

PILED RIVER

THE OFFICIAL PUBLICATION OF THE PILE DRIVING CONTRACTORS ASSOCIATION  | Q2 2009 Vol. 6, No. 2

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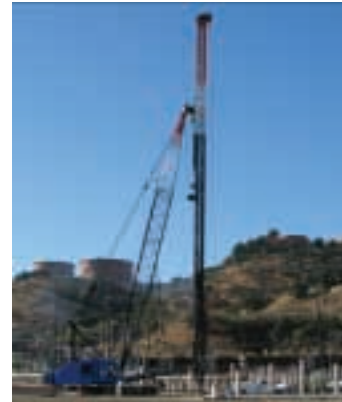
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On the Cover:
 Junttan rig driving
 concrete piles

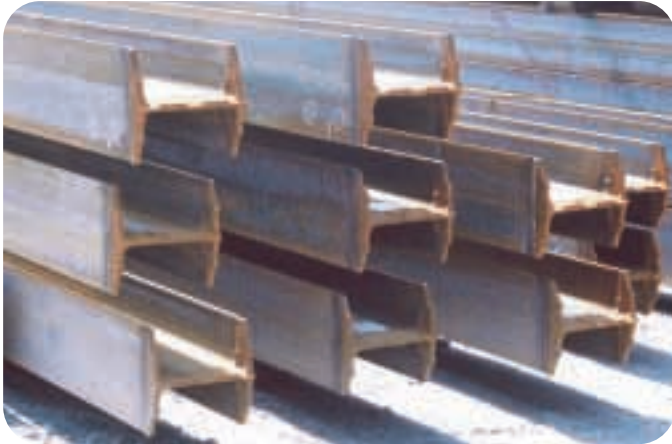


Professors' Driven Pile Institute 2009

Sponsorship information on page 25



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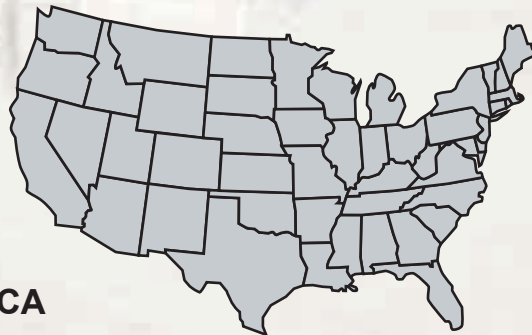
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Kiss Me, I'm a Pile Driver

By John King

Wow, what a way to start my term as your president with 2,700 attendees at the IFCEE. Thanks to Harry Robbin's idea to make PDCA members stand out at the conference with a visual presence. Mike Elliott (Pile Equipment, Green Cove Springs, Fla.) and Steve Hall came up with the Kelly green PDCA T-shirts to be worn on St. Patrick's Day and Andrea Edwards (Cox Industrial Division, Eutawville, S.C.) had everyone, including hotel staff wearing the PDCA "Kiss Me, I'm A Pile Driver" pins. This is what I believe makes the PDCA such a great association, the teamwork that started with Harry's idea; to Steve, Mike and Andrea making it all happen! We had hundreds of pins and T-shirts walking around the IFCEE '09 conference and there was no question that the other people in attendance knew PDCA was present and that we are proud of who we are and proud of what we do!

It is my honor to second Van Hogan's remarks about Mark Weisz: PDCA is a better association because of Mark, as well as the presidents before him. Thanks to all of you who have served the PDCA as president.

Now I must try and take Van Hogan's place. Thank God for our new vice president, Don Dolly. I say this because no one person can fill the void left by Van. Van, thank you so much for all you have done for PDCA, and more importantly, thank you for being my friend, I am a better person for knowing you.

I got a nice note from a friend who said that a few of them were reminiscing at IFCEE about the day they got together and dreamed up the concept of PDCA. To them I say, the passion for our industry is growing and I hope we make you proud. Let's face it, we are the best deep foundation, every time.

Let me take a moment to discuss QC/QA of our products:

I had the pleasure of touring the Nucor steel plant in Berkeley County, S.C. All of the testing done on the steel at every stage of manufacturing was amazing. Each finished product came with a batch sticker on it for tracabilty and each truck load come with a certified mill test report. For QC and QA, you can verify it all before it's driven.

Prestressed Concrete Piles - If you have never toured a prestress plant, I highly recommend you do. It's amazing to see how uniform the strands are, as well as all the different strand patterns they have for each siesmic zone. Again, for QC and QA purposes, a significant number of cyclinders of concrete are kept from each batch. They test the cyclinders the next day for strength before they release the strand and they test other cyclinders on the seventh day for the same reason. By the time you drive a pile, they have been tested twice for concrete strength to guarantee the quality of the concrete and therefore the pile.

Wood piles are tested and classified into so many categories I would need two or three more pages to list them all. But from the sizing, to the kiln, to the treatment cyclinders and the plant certification, you get a whole lot of capacity for a little bit of money. Since they are trees, you can't top God for quality control of the product.

Who else can let the engineer, owner, general contractor and all involved with building a project see and feel our finished product on a truck before it is driven? No other deep foundation is as tested before it goes into the ground and gives all involved that peace of mind, which all ends with "A Driven Pile is a Tested Pile." ▼



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The Port of Houston is a 25-mile-long complex of diversified public and private facilities located just a few hours' sailing time from the Gulf of Mexico. The port is ranked first in the United States in foreign waterborne tonnage and second in the U.S. in total tonnage. More than 225 million tons of cargo move through the Port of Houston annually. A total of 8,053 vessel calls were recorded at the Port of Houston during the year 2008. All together, the port authority and its neighbors along the ship channel are a large and vibrant component to the regional economy.

The Port of Houston has an impressive listing of firsts, from unloading the world's first container ship to becoming the country's first port to

receive ISO 14001 compliance. In order to meet future demands, an expansion was undertaken in late 2008 which required the building of the heavy foundations needed to support the new dock cranes used to unload the vessels.

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Hard Work Pays Off...

By Stevan A. Hall

PDCA recently concluded the International Foundation Congress and Equipment Expo '09 in Orlando, Fla. This program was the culmination of over two years of hard work by a dedicated group of associations and individuals. The PDCA, Geo-Institute of ASCE and the ADSC committed a significant amount of time and resources to bring what is undoubtedly the largest gathering of professionals in the Geo Engineering and Geo Construction industries together under one roof, not to mention the largest equipment expo of deep foundation, earth retention and industry support technology ever assembled.

PDCA is proud to have been a part of this program and wants to thank all involved, including the support shown by PDCA members who attended the congress, exhibited and sponsored. Your participation made a significant impact on the conference and helped ensure its success.

The PDCA's 2009 Professors' Driven Pile Institute (PDPI) is well underway. At this time, the PDCA has received 23 applications from professors representing various universities and colleges across the U.S. and U.K.

Joe Caliendo, Utah State University, has scheduled an excellent agenda with the best-known individuals in the driven pile industry as instructors.

Through the PDPI, the PDCA has provided the nation's leading engineering professors with the expertise to teach over 5,000 engineering students about driven pile advantages. Without question, this program is the standard by which all "teach the teacher" program are judged and is the best way to ensure the continued progress and strength of our industry for the coming years. This program has often been described as the most important program PDCA has ever undertaken and based on its success, apparently we have done an outstanding job.



The PDCA funds 100 percent of the cost of the program except for the professor's travel to and from Utah State University, the home of the PDPI. To help offset these costs, the PDCA has distributed the PDPI Fundraising brochure. There are several different levels of sponsorship and all will help ensure the PDPI program not only continues in the future, but also continues to be the preeminent program for teaching professors about driven pile. When you receive your brochure, please consider a contribution at a level that is comfortable for you.

The PDCA looks forward to bringing you the story behind this year's successful PDPI in the next edition of PileDriver magazine.

In closing, I want to thank Van Hogan, PDCA President 2008-09 for the tremendous job he did as your president. Van is a tireless worker when it comes to PDCA and his strong work ethic and dedication to PDCA was revealed throughout his term as president. Van has also gained the respect of his fellow PDCA members through his leadership as an officer, board member and committee chair and committee member. Van, I look forward to working with you throughout 2009 as our immediate past president. You have done much to deserve this title.

