PILEDRIVER

THE OFFICIAL PUBLICATION OF THE PILE DRIVING CONTRACTORS ASSOCIATION | FALL 2003 VOL. 4, NO. 4

INSIDE THIS ISSUE:

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Published by:
Lester Publications
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Gainesville, FL 32605
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Printed in Canada
Please recycle where facilities exist.

Visit the PDCA Web site at www.piledrivers.org.

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Piledriver is published quarterly. Please contact us by mail at P. O. Box 19527, Boulder, CO 80308-2527 Phone: 303-517-0421 | Fax: 303-443-3871 or by E-mail at membership@piledrivers.org.

The subscription rate for members is $18 which is included in the annual dues. The U.S. subscription rate for non-members is $36 for one year and $72 for two years.

Canadian subscribers: add $5 per year. All other non-U.S. subscribers add $10 per year.

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Contents

Cover:
Wilmington, DE's Autoberth project. Image courtesy of Moffatt & Nichol Engineers.

The Future of PDCA

By Jim Frazier, PCDA President

The ballots for next year's officers and board members will be out before you receive this newsletter. This will be my last president's message. What a relief! In the last two years as PDCA president, I've seen many changes. One of the most noticeable is when I look in the mirror and see the gray hair starting to surface.

Looking back, at first I thought we were in good shape as an organization, but it quickly became obvious that major changes were needed if we were going to survive. We wasted little time in making the decision to hire a new executive director. This became a huge undertaking for us. It took eight months to get Tanya Goble into the position and a lot of effort on everyone's part. I would like to thank those people who helped and were supportive in this endeavor. To those of you that questioned that decision, I hope you understand that we had no choice but to make a change.

Right now we are in a much better financial condition. In the last year, we've been able to increase our income and greatly reduce our expenses. One of the major issues in this turnaround, other than hiring Tanya, is the newsletter. It went from being a huge expense to breaking even. Our last two meetings have been profitable and well attended.

The South Carolina Chapter, our first local chapter, was formed and has been actively promoting the driven pile industry with great success. Also, our membership numbers have held steady.

Looking forward, we have some people that are hard working with great leadership qualities that will be running things in the next few years. The slate of officers and new board members for the next year is very solid. Our seminars, meetings and programs are well established and will continue to be very successful. The local chapter idea is an excellent way to get contractors and local design engineers together. We are also promoting the driven pile against other alternatives through cost analysis and higher capacities and are working hard on some promising programs that will benefit the members of our organization. I feel very good about the future of the PDCA.

There are some things that every one of us can do to make this organization a success. I am certain that almost every member can think of four or five people they know who are not members. For these people to become members, all it would take is to call them and give the PDCA a positive recommendation. A strong membership base is the key to moving our organization forward, so please do everything you can to help us increase our membership. It's been a privilege and pleasure serving as your PDCA president. ▼

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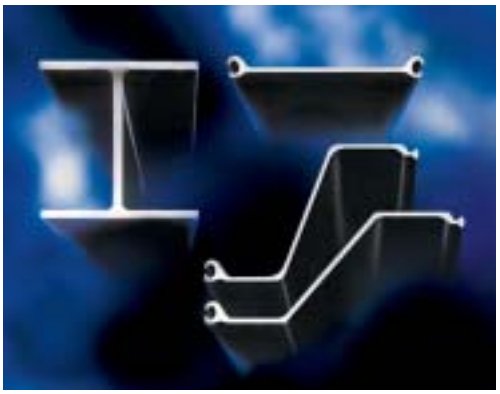

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HP12x53	HP12x63	HP12x74	HP12x84
HP8x36		HP10x42	HP10x57

SHEET PILING TECHNICAL DATA

Section Designation	AREA		WIDTH		HEIGHT		WEIGHT (MASS) PER SINGLE		WEIGHT (MASS) PER WALL		MOMENT OF INERTIA		SECTION MODULUS Per Single		SECTION MODULUS Per Wall		SURFACE AREA Total Area		SURFACE AREA Nominal Area*	
	in^2	cm^2	in	mm	in	mm	lb/ft	kg/m^2	lb/ft^2	kg/m^2	in^4	cm^4	in^3	cm^3	in^3/ft	cm^3/m	ft^2/ft	m^2/m	ft^2/n	m^2/m
PZ22	11.9	76.6	22.0	559	9.0	228.6	40.4	60.1	22.0	107	151	6301	32.5	532	17.7	952	4.92	1.50	4.48	1.37
PZ27	12.1	78.2	18.0	457	12.0	304.8	41.2	61.3	27.5	134	282	11734	45.3	742	30.2	1622	4.93	1.50	4.48	1.37
PS27.5	13.4	86.6	19.7	500	—	—	45.6	67.9	27.8	136	5.02	209	3.19	52.2	1.94	104	4.58	1.40	3.88	1.18
PS31	15.2	98.2	19.7	500	—	—	51.8	77.0	31.5	154	5.51	229	3.35	55.0	2.04	110	4.58	1.40	3.87	1.18

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The PDCA Web site and you

By Tanya Goble, PDCA Executive Director

Over the past year, the PDCA Web site, www.piledrivers.org, has been significantly improved, thanks to the hard work of our Webmaster, Fred Sargent of Bajillion.com. If you haven't visited the site recently, here's an overview of what you will find there:

Committees and Leaders

Are you interested in participating in some of the activities of the association? In this section of the Web site, you'll find a listing of the current board of directors, updates on our various committees and future meeting schedules.

Member Search

Do you need to find a piling contractor or equipment supplier in your area? You can search the complete PDCA contractor, associate and technical membership by types of products and services provided and geographical location.

Education and Events

Do you need information on up-coming PDCA events? Details on up-coming conferences are posted regularly here, including program agendas, registration forms and exhibitor information.

Publication

Do you need to reference an article from a previous edition of the PDCA quarterly magazine Piledriver? Online editions of the magazine can be found here.

Forums

Do you have a piledriving-related technical, equipment or business question that you need an answer to? The forums area lets the public seek answers to common problems. Posts

to the forums page are automatically forwarded to PDCA members for attention so that you receive a quick response. You can now view, reply to or create new postings without the need for a user login or password.

Reference Links

To quickly link to a variety of pile - driving equipment and accessory suppliers, visit Reference Links.

Driven Piles are Tested Piles

Visit this section for a brief summary of the key advantages of the driven pile.

Store

If you need to obtain a copy of one of the PDCA published manuals, you'll find ordering information here. ▼

A new SDI mill in the American heartland can meet your H-Piling needs.

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Photo courtesy of Orlando/Orange County Convention & Visitors Bureau

PDCA 2004 Winter Roundtable Set for Orlando

The Pile Driving Contractors Association has assembled an outstanding lineup of leading industry professionals to speak at its 2004 Winter Roundtable in Orlando, Florida from Feb. 19-21, 2004.

The Roundtable is for contractors, geotechnical and structural engineers, owners, developers, suppliers, academics and anyone else who deals with and supports the pile driving industry.

WHAT YOU WILL LEARN AND EXPERIENCE:

- Insight into case studies of major pile-driving projects.
- Evaluations of what did and didn't work.
- Discussions about what's new in the industry and what is needed in the industry.
- Ideas that will help you reduce the number of problems you encounter and better deal with problems that can occur.
- Opportunities to meet with your peers and industry leaders.
- Information on products and services from a wide range of exhibitors.

SCHEDULE OF EVENTS

Thursday, February 20	
1 p.m. – 5 p.m.	Short Course: Pile Design for Non Engineers Short Course: Wave Mechanics
6 p.m. – 7:30 p.m.	Opening Reception
Friday, February 21	
8 a.m. – Noon	Conference Sessions
Noon – 1 p.m.	2003 PDCA Project of the Year Award Luncheon
1 p.m. – 5 p.m.	Conference Sessions
6:00 p.m. – 7:30 p.m.	Reception
Saturday, February 22	
8 a.m. – noon	Conference Sessions

TOPICS AND SPEAKERS

Underwater Noise and Pile Driving
Dr. Robert Abbott, Strategic Environmental Consulting, Inc.

