, install approximately two hundred 12-inch by 12-inch prestressed, precast concrete piles up to 90 feet long inside the excavated cofferdam and install approximately another 200 piles throughout the site for utilities, piping and drainage structures.

The Heritage Wharf project at Royal Naval Dockyard consisted of improvements to the existing facility to accommodate a newer, larger class of cruise ships than the terminal was designed for. NMC was contacted in January of 2013 and asked to provide an estimate of cost to install two new berthing dolphins and two new mooring dolphins along with an ancillary walkway pier. The trick was that the structures had to be complete before May 15 and the design would likely not be complete until sometime near the end of the project. With only four drawings to work from, NMC negotiated a scope of services and within a month was towing two Manitowoc 999s across the Atlantic Ocean on a 50-foot by 150-foot deck barge. For the next two and a half months, NMC worked multiple crews, multiple shifts, six and even seven days a week. We worked closely with the local contractors, owner and engineers to coordinate our efforts and adjust to the changes and additions as they occurred. It was a great experience of cooperation, communication and coordination.

Photo courtesy of Norwalk Marine Contractors, Inc.

Where are we going?

Over the time that I've been in the industry, I've worked on projects ranging from as few as three piles to as many as 2,400, ranged in capacity from 15 tons to 750 tons and ranged in depths from 10 feet to 210 feet. Although I continue to see projects of all types and sizes, my experience over time has been that the general trend in foundation piles has been towards fewer and higher capacity piles.

Another trend I've seen is an effort towards placing more, if not complete, liability for pile drivability, capacity and tolerance on the pile driving contractor. A recently bid project specified fixed leads. The project site abutted a local airport and required crane booms be lowered every night. An addendum allowed the contractor to use hanging leads, but that if it did, became 100 percent responsible for final location of piles. Another specification stated the contractor would be paid for out of tolerance piles only if the piles hit obstructions, but then defined obstructions to be something man-made or man placed.

A wastewater facility expansion project called for 65-foot to 75-foot single length (no splices allowed) precast concrete piles and required the contractor to achieve 65-ton capacity. NMC had driven more than 2,400 piles on this site on a previous expansion to 50 tons. When the engineer's estimated lengths didn't attain required capacity, NMC furnished and installed piles up to 90 feet long, the longest length you could physically get into the site and got no more capacity out of the pile at 90 feet than we had at 60 feet. When reporting the results, the engineer's response was essentially, "It's in the spec; you own it." If not for the owner's construction manager directing the engineer to provide their evidence the soils were capable of supporting the required loads, who knows what would have happened.

Why PDCA?

When I see some of the specification clauses mentioned above, I ask if I have missed some new technology that allows pile drivers to install piles to tighter tolerances, that improves the soil so it can support any specified load or that allows piles to be installed to higher capacities without overstressing the pile or increasing the incidence of breakage.

It is easy to grumble about the changes but as the saying goes, the only constant is change. Or maybe, adapt or die. Pile drivers face competition, not only from other pile drivers, but from other forms of deep foundations and must vigilantly work to improve our product. This competition is why I have become active in PDCA. PDCA provides a place for pile drivers to keep up-to-date on equipment, new technologies and the state of practice. Also, PDCA provides and promotes education to both installers and designers, the idea being with increased understanding and/or comfort level will come more efficient design, more value to owners and competitive advantage over other forms of deep foundations. Finally, PDCA is working with code officials to update and standardize design and specifications to set a high but fair standard for pile drivers. In short, PDCA is working hard to advance the efficiency of both design and installation of the driven pile. ▼

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