I want to welcome John King from the frying pan to the fire! John is our PDCA President for the next 15 months (due to the 2010 Annual Conference date of May) and I am confident John will perform in an exemplary manner – it may be unique, given John's personality and approach, but I have no doubt that his ability to lead the PDCA will be felt immediately and in a most positive manner. I look forward to working with John and his Board of Directors to accomplish the many tasks that lie ahead of us this year.

Congratulations to Mark Weisz, who retired this year from the board of directors and relinquished his title of immediate past president to Van. Mark has been a true leader within the ranks of the PDCA. Mark, I know you are deserving of a little R&R, but don't go too far. Your counsel will always be sought after by those who follow in your footsteps.

Congratulations also go to Garland Likins (GRL) who received the PDCA Presidential Award for Distinguished Service; Van Komurka (Wagner Komurka Geotechnical Group) who received the PDCA's Professional Engineers Service Award; and to Dale Biggers (Boh Brothers) who received the PDCA Committee Chair of the Year Award. ▼

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Upcoming PDCA Events

2010 PDCA ANNUAL CONFERENCE

The PDCA has selected Coeur d'Alene Golf and Spa Resort as the site for the 14th Annual International Conference and Exposition in 2010. The conference dates are May 6 to 8, 2010.

The conference will present excellent educational programs, social activities, Companion's Program, and exhibitors with plenty of receptions, dinners, awards, golfing and fun for everyone. PDCA is especially excited about the planned evening reception/dinner cruise on Lake Coeur d'Alene.

The accommodations are excellent. All of the PDCA premiere blocked rooms have an excellent view of the lake with private balconies, and all deluxe rooms have either full or partial lake views. Those who register early with the resort will get the best rooms with the best views, regardless of whether you select premiere or deluxe.

The resort's signature restaurant, Beverly's is a five-star award-winning facility consistently ranking as one of the top restaurants in America. Beverly's also boasts a \$1.5-million wine cellar with the largest selection of imported and domestic wines in the Northwest and has received Wine Spectator's Grand Award for the past decade.

Spa Coeur d'Alene is a 30,000-square-foot facility with treatment rooms overlooking the lake. PDCA is working with the spa to make it a part of the Companion's Program – we will out do the Phoenix spa program for the ladies, but for now the package will be kept a secret.

And of course, there's the golf. Golf Digest said, "Coeur

d'Alene is what every golf course should be. It's not just upscale, it's posh. You aren't just pampered, you're spoiled. It's not just an escape, it's an experience." Each round of golf includes a shuttle to the course via a custom-designed, handcrafted, Honduran mahogany water taxi, range time at the over-the-water driving range, a forecaddie, deluxe golf cart (better than the personally owned customs you see on private courses), and a warm-up range massage to get you limber before you go out and play. Golf Digest also rated the course as one of the top resort courses in the world and named Coeur d'Alene Golf Course the "Best Conditioned Golf Course in North America."

With plenty of time for prior planning, this will be a conference you will NOT want to miss.

For more information about the conference or submitting a presentation for the educational tracks, contact the PDCA at 888-311-7322 or by e-mail to steve@piledrivers.org.

PDA TEST INTERPRETATION AND CAPWAP ANALYSIS SKILLS DEVELOPMENT WORKSHOP (2 DAYS) AND HIGH STRAIN DYNAMIC PILE TESTING (HSDPT) CERTIFICATION EXAMINATION (1 DAY)

Dynamic Pile Testing (PDA) is a powerful technique for evaluation of pile capacity and pile construction control. However, what makes the PDA really powerful is

being under the control of a test engineer who can properly recognize, understand and interpret the test signals by visual assessment and simple analysis. To perform testing at this level requires training and practice.

Capwap is the industry-standard signal-matching analysis which is applied to PDA data on completion of the pile testing. It is accepted as the definitive assessment of the dynamic testing signals. However, the analysis does not provide a unique solution, and there are no definitive rules for what is or is not an acceptable analysis. In the PDA Test Interpretation and Capwap Analysis Skills Development Workshop, PDA Testers will have the opportunity to develop their skills in interpretation of PDA test signals and in Capwap analysis.

The HSDPT Certification Examination will be given following the workshop. Both Part A (PDA Tester Basic or Intermediate) and Part B (PDA Signatory Advanced, Master or Expert) will be provided to participants.

The combined workshop and exam are scheduled for Sept. 23, 24, and 25, 2009, in Philadelphia, Pa. For more information on these two programs, contact the PDCA office at 888-311-PDCA (7322) or via e-mail to steve@piledrivers.org.

DESIGN AND INSTALLATION OF COST-EFFICIENT PILE CONFERENCE

The California Chapter of the PDCA and PDCA (national) have scheduled the 2009 Design and Installation of Cost-Efficient Pile (DICEP) conference in the Oakland, Calif. area on Nov. 19, 2009. The facilities for DICEP will be selected and announced on the PDCA Web site www.piledrivers.org and in the conference brochure that will be distributed well in advance of the conference date.

The DICEP conference features six presentations primarily designed for civil, geotechnical, and structural engineers, with lectures presented from an engineering perspective on the advantages of driven pile. However, the conference is also intended to provide a positive learning experience for contractors and other firms or individuals who support, conduct business or are associated with the pile driving industry. Certificates of Completion will be presented to all participants to use toward PDH credits in license renewals.

The conference will include an exhibitor area that will provide ample opportunities for suppliers and manufacturers to spend some quality time with engineers and contractors in a focused setting. The exhibit area will be in close proximity to the meeting rooms and will be the location of the continental breakfast and the morning and afternoon breaks. Additional time to network will be provided following the luncheon. Limited sponsorships will also be available.

For more information on the PDCA Design and Installation of Cost-Efficient Piles Conference, contact the PDCA office at 888-311-PDCA (7322) or via e-mail to steve@piledrivers.org. ▼



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The PDCA was founded in 1996 to promote the use of driven-pile solutions in all cases where they are effective. We strive to build and maintain working relationships among end users, manufacturers, government agencies, educational institutions, engineers and others involved in the design, installation and quality control of the driven pile.

We are dedicated to advancing the driven pile

As the only organization solely dedicated to pile-driving contractors, we know that you understand the superiority of the driven pile in most applications. We are the only association addressing the intrusion of non-driven solutions that take away business from the driven-pile contractor. The PDCA understands that to survive in today's competitive marketplace, a pile-driving contractor must strive to stay abreast of the latest trends and technologies in the industry. That is why we maintain close ties with the world's leading suppliers to the industry. It's why we provide a broad range of educational programs for university professors, practicing engineers and contractors. And, it's why more and more contractors, engineers and suppliers are realizing that the PDCA significantly increases their value in the marketplace.

We are a direct link to decision makers

Major manufacturers take an active role supporting the PDCA. At our conferences, we bring together the world's

leading design manufacturers and technical application experts to assist you in advancing the driven pile as a superior product.

The PDCA works closely with the technical community to format design codes and installation practices. We offer seminars throughout the country for engineers and educators on the capabilities and advantages of the driven pile. We also work with agencies, such as the Federal Highway Administration and state DOTs, which develop specifications for highway building and other infrastructure projects that use driven piles.

We offer timely, valuable services

The PDCA improves your company's bottom line, as well as your stature in the construction industry, through a variety of programs and services:

Job Referrals

We are the only organization that provides contractor referrals to end users of driven piles. You tell us where you will drive piles and we will refer you to end users. We also provide referrals to our supplier and technical members.

Peer-to-Peer Opportunities

With more than 120 contractor members, the PDCA offers many networking opportunities. Whether at our Annual Conference, DICEP conference, our regional seminars, or by just picking up the phone, you'll develop long-lasting professional relationships and friendships in the industry.

Annual Membership Directory

As a member, you'll receive PDCA's annual membership directory of our contractor, supplier and technical members. Your company is listed along with the piling solutions you employ and states in which you work. This directory is provided throughout the year to construction users on a complimentary basis.