Trends in Marine Pile Driving
Bob Bittner, Ben C. Gerwick, Inc.

Building Contractor Market Share and Size by Raising the Bar
Chris Dumas, Federal Highway Administration

The Rising Cost of Insurance
Arthur J. Gallagher Company

Sheet Pile Cofferdams
Dr. Harold Anderson, H.V. Anderson, Engineer

The Remote Pile-Driving Analyzer
Craig Christenbury, Chris Hill Construction

Hathaway Bridge Project
Bill Crittenden, Granite Construction

New Oakland-San Francisco Bay Bridge Approach Skyway
Kiewit/FCI/Manson

Orlando Airport Project: The Benefits of Pile Setup
Wayne Waters, Ed Waters and Sons

St. John's Bridge Project
Florida Department of Transportation

For more information on registration, hotel accommodations, the program and exhibitor opportunities, visit the PDCA Web site at www.piledrivers.org or contact us at 888-440-7453. ▼

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Outside, enjoy a host of pleasures like volleyball and three gorgeous pools. Jog along a tropical garden path or visit our health club. Or, find a treasure in one of the great shops that are just steps away. When the sun goes down, dine in the casual elegance of Augustine's Grille. Then, revel in Orlando's hottest nightspots on International Drive.

Come to Wyndham Orlando Resort for the perfect medley of old Florida charm and sizzling Orlando excitement.

- above text courtesy of www.wyndham.com/hotels/MCOWD/main.wnt

Room reservations can be made by calling (407) 351-2420. Ask for the PDCA Winter Roundtable Meeting room block. The deadline for the guaranteed conference rate of $169 is Jan.28, 2004. After that date, rooms are on a space-available basis only. ▼

PDCA 2004 Winter Roundtable

Company Name _____

Attendee Name _____

Attendee Name _____

Attendee Name _____

Address _____

City/State/Zip _____

Phone _____

Fax _____

E-mail _____

Conference Registration

- ❑ Short Course: Pile Design $25
- ❑ Short Course: Wave Mechanics $25
- ❑ PDCA member $295
- ❑ Non-member $325
- ❑ Companion registration $75

(includes all breakfasts and receptions.)

Total _____

Full payment must accompany this registration

Payment method: ❑ Check ❑ Visa/Mastercard ❑ Amex

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www.piledrivers.org

Registration Form

Association News

2003 DICEP Conference Summary

The recent DICEP Conference in Chicago was a great success. The event was well attended, with approximately 110 geotechnical and structural engineers, as well as contractors and suppliers in attendance.

Attendees heard presentations on pile set and how it can provide substantial savings, the FB-Pier program for the analysis of pile groups, the reliability and limitations of various testing and analysis methods and other topics. A few copies of the conference proceedings are still available, so please contact the PDCA office if you would like one.

The PDCA would like to thank the outstanding speakers on the program. These include Professor James Bay of Utah State University; Professor Dan Brown of Auburn University; George Goble; Michael Holloway of Insitutech; Van Komurka of Wagner Komurka Geotechnical Group; Megan Lee of American Engineering Testing; Robert Lukas of Ground Engineering Consultants, Mark Williams of the Florida Bridge Software Institute; and Michael Wysockey of Thatcher Engineering.

PDCA Education Committee Update

A meeting of the education committee was held in conjunction with the DICEP Conference. The second annual Professor's Piling Institute was held June 9-13, 2003 at Utah State University in Logan. You can read about the results of this year's program on the PDCA Web site. The committee continued to define the program for the 2004 Winter Roundtable to be held February 19-21, 2004 in Orlando. The topics will focus on areas of interest to PDCA contractor members. More details on the program and registration information are provided in this edition of Piledriver. The committee also began making preparations for the 2004 DICEP Conference, to be held September 16-17 in Los Angeles.

PDCA Communications Committee Update

A meeting of the communications committee was held in conjunction with the DICEP Conference in September. The committee is inviting all PDCA members to submit their choice for the 2004 Project of the Year Award. This award highlights an interesting driven-pile project completed within the last two years. The award will be presented at the 2004 Winter Roundtable in Orlando in February. More information about this award can be found at www.piledrivers.org. The committee is putting the final touches to a new CD-ROM learning tool on pile driving that will be made available to university professors, civil engineering students, engineers and contractors. This presentation provides a great overview of the driven pile including its history, materials, shapes and uses. It is very informative and will be a useful tool. Look for its distribution in the near future.

Technical Committee Update

In February, the committee completed work on a proposal to update the AASHTO guidebook on the installation of driven-bearing piles. This guidebook is used by the departments of transportation in all states. The proposed changes were presented at the annual T-15 AASHTO bridge committee meeting in early June. The AASHTO Bridge Committee will have one year to review the proposal. The updated guidebook will incorporate current pile driving practices and will help make future job specifications clearer and more consistent with new developments in industry. As a next step, PDCA will present the new code to state and federal departments of transportation. For their next project, the committee will begin work on producing a guide specification for the installation of driven bearing piles in the private sector. The objective is to provide a set of well-defined specifications that can be used by civil engineering designers. The PDCA would like to complete work on this specification over the next year. We need example specifications. If you have ones that you could make available to us, please send them to PDCA at P.O. Box 19527, Boulder, CO 80308-2527.

OTHER NEWS

Deep Foundations Recognized as G-I 2003 Committee of the Year

The G-I Technical Coordination Council (TCC) is pleased to announce the selection of the Deep Foundations Committee as the first recipient of the Geo-Institute Technical Committee of the Year award.

The award is presented to the committee that has done the most to contribute to the TCC mission of providing leadership on technical issues and advancing the state-of-art and state-of-practice of the geo-industry. The Deep Foundations Committee, under the leadership of Committee Chair Mohammad Hussein of GRL, Inc. was recognized for its efforts in organizing the International Deep Foundations Congress in Orlando (February 2002), in developing short courses on deep foundations design, construction, and quality control, and in organizing sessions and reviewing papers for a variety of major conferences. ▼

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REQUEST FOR PHOTOS

Attention PDCA members. Piledriver magazine is on the lookout for any interesting photos you may have. We're looking for fairly generic pile-driving images that we can print in upcoming issues. If they are digital, they need to be saved in either a TIF, JPG or EPS format at 300 dpi and should be at least 4 x 5 inches in dimension. If they are actual hard copy photos, please mail them to