Educational Conferences and Meetings

The PDCA offers cutting-edge education for contractors, engineers, geotechs and anyone else interested in the driven pile and its applications at two major conferences annually. Members receive discounts on exhibit and registration fees.

- The Annual Conference, held in early Spring since 1997, is a nationally recognized conference that brings together leading contractors, technical experts and suppliers to the piling industry.
- The Design and Installation of Cost-Efficient Driven Piles Conference (DICEP), held each September since 2000, is a nationally recognized daylong conference that brings together geotechnical and design engineers, college professors and contractors to discuss the latest trends in understanding, analyzing and controlling piling costs.

Industry Development

The PDCA continually strives to expand market share for the driven pile. The PDCA sponsors the Professors' Driven Pile Institute, held at Utah State University in Logan, Utah. Up to 25 professors from major engineering schools are invited to participate in an intensive, weeklong program that presents them with the latest concepts in driven-pile design, installation and quality control. Some of the leading faculty in the deep foundation field has attended the institute to date. The program supplies the educators with the tools and knowledge to be able to teach their students about the advantages of the driven pile. It promises to have a long-term impact on market share for the driven pile.

Publications and Reference Materials

As a PDCA member, you will receive our quarterly publication, *Piledriver*, which presents articles on issues and trends of interest to our industry. As a member, you'll receive discounts on advertising in the magazine.

All PDCA members receive a complimentary copy of the PDCA's codebook, *Recommended Design Specifications for Driven Bearing Piles*, now in its third edition. This book covers all required



“Through its programs and services, PDCA has presented our company with numerous opportunities to continue our business success. It is certainly a cornerstone for growth in a very competitive business.”

D.R. JORDAN, PRESIDENT AND CEO,
JORDAN PILE DRIVING, INC.



guidelines for driven piles and includes a suggested bid and payment schedule.

PDCA also offers the *Installation Specifications for Driven Pile-PDCA Specification 103-07* as a CD to all new members at no charge.

The PDCA also sells *Driven Pile Foundations, Volume I&II*, an FHWA manual on the design and construction of driven piles.

Connect Worldwide at www.piledrivers.org

The PDCA's newly redesigned Web site at www.piledrivers.org lets you research the latest trends in the industry and find direct links to manufacturers, suppliers, engineers and others. PDCA members receive a free listing in our member search area, which is being used by an increasing number of end users to find pile driving contractors and services. Our forums area makes it easy for you to connect with others to discuss issues and problems.

Leadership Opportunities

Membership in the PDCA provides opportunities for recognition and leadership. Positions are available on the PDCA board of directors and various committees that impact the industry. The PDCA recognizes noteworthy contributions to the industry with our Driven Pile Project of the Year Award, giving opportunities for high profile recognition.

Membership is available to you

There is strength in numbers and we at the PDCA need to count your company when telling government agencies, engineers and suppliers that we are interested in keeping your business viable and in growing market share for the driven pile. We need your ideas and efforts in working together toward a common goal: the use of driven-pile solutions. You can contribute your expertise and assist the Association in developing:

- A greater focus on safety.
- The quality of driven pile products.
- The formatting of codes and specifications for the driven pile.
- Support for a program to help educate students in the use of driven piles.

Join today. Be part of a growing and vibrant organization that will play a key role in the future of deep foundations. Support your industry by completing the membership application in this issue. You will immediately begin to enjoy benefits of membership. ▼



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MEMBERSHIP APPLICATION

Step 1: Company Information

Company Name: _____

Contact Name: _____

Address: _____

Phone: _____ Fax: _____

City / State / Zip: _____

Company Home Page: _____ E-mail: _____

Step 2: Select Membership Type

Important! Read carefully! The PDCA Bylaws define member classifications and qualifications. Dues are established by the PDCA Board of Directors and shown in () for each type.

- Contractor Member** – General or specialty contractor who commonly installs driven piles for foundations and earth retention 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 the pile driving industry.
 - 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 Associate Company desiring membership in a single local chapter, who only serves that local market, and whose interest is to support the local chapter. Membership must be approved by PDCA Executive Committee.

- Individual**
- Technical Affiliate Member** - (\$100.00)
 Individual who is involved with the design and installation of driven piles or in teaching the art and science of pile design and installation. May be employed engineers, architects, government or university employees. As a Technical Affiliate, your name and contact information will be displayed in the membership directory as well as on our Web site.

- Retired Industry Member** - (\$100.00)
 Individual who has reached retirement age, left active employment, and wishes to remain a member.

- Student Member** - (\$20.00)
 Full-time students studying towards a bachelor, master or doctorate degree in a regular university program.

- Affiliate Labor Organization Member** - (\$100.00)
 Concerned with pile driving for the purpose of gathering and sharing information.

- Organization Member** -
 Non-voting membership category. Must be approved by the PDCA Executive Committee.

Step 3: Member Information

(complete only the category for which you are applying)

A. Contractor Members – check all services that your company provides:

- | | | |
|--|--|---------------------------------------|
| <input type="checkbox"/> Bridge Buildings | <input type="checkbox"/> Docks and Wharves | <input type="checkbox"/> Marine |
| <input type="checkbox"/> Bulkheads | <input type="checkbox"/> Earth Retention | <input type="checkbox"/> Pile Driving |
| <input type="checkbox"/> Deep Dynamic Compaction | <input type="checkbox"/> General Contracting | <input type="checkbox"/> Other |
| <input type="checkbox"/> Deep Excavation | <input type="checkbox"/> Highway and Heavy Civil | |

B. Associate Members – check all products and services that your company provides:

Accessories

- | | | |
|--|--|---|
| <input type="checkbox"/> Cutter Heads and Drill Bits | <input type="checkbox"/> Hoses and Fittings | <input type="checkbox"/> Pile Points and Splicers |
| <input type="checkbox"/> Dock and Marine Supplies | <input type="checkbox"/> Lubricants and Grease | <input type="checkbox"/> Rigging Supplies |
| <input type="checkbox"/> Hammer Cushions | <input type="checkbox"/> Pile Cushions | <input type="checkbox"/> Safety Equipment |
| <input type="checkbox"/> Other | | |

Materials

- | | | |
|--|---|---|
| <input type="checkbox"/> Aluminum Sheet Piles | <input type="checkbox"/> Composite Piles | <input type="checkbox"/> Steel Sheet Piles |
| <input type="checkbox"/> Coatings and Chemicals | <input type="checkbox"/> H-Piles | <input type="checkbox"/> Structural Steel |
| <input type="checkbox"/> Concrete Piles | <input type="checkbox"/> Steel Pipe Piles | <input type="checkbox"/> Synthetic Material Piles |
| <input type="checkbox"/> Timber Piles/Treated Lumber | <input type="checkbox"/> Other | |

Equipment

- | | | |
|--|---|---|
| <input type="checkbox"/> Air Compressors and Pumps | <input type="checkbox"/> Drive Caps and Inserts | <input type="checkbox"/> Leads and Spotters |
| <input type="checkbox"/> Cranes | <input type="checkbox"/> Hammers | <input type="checkbox"/> Marine Equipment |
| <input type="checkbox"/> Drill Equipment | <input type="checkbox"/> Hydraulic Power Packs | <input type="checkbox"/> Specialized Rigs and Equipment |

Services

- | | | |
|--|---|---|
| <input type="checkbox"/> Consulting | <input type="checkbox"/> Geotechnical | <input type="checkbox"/> Testing |
| <input type="checkbox"/> Design | <input type="checkbox"/> Marine Drayage | <input type="checkbox"/> Trucking |
| <input type="checkbox"/> Freight Brokerage | <input type="checkbox"/> Surveying | <input type="checkbox"/> Vibration Monitoring |
| <input type="checkbox"/> Analysis | <input type="checkbox"/> Civil and Design | <input type="checkbox"/> Materials Testing |
| <input type="checkbox"/> Pile Driving Monitoring | <input type="checkbox"/> Other | |

General

- | | |
|---------------------------------|--------------------------------|
| <input type="checkbox"/> Rental | <input type="checkbox"/> Sales |
|---------------------------------|--------------------------------|

Step 4: Geographic Areas Where Services and Products Are Available

(All applicants check all that apply)