Editor

Lisa Kopochinski

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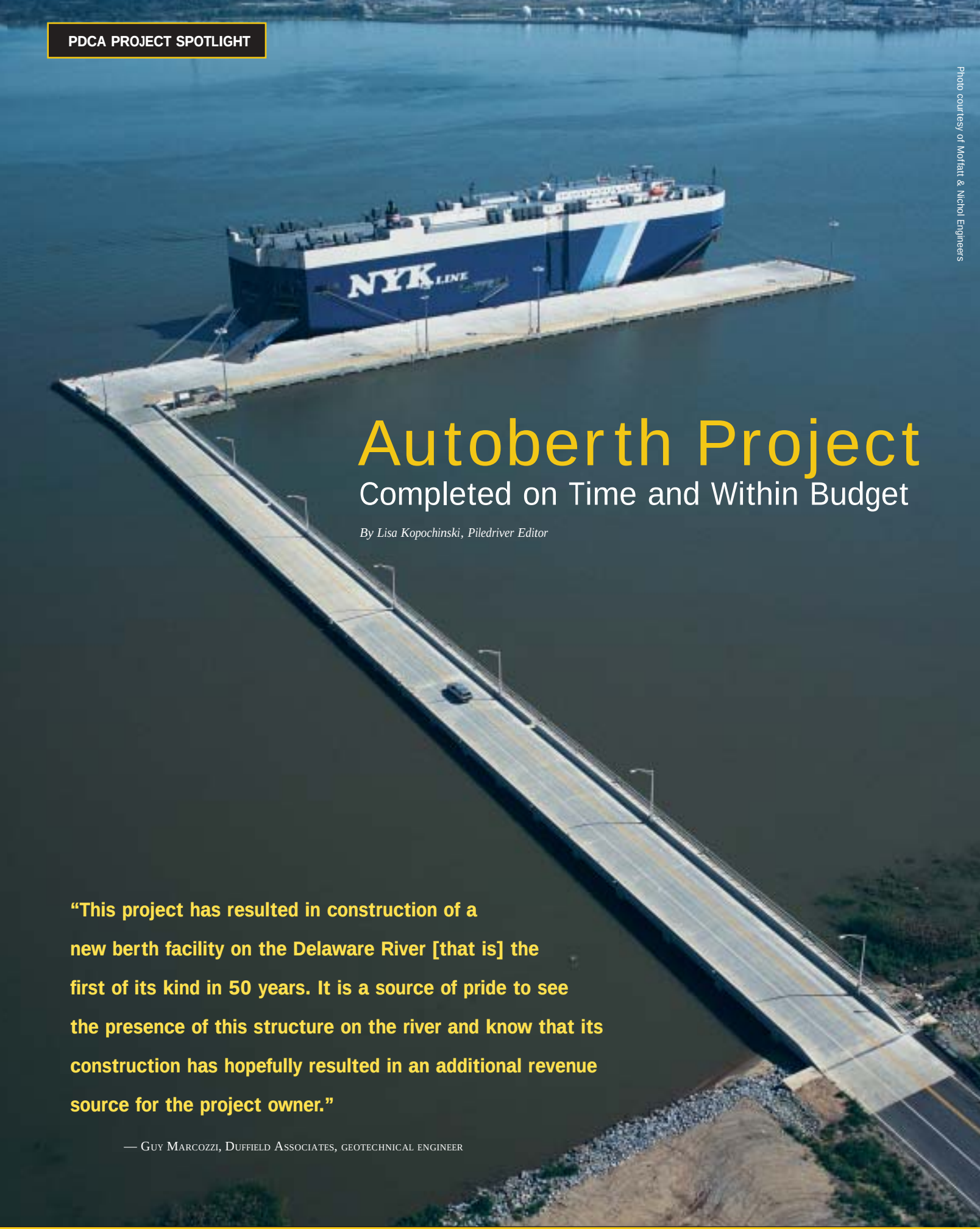

Photo courtesy of Moffatt & Nichol Engineers

Autoberth Project

Completed on Time and Within Budget

By Lisa Kopochinski, Piledriver Editor

"This project has resulted in construction of a new berth facility on the Delaware River [that is] the first of its kind in 50 years. It is a source of pride to see the presence of this structure on the river and know that its construction has hopefully resulted in an additional revenue source for the project owner."

— Guy Marcozzi, Duffield Associates, geotechnical engineer

Photo: Moffatt & Nichol Engineers

Photo: Duffield Associates Inc.

Photo: Kuhn Construction Company

After being on the drawing board for more than 15 years, the players involved in Wilmington, DE's Autoberth project are happy campers these days. Especially ecstatic are the Diamond State Port Corp. in Wilmington, DE and Collegetown, PA-based piledriving contractor Peirce Engineering.

As owner of the recently completed Autoberth, located at the Port of Wilmington on the Delaware River, Diamond State Port Corp. is pleased to see the $25 million project come to fruition. (The project was started in Spring 2001 and completed last September under budget and with no injuries or accidents).

The aim of the massive project was to construct a 115 ft. x 850 ft. berth and access trestle for the sole purpose of unloading car carrier ships. Ships can now pull into the berth and trestle (that stretches out 1,000 ft. into the river), drop the ramp and start unloading cars with no interference from any other vessels. The project represents the Port's initial endeavor to phase berthing from the Christina River, where regular dredging maintenance is required, to the naturally deep water of the Delaware River. There are also temporary storage/processing facilities located inland and to the west of the berth.

Peirce Engineering, which served as construction engineering consultant to Hockessin, DE-based general contractor Kuhn Construction Co., is proud to be part of a project of such magnitude. After all, the project earned Peirce runner-up for PDCA Project of the Year.

Remarks John Peirce, owner of Peirce Engineering: "This was the largest pile project with which I have ever been involved, including the pile diameter and the pile length. The 400-ton test is also the heaviest pile load test I have worked on, exceeded only by a 1,280 ton test for dam tie down anchors."

Peirce's role and scope of responsibilities on the project was extensive and included the following:

- design of a 400-ton pile load test for a 26-inch diameter, .500-in. wall, pipe pile. The test utilized four 26-inch diameter, uplift reaction piles; a 500-ton hydraulic jack; and jacking frame made from W36x300, A36 beams.

- design of internal, bottom formwork for concreting the upper 11 ft. of the 26-in. diameter pipe piles. Formwork consisted of a circular steel plate hung from the top of the pile with welded steel straps.

- design of welded, steel support brackets required for setting precast concrete pile caps, precast concrete trestle and berth deck panels, and concrete crew live load on the pipe piles. The load per each bracket was 30.5 tons maximum. Two brackets were installed per pile. Brackets were welded to the sides of the pipe piles.

- redetailed and reoriented the number 9, hooked, reinforcing dowels projecting from the tops of the pipe piles to assure the dowels fit in the proposed, 8-in.-thick, cast-in-place concrete, topping deck slab.

"We also performed an analysis of a new trestle deck slab for placement of the contractor's 100-ton Manitowoc 222 crawler crane," Peirce adds.

Unusual driven-pile applications

As for unusual driven-pile applications, he says, "The contractor [Kuhn Construction] used a prefabricated, modular, panel-truss bridge as a rolling template for driving the pipe piles. The truss-bridge template advanced over

previously driven pipe piles. The alignment of the template was maintained with the guidance of a survey laser level."

Peirce also recalls challenges on the project – the largest one relating to design.

"The project engineer made several comments on our design for the test pile jacking frame. These comments dealt with applicable design specifications, soil properties, test pile cap plate/jacking plate design, and lateral bracing for the test frame."

Peirce responded by adding additional lateral bracing to the originally designed test frame.

Poor soil conditions presented challenges

Soil conditions proved to be no picnic either.

"Out in the river away from the riverbank, the typical profile included 40 to 50 ft. of water, underlain by 30 to 60 ft. of very soft clay-like river silts," recalls Peirce."[This was] underlain by 10 to 15 ft. of dense sand, underlain by 15 to 20 ft. of very stiff-to-hard silty clay [and] underlain by a very stiff-to-hard mix of silt, sand and clay. The load test uplift reaction piles, approximately 120 ft. long, were driven approximately 25 ft. below the very soft river silts."

For Kuhn Construction, the general contractor's duties on the project included constructing the berth (a $10 million contract) as well as a $3 million trestle to access the berth.

"Our responsibilities in both contracts included driving the 26-in. diameter steel pipes, which were anywhere from 90 ft. to 140 ft. long," explains owner Larry Kuhn. "Our scope also included constructing the pile caps on the piling, setting prestressed deck planks to connect the piers and then pouring a 12-in. topping slab over the deck planks. Also included on the berth was the installation of the composite fendering system."

Kuhn cites the largest challenge as being proper positioning for the piling.

"The piling were up to 140 ft. long and were driven in 40 ft. deep water. Specifications called for the piling to be within four inches [of design location]. To do this 1,000 ft. from the shoreline in a three-knot current was tricky. We overcame this obstacle by constructing a template from two Acrow-style bridges made by Mabey Bridge that rode on top of piles that had previously been driven and cantilevered the template in the next row."