- | | | | | | | | |
|-------------------------------------|-----------------------------|-----------------------------|-----------------------------|---------------------------------|--|--------------------------------|-----------------------------|
| <input type="checkbox"/> All States | <input type="checkbox"/> AK | <input type="checkbox"/> AL | <input type="checkbox"/> AR | <input type="checkbox"/> AZ | <input type="checkbox"/> CA | <input type="checkbox"/> CO | <input type="checkbox"/> CT |
| <input type="checkbox"/> DC | <input type="checkbox"/> DE | <input type="checkbox"/> FL | <input type="checkbox"/> GA | <input type="checkbox"/> HI | <input type="checkbox"/> IA | <input type="checkbox"/> ID | <input type="checkbox"/> IL |
| <input type="checkbox"/> IN | <input type="checkbox"/> KS | <input type="checkbox"/> KY | <input type="checkbox"/> LA | <input type="checkbox"/> MA | <input type="checkbox"/> MD | <input type="checkbox"/> ME | <input type="checkbox"/> MI |
| <input type="checkbox"/> MN | <input type="checkbox"/> MO | <input type="checkbox"/> MS | <input type="checkbox"/> MT | <input type="checkbox"/> NC | <input type="checkbox"/> ND | <input type="checkbox"/> NE | <input type="checkbox"/> NH |
| <input type="checkbox"/> NJ | <input type="checkbox"/> NM | <input type="checkbox"/> NV | <input type="checkbox"/> NY | <input type="checkbox"/> OH | <input type="checkbox"/> OK | <input type="checkbox"/> OR | <input type="checkbox"/> PA |
| <input type="checkbox"/> RI | <input type="checkbox"/> SC | <input type="checkbox"/> SD | <input type="checkbox"/> TN | <input type="checkbox"/> TX | <input type="checkbox"/> UT | <input type="checkbox"/> VA | <input type="checkbox"/> VT |
| <input type="checkbox"/> WA | <input type="checkbox"/> WI | <input type="checkbox"/> WV | <input type="checkbox"/> WY | <input type="checkbox"/> Canada | <input type="checkbox"/> International | <input type="checkbox"/> Other | |

Step 5: Method of Payment

I am providing payment in the amount of:

- | | | | |
|-----------------------------------|-----------------------------------|-----------------------------------|----------------------------------|
| <input type="checkbox"/> \$850.00 | <input type="checkbox"/> \$425.00 | <input type="checkbox"/> \$100.00 | <input type="checkbox"/> \$20.00 |
|-----------------------------------|-----------------------------------|-----------------------------------|----------------------------------|

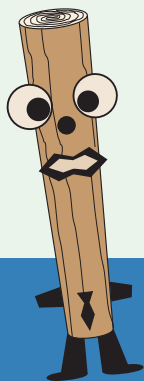
I am making payment in full by:

- | | | | | |
|--------------------------------|-------------------------------|-------------------------------------|---|-----------------------------------|
| <input type="checkbox"/> Check | <input type="checkbox"/> Visa | <input type="checkbox"/> MasterCard | <input type="checkbox"/> American Express | <input type="checkbox"/> Discover |
|--------------------------------|-------------------------------|-------------------------------------|---|-----------------------------------|

Card Number: _____ Expiration Date: _____

Name on Card: _____ Security Code: _____

Statement Billing Address _____



Did You Know?

GEOTECHNICAL DRILLING MACHINE EFFICIENCY

By Hillis-Cames Engineering Associates, Inc.

The Standard Penetration Test (or SPT) is the standard method of obtaining disturbed soil samples for geotechnical purposes. The test is performed by driving a drill rod(s) with split-barrel sampler attached into the subsurface and counting the number of hammer blows required to drive the sampler 18 inches; measured in three six-inch increments. The number of hammer blows for the second and third six-inch increments are added together and are referred to as the 'N' value. It is the 'N' value that is then utilized by the geotechnical engineer to perform a wide variety of geotechnical calculations and interpretations. The hammer driving the drill rod/sampler is to weigh 140 pounds +/- and it is to "freely fall" 30 inches +/- (the hammer weight and hammer drop are to fall within specified tolerances).

Traditionally, the hammer is raised with a manila rope wound around a rotating drum or "cathead." The driller releases the rope, it falls away from the rotating drum and the hammer drops. Unfortunately, the amount of energy actually transferred to the anvil and drill stem is less than the total available energy (140 pound hammer x 2.5 foot drop = 350 foot-pounds). The reason for the decrease in actual transferred energy is the same reason a pile driving hammer does not deliver 100 percent rated energy; friction in the system decreases the available energy as the hammer falls and thus some loss of efficiency occurs.

For the pile driving contractor attempting to assess driving conditions for a prospective project, the 'N' values displayed on the boring logs are likely the actual blow counts determined during the exploration program, not adjusted for drilling machine inefficiencies, and the pile driving contractor assumes that these blows represent 100 percent efficiency. This acceptance of the 'N' values as representing 100 percent efficiency can lead to some surprises during the pile driving program.

The measurement of drilling machine efficiency can be effectively performed using a specialized version of the PDA, commercially available, and designed for the low energy transfers occurring during geotechnical drilling. The author has performed these measurements on several large projects over the past 10 years for the Maryland State Highway Administration (MD SHA) and the Delaware Department of Transportation (DelDOT). The range of actual transferred energy during the performance of the SPT test can vary widely from as little as 25 percent to as much as 94 percent depending upon a large number of factors. Some of the major factors that affect drilling machine efficiency are as follows:

- Manually operated hammer versus automatically operated hammer (MD SHA requires automatic hammers on all state projects).
- RPM of the rotating drum for manually operated hammers.
- Condition of the sheaves.
- The condition of the rotating drum, i.e., the drum should be smooth, rust-free, with no discernible indentation or groove created by the manila rope.
- The condition of the drill rods, i.e., the rods should not have flared ends, fit tightly, and be straight without excessive grooves, pits, or other defects.
- The drill rods should be started plumb and not move wildly back and forth when the SPT test is in progress.
- The driller, in a manually operated system, must consistently raise the hammer to the required 30-inches +/-.
- The manila rope should not be covered in grease.
- The operating speed of the drilling machine.
- The angle at which the manila rope enters and exits the sheaves.
- The diameter of the rotating drum. Some small, portable engines used in skid and tripod drilling come equipped with smaller-than-normal diameter rotating drums and do not spin fast enough to quickly allow the rope to become disengaged from the drum when released by the operator.

In monitoring drilling machine efficiency, the following energy ratings have been typically recorded for the following various classes of drilling equipment:

1. Truck- and ATV-mounted drilling machines equipped with automatically operated hammers – 85 percent to 94 percent efficient depending upon the age and wear of the hammer system.
2. Drilling machines with manually operated hammers – 55 percent to 81 percent efficient, typically 70 percent to 73 percent efficient.
3. Skid rig drilling machines, manually operated – 25 percent to 45 percent efficient depending upon drum diameter and position of and type of tower and sheaves.
4. Tripod Drilling Equipment – 20 percent to 30 percent efficient.

What can the pile contractor do to better understand the boring logs and the SPT 'N' values?

1. Read the geotechnical report, if accompanying the boring logs, for any explanation of the type of drilling equipment used during the exploration program and the type of hammer (manual or automatic) that was used.
2. If more than one drilling machine was used look for consistency in 'N' values with the same drill rig in the same geologic formation realizing that 'N' values can change because of natural changes in the geologic formation. However, if there are enough borings drilled with more than one machine, consistently higher or lower 'N' values may become apparent when comparing one machine to another in the same formation.
3. Talk to the driller and ask if the drilling machine used had been tested for energy transfer ratings.
4. In the absence of PDA data, geotechnical engineers will typically use a value of $N=60\%$ or $N=70\%$ when performing their calculations. Ask the geotechnical engineer if these values are reasonable for the drilling equipment used on the project (except if skid-mounted or tripod drilling machines were used).

AASHTO and ASTM both provide standards for the SPT test with basic requirements for drilling machine equipment. However, over the years drilling machines can be sold several times and be modified several times so that they no longer represent the condition they were in at the time of manufacture. They may be modified for special conditions or simply modified without care taken with respect to the transfer of energy.