Photo: Moffatt & Nichol Engineers

Photo: Moffatt & Nichol Engineers

Autoberth Project is a Strong Contender for PDCA Project of the Year

The Autoberth project in Wilmington, DE was considered for PDCA Project of the Year for a number of reasons.

While it was a runner-up, the project was a strong contender largely because of a unique template system designed by the contractor. No permanent falsework was required to drive the piling and meet the stringent four-inch position tolerance.

A cantilevered-rolling template was designed that was supported on the previously driven rows to ensure exact placement of the piling. Once a new row was driven, the piling were cut off to grade, a temporary pier cap with rollers was set on top and the cantilevered template was rolled ahead to place and drive the next row of piling. The rolling template was constructed from a Bailey Bridge.

Piling for this project were extremely long. The use of concrete piling would have been costly because of the large, high capacity floating rigs required to drive them. Rigs of this size and capacity were not readily available. The steel pipe pile was a cost-efficient alternative. The lighter weight steel piles ensured competitive pricing from many contractors.

Because the pile was driven open-ended, there was less disturbance of the surrounding soil in the upper stratas. Once a plug formed in the end of the pile, it also became an end bearing piling due to the soil plug.

Big savings for owner

When asked what he is most proud of about the project, Kuhn says it's the value-engineering proposal the company made to construct the berth from precast members in lieu of the designed cast-in-place structure. "This resulted in a $100,000 savings to the Diamond State Port Corp., the owner," he smiles.

Coy Butler of Baltimore, MD.-based Moffatt & Nichol Engineers concurs: "The value engineering precast concrete alternative [that] was suggested by the contractor allowed [for] early completion and a credit to the owner."

As structural engineer, Butler says his firm was responsible for all the preliminary and final structural design of the pier and its components.

While calling the project "a clean attractive pier [that] is functioning very well for its intended purpose – allowing a dedicated berth and access roadway for autos that is removed from activities of the other cargos," he says the main challenge Moffatt & Nichol encountered was related to soil conditions.

"The soils at the pier site were very soft alluvial deposits requiring very long piles. The preferred concrete piles were estimated to be 120 ft. long and considered too heavy for local available equipment. Therefore, steel pipe piles were selected and [protective] coating and cathodic protection were added. Also, a large tidal variation with strong currents required good template and control during pile driving with the long piles. The contractor set-up a "Bailey" bridge as a template which allowed very good control of pile driving."

Duffield Associates Inc. of Wilmington served as geotechnical engineer and provided geotechnical, environmental, wetlands, mitigation and permitting services for the project.

Photo: Kuhn Construction Company

Remarks Guy Marcozzi, Duffield's assistant project manager: "[We] developed and performed the field and laboratory evaluation phase for the facility. Complex issues arose as a result of fill required for flood and drainage management, which had to be juxtaposed against the corresponding settlement of the fill over very soft and compressible soils."

Further complexities resulted from construction of the land-side staging areas directly next to an active dredge

Photo: Kuhn Construction Company

Photo: Duffield Associates Inc.

material disposal facility operated by the U.S. Army Corps of Engineers. Working with the stakeholders, Duffield was able to develop a phased filling program that allowed the fill operations to be constructed without elaborate and expensive subsurface stabilization.

Marcozzi adds that the berth location was specifically sited in the Delaware River at a spot with a depth of 40 ft., matching the authorized depths as maintained by the Corps of Engineers in the Delaware River.

"The berth itself was designed to accommodate not only the existing class of Ro/Ro ships, but the next generation as well. Further expansion of the berth to either the north or the south can be easily accommodated by the existing design. The facility is a dedicated berth for automobile and Ro/Ro cargo, connected to a secure, dedicated and lighted roadway connecting directly to landslide infrastructure. Should the Port's strategic emphasis shift away from the Ro/Ro cargos, the berth was also designed to accommodate additional types of shipping traffic.

PDCA member Pipe & Piling Supplies Ltd. of St. Hubert, Quebec, Canada, was one of the suppliers of piling material for the project, which was 26 inches in diameter by a .5-in-thick wall, the size required by the engineers.

As for challenges, Anshu Bhatia, sales manager at Pipe & Piling Supplies Ltd., says he was most concerned that Kuhn Construction did not run out of materials on the site and that they had timely deliveries.

"We overcame this by coordinating with Kuhn, the transport companies and the coater to ensure that we had enough material ready to ship to them." ▼

The piling used in this project was a 200-ton steel capacity piling 26 inches in diameter, .500-inch wall thickness. Piles were bituminous coated and were driven open ended (with no point or flat plate). Specifications called for the piling to be within four inches of the design location. The piling were driven in the Delaware River, within tolerance, despite a three-knot current.

Autoberth Project – Unique in Many Ways

The Autoberth project is unique on a number of levels — the most obvious being its location and poor soil conditions.

The structure was built just outside the shipping channel of the Delaware River to alleviate concerns raised by the State Dept. of Natural Resources and the U.S. Army Corps of Engineers regarding maintenance dredging. By locating the structure next to the channel, no additional dredging was required for ships to access it. Though the concerns of the environmental agencies were addressed by the location of the berth, construction and design-related issues were further complicated.

From a design standpoint, a structure had to be constructed to withstand the swift two-to three-knot current of the river and the effects it would have on a moored ship. To overcome this obstacle, design engineers Moffatt & Nichol Engineers used TermSim®, a technologically advanced software program that models the effects of the current and wind on the massive auto vessels that would use the facility.

By moving the berth away from land, the geotechnical aspects of the project were further complicated. The Port of Wilmington site is notorious for poor soil conditions. These poor conditions require the use of driven piles to support most structures. Not only was the berth being built in poor soil conditions, but the top 40 ft. of the piling could provide no structural support from the soil because they were exposed to the water. Pile length estimates by Moffatt & Nichol were in excess of 120 ft. per pile, all but ruling out the use of concrete piling. The heavy weight of concrete piles and the lack of contractors with equipment of sufficient size to drive them, caused the Port to be concerned that it would not receive competitive bids on the project. As a solution to this problem, Moffatt & Nichol proposed using hollow thick-walled steel pipe piles manufactured and driven to very tight tolerances. The specifications required strict quality control of the welding procedures and the contractor to drive the piling within four inches of the design location shown on the contract drawings. In 40 ft. deep water with a swift current, this was not an easy specification to satisfy.

To meet the specification, general contractor Kuhn Construction designed a template system for driving the piling that was attached to a Bailey bridge. Kuhn rolled the bridge on roller bearings placed on previously driven piles and cantilevered the template out to the next row of piling. After driving the piling, they were cut off to grade and a temporary steel pier with the roller bearings mounted on it was placed on the new row of piling. The bridge structure was then rolled onto the steel pier cap and cantilevered to the next row of piling. Kuhn doubled the pile-driving production rate by using this system.

Accurate layout of the template was maintained by using an electronic distance measuring device mounted on a temporary fixed platform built on the first row of piling. From the platform, distance readings were taken from several prisms mounted on the rolling template. This enabled Kuhn to drive all piles well within the four-inch tolerance. ▼

Whispering Gallery

Danish foundation contractor Per Aarsleff developed a new pile hammer silencer to comply with strict environmental noise restrictions being imposed on city center projects.

When sheet piling was brought to a standstill on a new art museum in the center of Århus, Denmark, soon after it began [in] November [2000], Danish foundation contractor Per Aarsleff was faced with a difficult problem — how to reduce the noise from its Junttan piling hammer to bring it in line with the strict environmental restrictions imposed by the local authorities.

The firm had just started installing a sheet pile cofferdam around the perimeter of the 55m by 55m site, which is surrounded by a music hall, court buildings and residential flats, when work was stopped. A limit of 75dB, equivalent to the noise from a crowded street, had been set and pile driving was exceeding it.