The Federal Highway Administration (FHWA) has been very interested in developing an AASHTO Standard for monitoring drilling machine efficiency. The author participated in a FHWA Technical Working Group (TWG) composed of state DOT representatives, FHWA personnel, and private consultants to evaluate and develop an AASHTO standard. I have attached the proposed standard that came from the efforts of this group. It has not yet been adopted as an official AASHTO Standard. ▼

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PDCA Chapter Updates

PDCA of South Carolina

PDCA of South Carolina currently has 33 members. The chapter meets quarterly in the evening for a social/cocktail period, dinner, and an industry pertinent speaker. The chapter's quarterly meetings attract 50 to 60 members and guests. The chapter places an emphasis on its efforts to invite local engineers and academia, which helps promote the use of driven pile in the South Carolina area.

PDCA of South Carolina's next function will be on Tuesday, June 2, 2009, at 6:30 p.m. The meeting will be held at the Town and Country Inn in Charleston on S. Hwy 17. The speaker will be John C. Ryan, PhD, P.E. with Ryan Structural Engineers, who will speak about recently completed testing on splice joints for prestressed concrete pile. For further information, please contact John T. Parker, Jr. at 843-853-7615.

PDCA of South Carolina is actively promoting the "A Driven Pile is a Tested Pile" ideal and our new mantra "Driven Piles-Recycled, Recyclable and Renewable" acknowledges that our products make for a "green" foundation. With PDCA National's help and an enthusiastic board, PDCA of South Carolina looks for a successful 2009.

PDCA of the Mid-Atlantic

The PDCA of Mid-Atlantic recently held its second quarterly meeting. PDCA safety committee chair, John Lanigan (Corman Construction), presented a presentation on the Maryland I-95 / I-695 Interchange. Lanigan's presentation not only included construction specifics about the project including the 11 bridges, site development, and pile driving, but also the logistics of maintaining a safe, incident-free workplace throughout the project.

While chapter meetings are generally held at Paul's Restaurant on the South River, Riva, Md., the next meeting will most likely be held at Ocean City, Md. on Thursday, July 16 2009. The chapter dinner programs begin at 5:30 p.m. with a social, chapter news, speaker presentation, dinner and dessert.

PDCA of the Gulf Coast

The PDCA of the Gulf Coast held back-to-back meetings in April. The chapter held its regularly scheduled business meeting on April 23, with guest speakers from Service Rigging and Service Fastners addressing proper use of rigging, safety and tools.

On April 30, the chapter held its first Crawfish Boil and Fish Fry at the VFW Hall in Metairie, La. The event featured crawfish, fried catfish, jambalaya, beer and soft drinks. The event was attended by more than 150 people.

PDCA of California

PDCA (National) visited with representatives from the PDCA of California to conduct site visits at various hotel facilities in the Oakland area to secure space for the 2009 Design and Installation of Cost-Efficient Piles Conference. The conference is tentatively scheduled for Thursday, Nov. 19, 2009. ▼



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Call for abstracts announcement:

Role of Full-Scale Testing in Foundation Design ASCE Geotechnical Special Publication (GSP) honoring Bengt H. Fellenius

The ASCE Geo-Institute is soliciting abstracts for technical papers to be considered for inclusion in the Geotechnical Special Publication (GSP) honoring Professor Bengt H. Fellenius, Dr. Tech., P.Eng., M.ASCE. The GSP will be titled: **Role of Full-Scale Testing in Foundation Design**, Mohamad H. Hussein, Robert D. Holtz, K. Rainer Massarsch, and Garland E. Likins — Editors. The GSP volume will be published during the 2012 Geo-Institute's annual conference. Technical papers covering all aspects of foundation testing, design, and construction practices will be considered. Papers documenting case histories are particularly welcome. Deadline for abstract submission is September 30, 2009. Finished manuscript is expected in late 2010. Please e-mail (up to 300 words) abstracts to Mohamad H. Hussein at: MHGRL@pile.com ▼

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Professors' Driven Pile Institute 2009

Utah State University Logan, Utah June 14 - 20, 2009

The PDCA is proud to announce the 4th Professors' Driven Pile Institute, to be held June 14 - 20, 2009, at Utah State University in Logan, Utah.

Through the Professors' Driven Pile Institute, the PDCA has provided the nation's leading engineering professors with the expertise to teach over 5,000 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.

PDCA Advances Driven Piles

A key component in the increased visibility and marketability of driven piles has been our liaison with academia through the PDCA's Professors' Driven Pile Institute.

The Basics

- 100 of the nation's leading engineering professors have completed this intensive, five-day training program
- Professors learn about driven pile design, installation, quality control and assurance, and advancements in driven pile technology
- Familiarity with the role of PDCA in the industry
- The knowledge, skill and material to teach their engineering students about the value of driven piles
- The end result; a new generation of engineers specifying driven piles as the preferred method for deep foundations and earth retention systems

How Can You Help?

The PDCA funds virtually all expenses for the professors, which means a program such as the Professors' Driven Pile Institute is expensive to conduct, but worth every dollar invested. This is a WIN-WIN program.

PDCA is seeking the following sponsorship levels to help reach our goal of \$50,000.



Sponsorship Levels

Platinum Sponsor - \$10,000

Identified as the sponsoring company for two professors, major name and logo recognition throughout the program, in the PileDriver magazine, PDCA E-Letter, web site, all instructional material, and a plaque acknowledging your sponsorship.

Gold Sponsor - \$5,000

Identified as the sponsoring company for one professor, name recognition throughout the program, in the PileDriver magazine, PDCA E-Letter, web site, all instructional material, and a plaque acknowledging your sponsorship.

Silver Sponsor - \$2,500

Name recognition throughout the program, in the PileDriver magazine, PDCA E-Letter, web site, all instructional materials, and a certificate acknowledging your sponsorship.

Bronze Sponsor - \$1,250

Name recognition throughout the program, in the PileDriver magazine, PDCA E-Letter, web site, and a certificate acknowledging your sponsorship.

Nickel Sponsor - \$500

Name recognition in the PDCA E-Letter and web site.

Member - \$200

Name recognition in the PDCA E-Letter and web site.

**Now is the time for all of us
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Make a Commitment to the Future of:

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Rising To The Challenge

Ralph L. Wadsworth Construction Co. marks 34 years with innovative bridge and highway projects

By Gloria Taylor

It was a signature project for Ralph L. Wadsworth Construction Co. (RLW) and one for the history books.

When the Utah Department of Transportation (UDOT) needed to replace some aging bridges on and near the busy Interstate 80 in Utah, it opted for a highly creative and accelerated system of bridge replacement.

Briefly, a contractor would prepare new foundations or abutments under the old bridges, then build the new bridges off site and painstakingly move the super-structures in place after demolishing the existing bridges.

An ambitious and demanding project dubbed Innovate-80, the accelerated bridge construction (ABC) system, aimed to reduce the amount of time motorists would be tied up in costly traffic jams, said Tod Wadsworth, vice president of business development and piledriving operations for the Draper, Utah-based company, which got the nod to build the first phase of seven bridges.

In a separate tender, the company placed yet another bridge on I-215, which intersects I-80, using the same techniques.

Wadsworth and his brothers Kip, Con and Ty Wadsworth are the second-generation owners and managers of Ralph L. Wadsworth Construction Company started by their father Ralph.

Another unique and necessary part of the showcase project was the self-propelled modular transporters, or SPMTs that were enlisted to move the mammoth super-structures. Operating like buggies on steroids, the wheeled modular pieces of equipment supplied by Texas company, Mammoet, are sophisticated, highly technical pieces of equipment designed to carry the heaviest of industrial loads.

Through a complex hydraulic suspension system, each axle supports an equal share of the load, and the SPMTs can be assembled in any configuration to support irregular loads.

Although the system does not significantly cut down on the amount of construction time, Wadsworth said its chief benefit is in significantly reducing the amount of time the bridges must be closed to traffic, no small consideration to users. They provide the ability to move a bridge from a staging area into its final location within hours.

The company has long viewed itself as an innovative performer and prides itself on being able to take on demanding jobs.