Per Aarsleff was able to continue piling in December [2000] using an in-house developed silencer for the hammer. This reduced noise by about 10dB to less than 75dB at the nearest building, some 30 m away.

Silencing was achieved by shrouding the impact zone between the hammer and pile top with a specially designed soundproof casing. The silencer comprises a hollow section steel frame filled with foam, surrounded by an aluminum casing which houses a 50-mm thick rubber layer to absorb high frequency noise and a 6-mm thick layer to dampen low frequency noise.

The casing attaches to the mast of the piling rig and surrounds the whole hammer. Two hydraulically controlled gates close the casing at the bottom of the hammer so that it fits snugly across the top of the sheet pile wall without hampering the installation process, hence blocking noise.

"One of the problems developing the silencer was to make it handy and operational — the silencer has not slowed down piling too much," says Per Aarsleff, piling manager, Lars Rande.

The sheet piles were installed through fill, boulder clay and into stiff fissured clay to form the up to 14-m deep basement excavation. Sheet piles varying between 18 m and 23 m long were used for the three highest walls, with additional support provided by 280 anchors. The lower northern wall consists of 13 m long piles.

The piles were typically driven to around 18 m using a 6t Uddcomb hammer fitted with the silencer, which had to be modified to allow it to close around the square section pile below the hammer. Similar results as the sheet piling were achieved, with noise cut by over 10dB.

Once excavation had reached just below the first anchoring layer, it progressed in 4 m deep, 5 m wide strips starting across the center of the hole. Each trench was excavated at 90° to the previous one and a 70 cm thick concrete blinding layer was placed at the base. This sequence provided constant support to the sheet piles throughout excavation and saved one layer of anchors in the sheet pile wall.

The sheet piles will provide permanent support to the basement, with museum walls built 500 mm from the cofferdam, creating a service duct around the perimeter.

Noise levels were monitored every week throughout the installation of the sheet piles and the 75db limit was never exceeded. Container screens were also placed at strategic locations around the site to limit noise further.

A similar silencing device has been used to install precast concrete piles on the project. A total of 620 300 mm square precast piles were driven for the museum, 570 of which were installed through the basement slab.

Polystyrene blocks placed in the blinding layer at the pile positions allowed piles to be driven through the slab.

As 500kN to 1,000kN of uplift was expected due to heave in the upper part of the clay, all the piles were designed for tension. To limit negative skin friction on the piles, the upper expansive layer, above the water table, was predrilled to 8 m with a 300 mm auger.

The piles were typically driven to around 18 m using a 6t Uddcomb hammer fitted with the silencer, which had to be modified to allow it to close around the square section pile below the hammer. Similar results as the sheet piling were achieved, with noise cut by over 10dB.

However, monitoring noise during this part of the works proved difficult as it was cut to below background levels. "Men could stand by the rig and were able to talk without raising their voices," explains Finn Rasmussen, the Per Aarsleff engineer who designed the silencer.

A similar silencer [was] used to install concrete piles on another contract in the cosmopolitan Clementborg café district. Here, Per Aarsleff used a Giken Silent Piler to install up to 13 m long sheet piles to support a 3 m deep excavation for a new shopping and entertainment center. The Giken can exert 150t of pressure and install 40m2 of sheet piles per day without noise or vibration. Installation is helped using water jetting.

Following the success of the prototypes, the silencer for precast concrete piling is close to its final version and Per Aarsleff will soon be able to offer most of its rigs with the silencer option.

The contractor has been working on the reduction of vibration and noise over the last 15 years. Some 95 percent of piles in Denmark are driven and the development of the silencer means it can carry on driving piles under the increasingly severe noise restrictions being set by local authorities.

"Aarsleff can continue to use sheet piles as a suitable solution where previously other methods, such as slurry walls, may have been chosen to meet environmental noise constraints," Rande says. ▼

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The PDCA Announces
Formation of its First Local Chapter

The PDCA would like to recognize the South Carolina Chapter and congratulate its members on this important step forward.

Pile Driving Contractors Association
South Carolina Chapter
P.O. Box 20460
Charleston, SC 29413

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Cape Romain Contractors, Inc.
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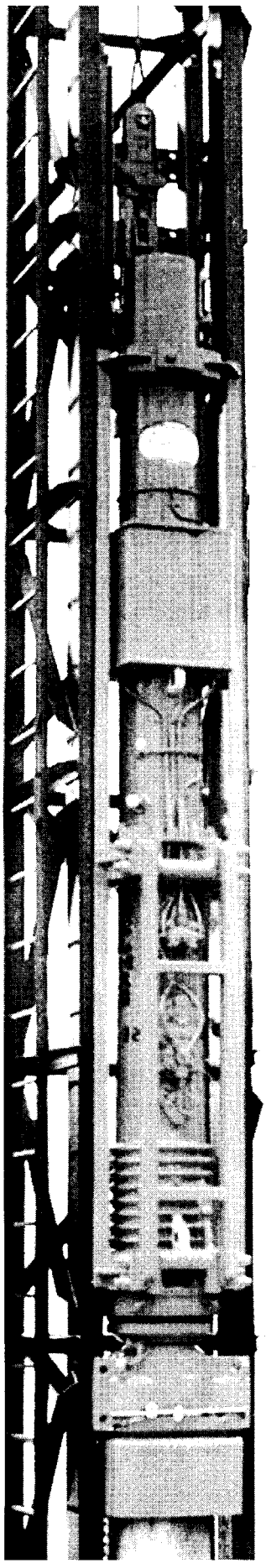

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Benefits of Driven Piles

Quality

Driven piles are a total engineering solution. The design, installation and quality assurance, that are a part of each driven pile, combine to eliminate guesswork and produce a known, reliable and cost-effective product that can accommodate a wide variety of subsurface conditions.

Driven piles consist of natural materials or pre-manufactured structural shapes built to precise tolerances utilizing high-strength materials and reliable quality control. All driven piles conform to ASTM standards. Their quality is consistent from the first pile to the last and can be seen and verified prior to installation.

Driven piles maintain their shape during installation. They do not bulge in soft-soil conditions and they are much less susceptible to damage from the installation of subsequent piles. Many hollow-section piles can be inspected visually after installation to assure integrity. Most solid-section piles are uniform in section and can be dynamically inspected to verify integrity.

The pile-driving process can be easily modeled prior to installation to determine adequate and economic equipment selection. Dynamic testing can confirm proper hammer performance and its effect on the pile. Many modern hammers have impact velocity measurement devices permanently installed providing a very high level of quality control.

Adapts to Variable Conditions

Driven piles are usually installed to established criteria (i.e., minimum blow count per unit penetration). Variable subsurface conditions require piles of different lengths. Driven piles may either be cut off to shorten their length or spliced to extend their length. Splice designs usually meet or exceed the strength of the pile itself. One length does not have to accommodate all site conditions. This allows driven piles to easily adapt to variable site conditions to achieve uniform minimum capacity with high reliability thus eliminating uncertainty due to site variability.

A driven pile is a tested pile.

Driven piles are ideally suited for marine and other near shore applications. There are no special casings required and there are no delays related to the curing of concrete. Piles driven through water can be used immediately allowing construction to proceed in a timely manner. To minimize disturbance in wetlands or allow work over water, driven piles can be used to construct temporary trestles. For bridges or piers, driven piles can be quickly incorporated into a bent structure allowing the bridge or pier itself to be used as the work platform for the next piles in top-down construction.

Driven piles can also be selected to meet the specific needs of the structure, site conditions and budget. You can select from a variety of materials and shapes that best meet your needs.