Family owner-managers of Ralph L. Wadsworth include (from left): Tod L. Wadsworth; Kip L. Wadsworth; Ty L. Wadsworth; Con L. Wadsworth.

“Time is money, and there are hundreds of thousands of people who drive the bridges every day. You would have had traffic jams every day for six months,” he said.

In the end, Innovate-80 was just as unique to the state as it was to RLW, the second-generation family firm that acted as construction manager-general contractor on the multi-structure contract.

“It was the second time the system had been used in Utah and one of the very few times it’s been used in the United States,” said Wadsworth. His company had moved the first bridge on I-215 a year ago and welcomed the challenges the project represented.

As other states and dignitaries from other countries watched, RLW not only delivered on the project but finished well ahead of schedule. Last fall, the company placed the final bridge in place, capping a successful “first phase.”

In many ways, that early phase could be the poster project for the company because of its complexity. The vice president said the company has long viewed itself as an innovative performer and prides itself on being able to take on demanding jobs.

Innovate-80 was also important to the company in another important way. Simply stated, it demonstrated the heavy highway bridge building contractor’s ability to do more of a large project’s technical work on its own. In the case of the I-80 bridges, that skill included doing its own piling work and girder direction.

“If you own your own equipment and you have the experience, knowledge and the engineering ability, when a job comes out to bid it’s second nature for us to figure out a way to design and engineer the project without third-party involvement which just increases the cost,” said the vice president.



The bridge farm where the company built the bridges they would move into place for the Innovate-80 project. Innovation at its finest!



Soil nail system used to create a surface that resembles rock. The company pounds soil nails into a rock surface and adds mesh and spray grout to create a concrete wall that has a natural rock look.

The company pounded 22 16-inch round steel piles for each bridge abutment.

“A lot of companies do not do their own piling. If you’re building a bridge across a river, you have an advantage if you can install your own piling and cells and erect the girders, form the deck and pour your own concrete,” said Wadsworth.

Through its piling and shoring division, RLW routinely installs round piles, H piles, solid concrete piles, steel piles and sheet piles and offers vertical shoring services for walls, buildings and various other highway work.

Over the years, RLW has accumulated a distinguished portfolio of construction jobs in the heavy highway, commercial, industrial, and specialty categories.

Looking back on the recent I-80 projects, Wadsworth said the bridges are a great addition to RLW’s portfolio.

“It puts us up there in stature with some pretty unique and innovative heavy highway contractors; we’re one of the very few in the nation that can say we’ve actually done it,” he said.



Setting girders for one of the bridges in the bridge farm.

Founder’s Legacy

Ralph L. Wadsworth, an engineer, founded his company in 1975. Tod doesn’t hesitate when asked about his father’s legacy.

“It’s the ability to take on difficult or unusual projects and complete them beyond the customer’s expectations,” he said. “You win the bid by innovative thinking, proceed with aggressive construction then and complete the projects on time and within budget. Along the way you distinguish them with quality artwork and aesthetics second to none.”

The company attributes its long-term success to dedication to its projects and clients; continuous attention to quality; project delivery on time and within budget and a passion for the complicated, creative and unusual.

The founder has formally retired from the company, but he does act as consultant to the current owners.

Aesthetics – The Defining Factor

Operating a construction company in an industry where astute judgment, precise measurements and meeting deadlines are paramount, some might consider aesthetic appeal best left to the architects.



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Not so, for Ralph L. Wadsworth Construction.

The company also distinguishes itself through its custom artwork on the structures it builds. In this way, it is able to leave its own legacy to the communities in which it works.

"We typically like to dress up the concrete on all the bridges or the buildings we construct," said Wadsworth. "When we leave, we hope to leave an impression there. It's an icon for the society around it. Everybody who gets to use that structure enjoys it."

In one creative project, the company went to the local junior high school and got the students to create their own artwork and the creations were converted to photos. The company then duplicated the photos in cement on a bridge.

"The artwork is also a way of giving back to the community and the bridge-building industry," said Wadsworth.

Giving Back

Fundraising might well be called "fun raising" at Ralph L. Wadsworth Construction Co., particularly for those who enjoy keeping fit.

The company supports the community in various ways. One high-profile initiative is the Minuteman 5K Walk and Run sponsored by the Utah National Guard Charitable Trust. Proceeds from the event go into the charitable trust along with other donations and are earmarked for wives and families of service members deployed in foreign countries who have had to take drastic pay cuts in order to serve their country.

The charity subsidizes costs for mortgage payments and home repairs or grief counseling for family members whose father or mother is serving on the front lines. More than \$500,000 has been raised to date.

Future

Despite the economic downturn, the company remains optimistic, said Wadsworth.

"I think the economy's going to change," he said. "Transportation has to progress." He feels that bridges have been neglected and need to be better monitored and maintained and constructed to higher standards.

For Ralph L. Wadsworth Construction Company and the team of employees whom he says are "the best in the industry" that mission is a call to action. ▼



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Foundation Constructors

By Aileen Goos

How did a man with a bright idea and an initial investment of \$40,000 grow a small foundation company into an industry leader in California?

It's a success story Hollywood movies are made of: forward-thinking businessman has a plan to revolutionize his industry, his counterparts shun the idea, so he forges out on his own to prove it to himself and others, and strikes it rich.

The star is Fred Cavin, who started Foundation Constructors in 1971 with little more than ingenuity and integrity (not to mention a healthy dose of determination). Now, nearly 40 years later the company heads up projects that total over \$100 million per year. Not bad for a guy who started the business out of his kitchen.

"We hold ourselves to a much higher standard, even when we don't have to," says Don Dolly, president of Foundation Constructors. "This company was founded on the principle of integrity and that's something we all believe in to this day. Our CEO, Peter Brandl, whole-heartedly believes that doing the right thing is the foundation of success.

"Because of Mr. Brandl's beliefs and his contribution to

the industry, we provide quality you can count on," Dolly said. "Foundation Constructors is a sure thing; it's a brand name that's associated with quality assurance and reliability."

It started back in the late 1960s and early '70s – a time when seismic codes were changing in California and the traditional step-taper piles, which were driven and pounded in place, didn't quite meet the evolving seismic international standards.

Cavin, who was western regional manager for Raymond International, was very proud of the product, but recognized that it wouldn't meet the standards. So, he traveled to New York to meet with the board to explain that the driven precast, pre-stressed pile was going to be the future in California.

The board didn't want to hear it. Not that it mattered much to Cavin, who returned to California, convinced that he was on to something, and decided to start his own company that applied the new technique.