Driven piles can be:

- Steel
- H-Pile
- Pipe (open-end or closed-end)
- Tapered
- Shell (mandrel driven)
- Sheet Pile
- Concrete
- Square
- Octagonal
- Cylinder
- Sheet Pile
- Timber

Other options include:

- Composite piles that combine pile types (i.e., a concrete pile with a steel-tip extension) can be used to accommodate unusual site and driving conditions.
- New high-strength materials that allow for greater design loads per pile.
- Coatings and/or additives that can be used to mitigate the effects of corrosion thereby lengthening the service life of a structure.
- Coatings that can also be used to mitigate the effects of negative skin friction.
- Pile shoes (or points) that can be added to assist penetration requirements and provide very reliable contact with rock.
- Piles installed on a temporary basis to meet temporary needs.
- Piles installed to accommodate compression, tension or lateral loads.

- Hollow piles that can be filled to improve their strength.

- Piles that can be driven as displacement or non-displacement types.

Cost Effective

Driven piles are usually the most cost-effective deep foundation solution. You pay for only what you need. There are no hidden extra costs or added expenses for site clean up. The wide variety of materials and shapes available for driven piles can be easily fabricated or specified for high structural strength, allowing them to be driven by modern hammers to increased working loads thus requiring fewer piles per project, resulting in substantial savings in foundation costs.

Pile capacity is easily verified by either static or dynamic pile testing. Capacity per pile or pile length can be easily optimized to provide exactly the required capacity (including safety factor) to minimize foundation costs. Testing also eliminates the uncertainty of bearing capacity estimates based on static analysis. There is no need to be overly conservative and, thus, wasteful to protect against failure.

Driven piles require no set-up time. When installed to a specified bearing capacity, they can be put into use immediately upon installation. Driven piles also leave no spoil behind. The site is left clean and ready for the next construction activity.

Reliable and Available

Pile-driving contractors can be found all over the country. The equipment and installation methods are time-tested and well proven. Advances in materials, equipment, methods and testing continually combine to improve the efficiency of driven piles.

Recording the blow count versus depth during pile driving easily documents successful pile installation. You know what you have at the completion of driving. Because driven piles are almost always driven to a blow-count criterion, they will have a measurable capacity providing assurance that they meet the project requirements. Piles can be easily driven through upper soft-soil layers regardless of the soil type and groundwater conditions.

Driven piles have superior structural strength. They have the same high lateral and bending resistance for their entire length making them ideal to resist wind, berthing and seismic loading conditions. Driven piles can tolerate moderate eccentricity in the application of superstructure loads due to their full-length strength. Piles can be driven either vertically or at usual angles of inclination to increase support for lateral loads. In special cases, piles can even be driven horizontally.

Residual Benefits

Pile driving is relatively easy in many soils. Shaft soil strength usually increases with time after pile installation is complete to provide additional load capacity. Soil at the driven pile toe is in a compacted condition for displacement piles therefore end bearing can often carry a substantial load. There are no “soft-bottom” soil conditions so large settlements for end-bearing piles are eliminated. Driven piles displace soil. Other deep-foundation options can require the removal of soil, which can undermine the support of adjacent structures and cause excessive deformations, both of which can result in structural problems. In fact, the driving process itself usually densifies the soil, improving the capacity of previously driven piles, while the removal of soil generally loosens and weakens the soil structure, reducing capacity of previously installed piles. Thus, driven piles generally have higher capacity than other pile types of the same diameter and length. Driven piles require no curing time and can be driven in natural sequence rather than skipping alternate piles, thus minimizing the moving of the equipment and speeding installation.

Environmentally Friendly

Driven piles are usually installed in a manner that produces no spoils for removal and therefore no exposure to or disposal problems with potentially hazardous or contaminated materials.

Alternate Uses

The most common use of the driven pile is in deep foundations. Driven piles can also be utilized in other applications such as retaining walls, bulkheads, mooring structures, anchorage structures and cofferdams. A driven pile is a tested pile. ▼

PDCA MEMBERSHIP APPLICATION

Step 1: Select Membership Type

I wish to apply for the following membership status (check one):

❑ **Contractor ($650 / year)**
A Contractor Member is defined as a specialty subcontractor or general contractor who commonly installs driven piles for foundations and earth retention systems. Includes one primary membership. Secondary memberships are $75 each.

❑ **Associate ($650 / year)**
Associate Members of the Association shall consist of firms or corporations engaged in the manufacture and/or supply of equipment, materials, testing or other services to the pile driving industry. Secondary memberships are $75 each.

❑ **Technical Affiliate ($95 / year)**
Technical Affiliate Members of the Association shall consist of individuals who are involved with the design and installation of driven piles or in teaching the art and science of pile design and installation. They may be employed engineers, architects, government agencies, or universities. Employees of contractors are not eligible to become Technical Affiliate Members. Note: Technical Affiliate Membership category is for individuals only. For a company listing in the directory and on the Web site, you must join as an Associate Member.

❑ **Retired Industry Member ($50 / year)**
A Retired Member shall be defined as any individual who has reached retirement age as defined by U.S. law, who has left active employment and who wishes to remain a member.
I am retiring as a: ❑ Contractor ❑ Associate ❑ Technical Affiliate

Step 2: Demographic Information

Title: ❑ Mr. ❑ Mrs. ❑ Ms. ❑ Dr. ❑ Prof. ❑ Other

Business Title _____ Business Phone _____

Name _____ Business Fax _____

Company Address _____ Primary Email _____

Business Address _____ Home Page _____

City/State/Zip _____

Step 3. Company Description (complete only the category for which you are applying)

A. Contractor Only Company Description (check all that apply):

❑ Bridge Building ❑ Docks &Wharves ❑ Marine
❑ Bulkheads ❑ Earth Retention ❑ Pile Driving
❑ Deep Dynamic Compaction ❑ General ❑ Other _____
❑ Deep Excavation ❑ Highway & Heavy Civil

B. Associate Company Only Company Description (check all that apply):

Accessories

❑ Cutter Heads & Drill Bits ❑ Lubricants & Greases ❑ Safety Equipment
❑ Dock & Marine Supplies ❑ Pile Cushions ❑ Other _____
❑ Hammer Cushions ❑ Pile Points & Splicers
❑ Hoses & Fittings ❑ Rigging Supplies

Applications Systems

❑ Aluminum Sheet Piles
❑ Coatings & Chemicals
❑ Structural Steel
❑ Synthetic Material Piles
❑ Other_____
❑ Steel Pipe Piles
❑ Steel Sheet Piles
❑ Vinyl Sheet Piles
❑ Other Structural Materials
❑ Timber Piles/Treated Lumber & Timbers
❑ Concrete Piles
❑ Composite Piles
❑ H-Piles

Equipment

❑ Air Compressors
❑ Cranes
❑ Drill Equipment
❑ Drive Caps & Inserts
❑ Hammers
❑ Hydraulic Power Packs
❑ Leads & Spotters
❑ Pumps
❑ Specialized Rigs & Equipment
❑ Other _____

Services

❑ Consulting
❑ Design
❑ Freight Brokerage
❑ Geotechnical
❑ Marine Drayage
❑ Surveying
❑ Testing
❑ Trucking
❑ Vibration Monitoring
❑ Other _____

General

❑ Rental ❑ Sales ❑ Other _____ ❑ Other _____

C. Technical Affiliate Only (check all that apply)

❑ Analysis ❑ Civil & Design ❑ Consulting ❑ Educational/Association
❑ Geotechnical ❑ Materials Testing ❑ Pile Driving Monitoring
❑ Surveying ❑ Vibration Monitoring ❑ Other

Step 4. Geographic Areas Where Contracting, Products and Services Available

(All applicants check all that apply)

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

Step 5. Sponsorship: Who told you about PDCA?

Member Name_____

Step 6. Method of Payment

Attached is my payment of $_____ for annual dues.

❑ I understand that dues are due annually on December 31 and, that if I joined PDCA after March 31, I may be entitled to aprorated dues amount for the subsequent year only.