Over the next 10 years, those counterparts who turned



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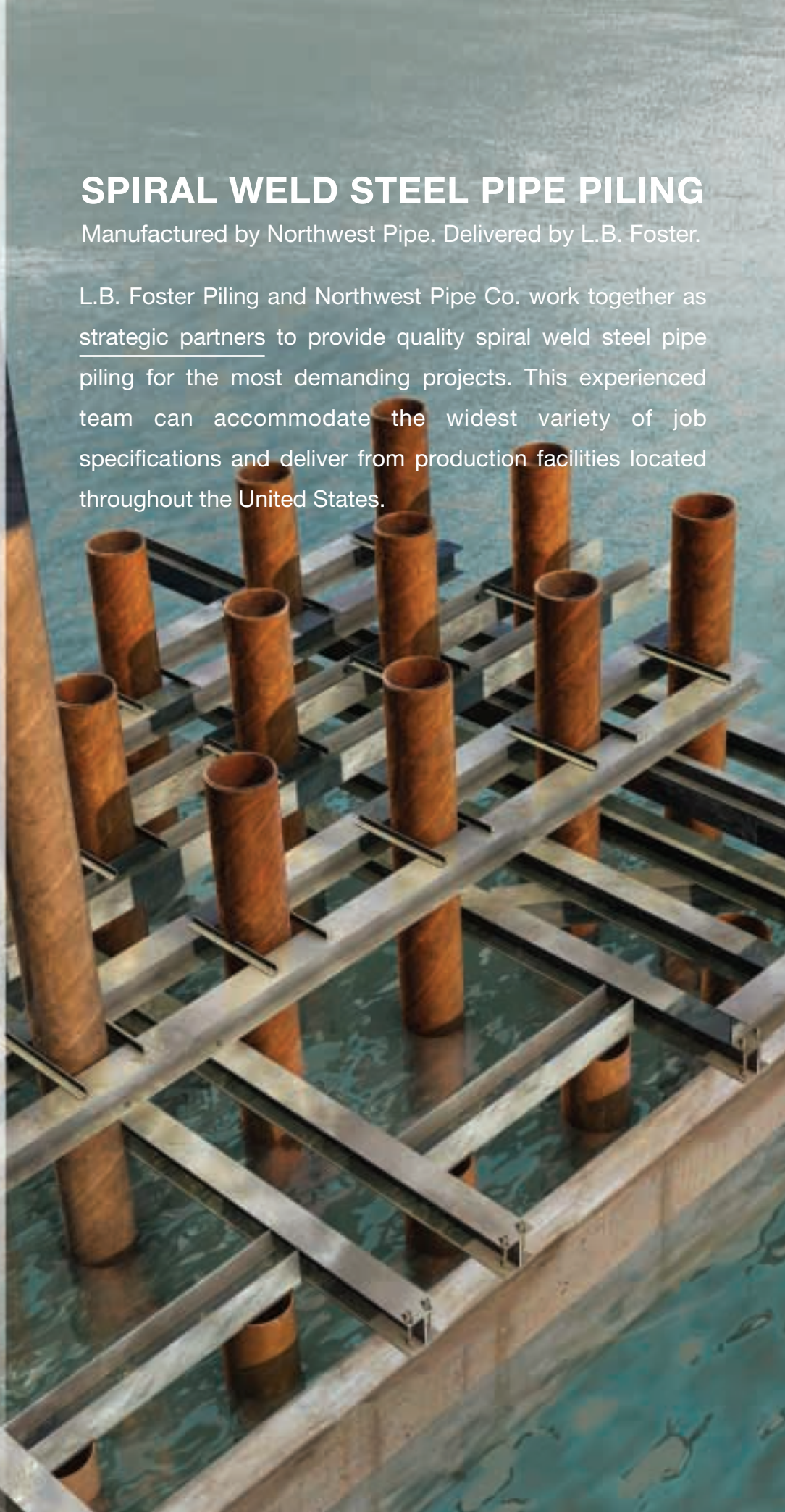
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up their noses at Cavin's concept weren't doing so well, while Cavin branched out and evolved with the market. His bright idea paid off. His legacy now consists of two wholly-owned construction teams: Foundation Constructors, Inc., services Northern California, Northern Nevada, and Utah while Foundation Pile, Inc. handles Southern California, Southern Nevada, and Arizona.

Foundation Pile Driving provides clients unparalleled expertise on complex, and intricate projects of all sizes. Their field crews, foremen, superintendents, and owners make up a cohesive management team that brings over 150 combined years of pile driving experience to every job.

A licensed pile driving contractor with technical general engineering know-how, Dolly said their staff – a tight-knit group, most of whom have been with the company 15 to 30 years – are key to its success.

"We are fully staffed to coordinate project details with our customers, and their design teams in a partnered approach to maximize project efficiency, and profitability," he said. "Foundation has been, and remains today, an innovator in the pile driving industry; therefore, enabling us to meet tough challenges. Our experience and ingenuity, along with forward thinking ensures that Foundation Constructors is an asset to every client on every project."

Some of their recent and most impressive projects include the America Center, an office building and parking tower in San Jose, Calif. (valued at \$6,452,000); the Victoria Canal Intake and Pump Station in Holt, Calif. (valued at

\$2,523,000); and the Praxair Richmond Hydrogen Plant in Richmond, Calif. (valued at \$12,229,000).

Their reputation for getting the job done on time and/or under budget helped them beat out many prominent driving firms for the Cosumnes Power Plant (worth \$3.65 million), and the Sacramento Airport Parking Structure (worth \$2.4 million).

Another impressive, albeit challenging project, the Foundation crew had a hand in creating was the Oyster Point Over Crossing in San Francisco, which required huge pipe piles to support a span of Highway 101. With live traffic on all sides, including freeway, off-ramp/on-ramp, and frontage roads surrounding the work, and a work area no more than 35 feet wide, Foundation successfully installed "cans" over 90 feet long.

They manage to hold top billing in the industry, despite the challenges in California that send would-be competitors running for warmer business climates. The list of challenges to overcome is an arm's length long that includes dealing with constant environmental regulations, air quality and emission standards, taxes, and insurance. The Golden State is a very litigious state where people are quick to partner with a lawyer and sue, which makes acquiring adequate insurance costly and difficult to negotiate.

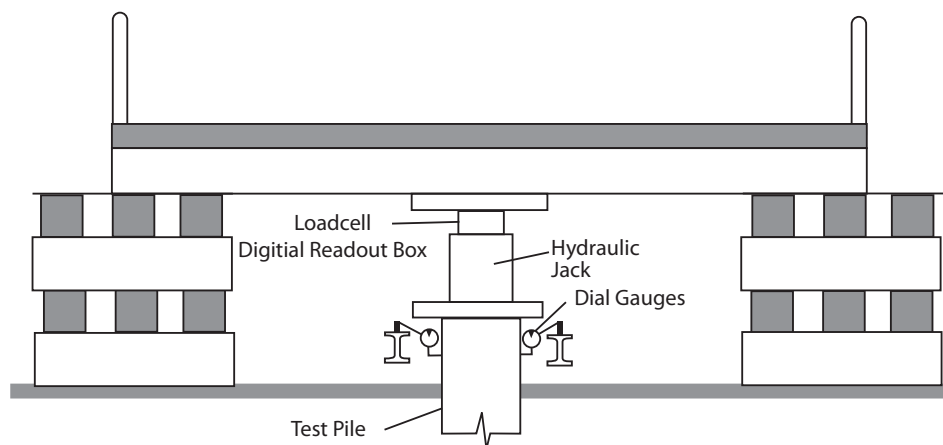
"One of the things Foundation Constructors is great at is driving pile," says Dolly. "We've found a way to succeed in California's challenging business environment."

That success could largely be attributed to the company's

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foresight and wise business decisions. They own what is considered to be one of the largest fleets in California, which includes 32 crawler cranes and 14 truck cranes with capacities up to 240 tons. They follow market trends and are fully aware of what their competitors are working on. They have their own mechanical team that Dolly says has paid off for the company.

They're actively involved in industry associations and continually recruit some of the brightest minds that emerge from the top industry colleges and engineering schools. And they recruit and train their own welding team members who are familiar with the higher standards in California.

The earthquake in 1989, measuring 6.9 on the Richter scale that resulted in hundreds of millions of dollars worth of property damage, highlighted some issues with welding quality. With credit to the Department of Transportation, the state



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implemented a new welding standard that Dolly says has made California leaders in welding integrity.

“Many constructors hire third parties to handle welding on their projects,” he says. “Foundation made a smart business move and decided to invest in developing our own fabrication team. It wasn’t cheap, but it shows how proactive we are. I think we have the best welding team in the industry and it shows that we have the right people with the right skills and the right time.