I am making payment in full by

❑ Check # _____

❑ Credit Card: ❑ MasterCard ❑ Visa ❑ American Express

Card Number: _____ Expiration Date:_____

Name as it appears on card: _____ Signature: _____

Please send this completed application to: PDCA

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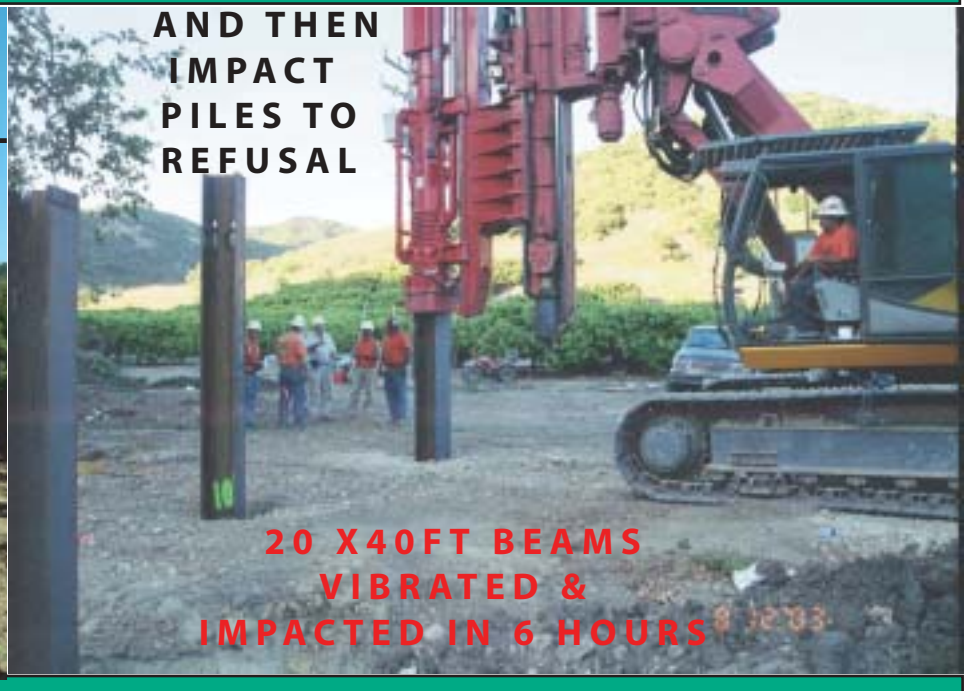

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PDCA New Member List

NEW ASSOCIATE MEMBERS

Piling Products, Inc.
Jacksonville, FL
Contact: Sandra R. Koslow
Services provided: dock and marine supplies, pile points and splicers, steel sheet piles, H-piles, vinyl sheet piles.

Soil Consultants, Inc.
Charleston, South Carolina
Contact: Kenneth Johnson, Jr.
Services provided: consulting, geotechnical, testing, vibration monitoring.

WPC
Mt. Pleasant, South Carolina
Contact: William Wright
Services provided: consulting, design, geotechnical, PDA, testing, vibration monitoring.

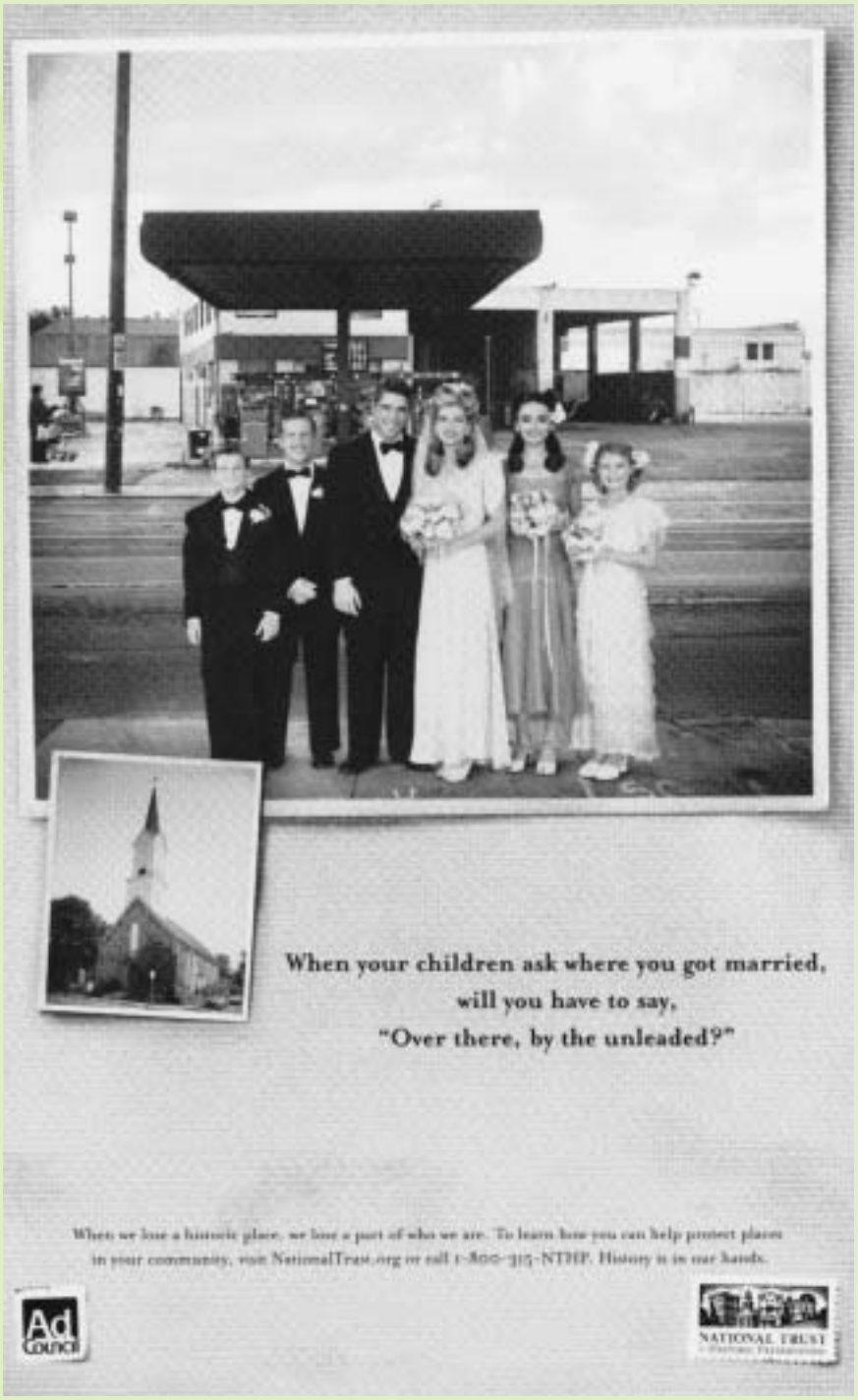
NEW TECHNICAL MEMBERS

Carlos Espana
Espana Geotechnical Consulting
Roseville, California
Services provided: geotechnical engineering.

Keith Plemmons
The Citadel
Charleston, South Carolina
Services provided: educational, analysis, geotechnical, civil and design, consulting, materials testing, pile-driving monitoring, vibration monitoring.

Eric Zimmerman
GME Consultants
Bridgeview, IL
Services provided: geotechnical engineering.

We would like to welcome the following companies as new members. Please visit the PDCA Web site at www.piledrivers.org and click on Member Search for complete contact information on all PDCA members.



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The Group

Founding Director David Jack Helps Strengthen PDCA's Efforts

By Jennifer Bernal

David Jack's love of the construction industry began about 30 years ago when, as a teenager, he worked for his father's construction company.

With the help of a strong education — he earned a Bachelor of Science degree in construction engineering in 1981 from Cal Poly, San Luis Obispo, CA — and much motivation, today Jack is sponsor of foundations work at Kiewit Pacific in Concord, CA and a founding director of the Pile Driving Contractors Association.

"In 1987, I started working for Kiewit Pacific as a concrete superintendent at the Harvey Place Dam near South Lake Tahoe," he recalls. "Since that job, I have been involved with the construction of bridges, treatment plants, cut and cover tunnels and power plants."

Jack, 46, first became the sponsor of foundations work at Kiewit Pacific 11 years ago. He is responsible for finding, bidding and putting together the management team on pile-driving work in California, Nevada, Utah and Idaho. He's also involved in large estimates that the company may be working on throughout the United States. Some of his clients include departments of transportation, municipal sewer and water agencies and top building contractors in the west.

Jack became involved with PDCA in 1996 because he felt that the pile-driving industry needed a better voice.

Already a member of the Deep Foundations Institute, he says, "At the time, we were losing market share to the drilled shaft industry. They were well supported by the Association of Drilled Shaft Contractors. ADSC was doing a good job of getting engineers and owners to switch from driven pile to drilled pile. Our initial vision was to get the PDCA to act as a vehicle to educate on the positive attributes of the driven pile."

He believes that the greatest benefit of PDCA is being able to stay on the cutting edge of the industry. In addition to helping strengthen PDCA's efforts, he also enjoys the social aspect of being involved in the association.

"I enjoy the conferences. I have met a lot of great people from all over the United States and abroad."

Unusual driven-pile applications at Kiewit

In discussing his career and projects at Kiewit Pacific, he recalls an unusual application of the driven pile that the company recently worked with.

Jack became involved with PDCA in 1996 because he felt that the pile-driving industry needed a better voice.

"Lately we have been doing a lot of large diameter CISS cast-in-steel shell pile. We are driving eight-ft. diameter pile up to 300-ft. long for the new Bay Bridge. These large piles are a new thing here in California."

Jack is also confident that driven pile will continue to be important in the construction industry in his area.

"There are a lot of sites that have very difficult soils for drilled shafts here in the Bay area. Most of the easily developed land has been developed years ago," he says. "The only areas remaining for the building market are the areas that are underlain with Bay mud. These sites have this material up to 150 ft. deep. Without driven pile, none of these sites would be buildable."

In addition to his extensive experience, his corporate philosophy has helped him advance in his career with Kiewit Pacific.

"Get work at the right price, build the work at the lowest cost, and take care of our clients. We strive for repeat business. As for our employees, we have developed a strong diverse team of engineers, superintendents and craftsmen/women that have worked for Kiewit for many years. We have a very low turnover with our core people. People are our most important asset."

As for the future, Jack plans to stay put at Kiewit Pacific.

"They have given me opportunities that were not available anywhere else. It is a first-class company with some of the best construction minds in the industry."

Jack believes that the greatest benefit of PDCA is being able to stay on the cutting edge of the industry.

During his time off, Jack enjoys spending time with his wife of 22 years, Diane, and their two children. His son Clayton, 14, is a freshman in high school and his daughter, Allison, 18, recently went away to college at Lehigh University in Bethlehem, Penn. He also spends time on one of his passions— amateur wrestling. He was a former college wrestler and a finalist in the 1984 USA Olympic wrestling trials.

"I spend a lot of time working with kids to improve their wrestling skills. I have been coaching for the last 15 years and I love it." ▼

Calendar of Events

February 19-21, 2004
8th Annual Winter Roundtable Conference
Wyndham Orlando Resort
Orlando, Florida

September 16-17, 2004
5th Annual DICEP Conference
Sheraton Gateway Hotel
Los Angeles, California

For Editorial Questions, Please Contact Lisa Kopochinski, Editor, at (800) 481-0265 or at

lisa@lesterpublications.com

Index to Advertisers

L.B. FOSTER COMPANY IS PROUD TO BE A UPRR SUPPLIER OF THE YEAR

This May, L.B. Foster Company's Piling Division received a Supplier of the Year Award from the Union Pacific Railroad.

Regarding Foster's service, the Union Pacific announcement stated, "This supplier exemplifies many of the ideals of customer service. Their on-time delivery report card is simply astounding given the relatively short lead times and numerous changes in project timing and requirements.

"The L.B. Foster team's commitment to the UPRR is best illustrated by their reaction to the 2002 Sharon Springs casualty. Friday night the UPRR Maintenance Track Manager contacted L.B. Foster via a pre-established UP emergency phone number. The Foster crew swung into action immediately, putting the customer's needs first, expediting loading and trucking, pushing past normal communications and paperwork procedures. By Saturday afternoon Foster delivered the necessary piling to the job site. Right material, right timing, right supplier.

"L.B. Foster Piling succeeds at the old adage 'the customer is king.' With a spotless track record, a remarkable sense of urgency and a businesslike vision for the future, this company deserves to be a 2002 Supplier of the Year."

L.B. Foster is deeply committed to providing the UPRR, as well as all of our customers, with the products and services they need, on every level, to assure continued successful operation of their business. For more information on all of our piling products, including hot rolled Z-pile, H-pile, pipe pile, and more, call us today at 1-800-255-4500, e-mail us at info@fosterpiling.com or visit us at www.fosterpiling.com.

The Sharon Springs Bridge before the fire.

The bridge collapses.

Rebuilding the bridge. Foster piling arrived at the scene in 24 hours.

The new bridge, ready for operation.

Foster Piling

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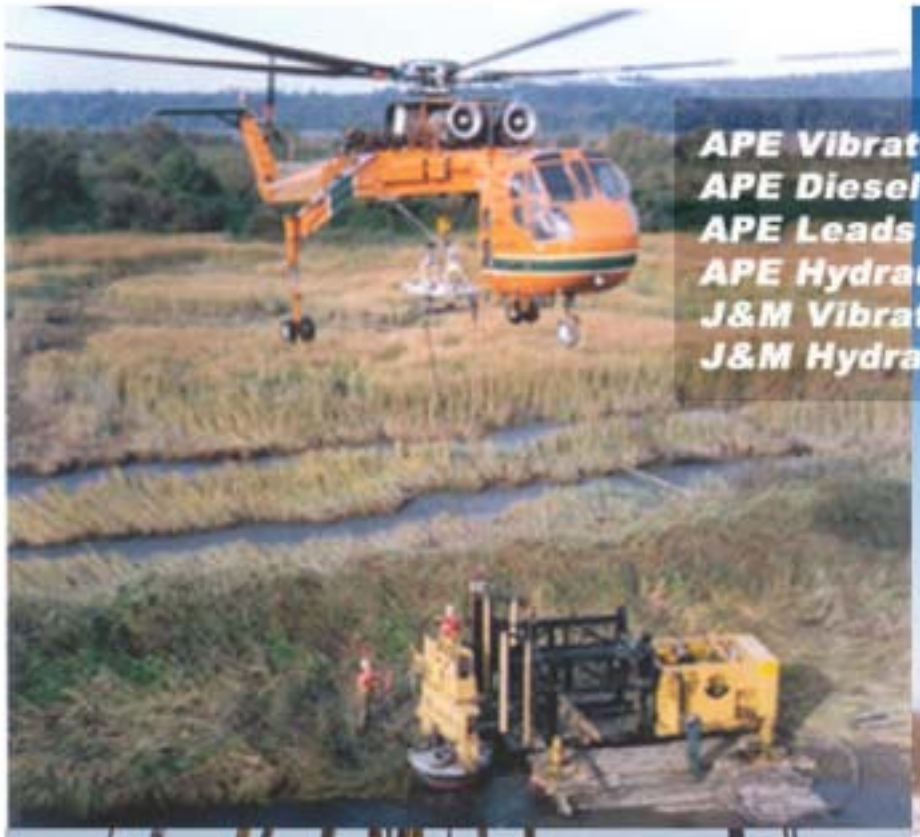

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