“Our goal-oriented management style, and our dedication to safety continue to help our clients meet their project goals year after year,” he says. “Foundation Pile Driving helps make every project we’re part of a success. We’re very proud of our staff and all we have accomplished.” ▼

“Foundation made a smart business move and decided to invest in developing our own fabrication team”

- DON DOLLY



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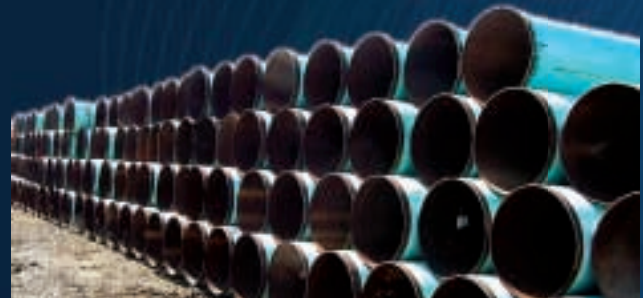
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	V 22	Larssen Interlock + Pipe Pile Weld-on
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	LBM LBF	Transition Profiles 

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	HZn	Variable weld-on
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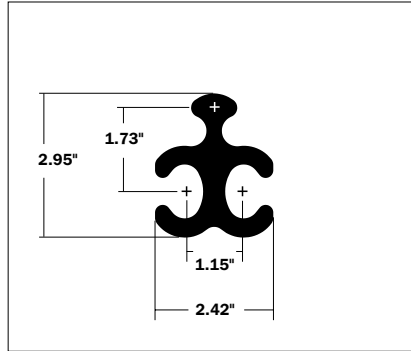
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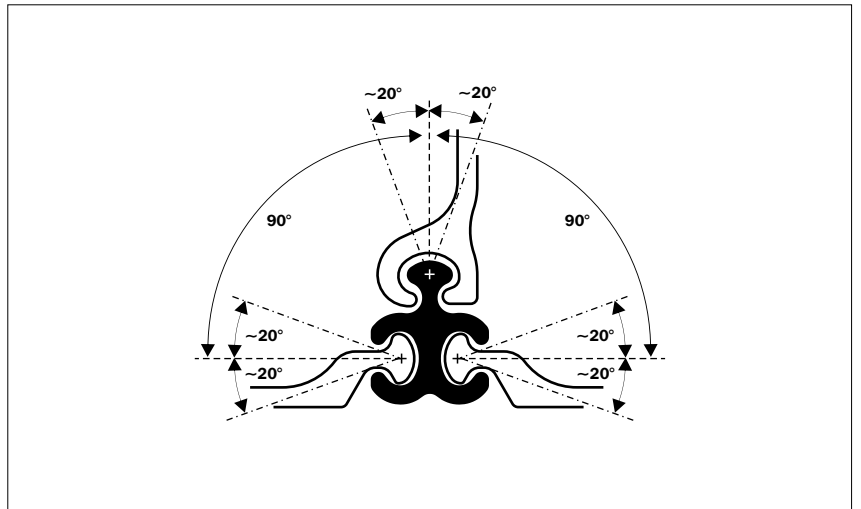
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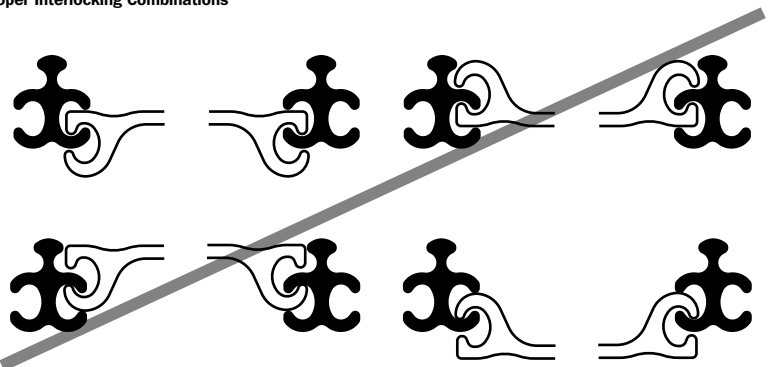
1. General interlocking guidelines call for a ball-to-socket or a socket-to-ball connection. Please review the proper interlocking examples listed.
2. Thread the connector into the interlock while the sheet pile is out of the ground.
3. Adjust the connector to the appropriate position.
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Proper Interlocking Examples



Improper Interlocking Combinations



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Are We Green?

Is what we're using for piling today sustainable?

What does sustainable mean?

Does it mean "green"?

What qualifies as sustainable or "green"?

By Billy Taylor, Sustainability Director, Cox Industries Inc

Let's try to un-muddy the water a bit. First of all, "green" is a color. No more, no less. No doubt, by now, you may have heard of "green washing." This is when a product or service is represented as something that is better for the environment than what is currently available. As of late there has been such a mass abuse of the term "green" it could be classified as pandemic. The true definition of whether something is sustainable or not is – a product or service that equally weighs its impact on the environment, on society and on the bottom line. If you can only answer one or two of these requirements, consider yourself a "green washer."

There have been many variations of materials used for piling over the years. Obviously the material with the longest history – timber pile – has passed the test of time, but could an ancient building material actually be on the cutting edge of the sustainability movement? Although there are several alternatives to timber pile, none of these match the low "carbon footprint" or environmental benefit of wood. With the rapid advance of technology, what is it that makes timber tomorrow's truly sustainable product?

To know where we are, it is imperative to know where we've been. Piling has been documented as far back as Babylon from Biblical times and as supports to a wide assortment of structures in Venice and Holland during the Middle Ages. During these times, piles were made from trees whose branches were removed and then the tree was driven into the ground, small diameter first, until penetration of the soil was no longer possible. Known as refusal, this process was a combination of the soil's stratigraphy and the limits of the driving mechanism. A few examples of those mechanisms can be seen below.

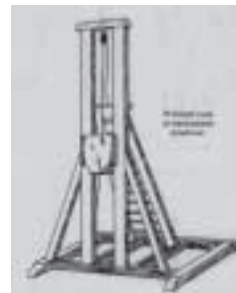
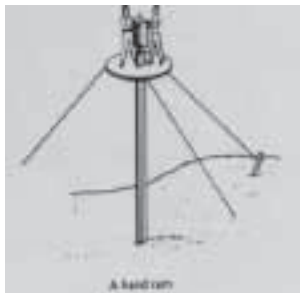
In 1845, Nasmyth invented the first steam-activated pile-driving hammer. Steam-driven power changed things dramati-

cally and technology hasn't slowed down since. Even though we have invented new ways of doing an age-old practice, we have noticed one constant that has been with us from the beginning: timber.

Wood has not only proven itself over the years, it's also the only renewable piling product available and it requires less energy to produce than any other alternative piling product. What does this tell us? Simply put, we can grow more trees for timber piling. When is the last time we grew any other piling material? Once we have the material, it takes far less energy to make that timber product into a pile.

- No other material can match wood's unique combination of benefits, including strength, affordability, ease of use and environmental superiority. Wood is easy to use and widely available. Its practicality and workability make construction simple and efficient for use in residential or commercial applications. As the world's only renewable building material, wood can not only be recycled, but regenerated as well. What's more, trees provide benefits to the environment while they grow, taking in carbon dioxide and releasing oxygen.
- Wood contributes far fewer greenhouse gas emissions than alternative non-renewable piling materials. Although wood products make up 47 percent of all raw materials made in the United States, its share of energy consumption during production is only four percent of all manufactured materials.

So let's close this circle from where we started. Is the piling you're using today sustainable? If it's a treated timber piling, the answer is yes. ▼



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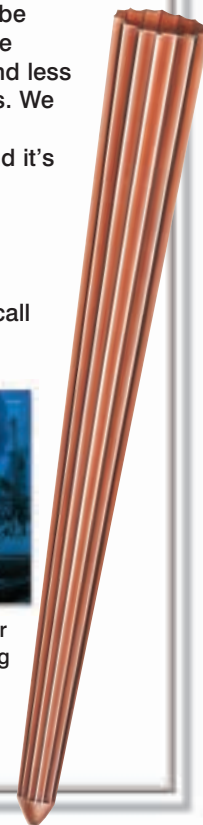
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Successful Steel Sheet Pile Driving

Improving Pile Driving Efficiency and Performance

By Jeffrey H. Greenwald, P.E., CAE

Executive Director, North American Steel Sheet Piling Association

This is the second of three articles covering installation of hot-rolled steel sheet piling and is based on the *Best Practices – Steel Sheet Piling Installation Guide* from the North American Steel Sheet Piling Association; www.nasspa.com.

Introduction

Steel sheet piling (SSP) is a hot-rolled structural shape with interlocks on the flange tips that allow individual sections to be connected to form a continuous, earth-tight, and water-resistant steel wall. Because it is readily available and transportable, SSP can be quickly installed and is an economical solution for a durable, long-lasting wall system. Applications are far reaching and include, for permanent construction, retaining walls, bulkheads, bridge abutments, graving docks, cut-off walls, mooring dolphins and pier protection cells. Common uses also include temporary structures, such as cofferdams for building excavations, trenches, piers for bridges, and lock and dams on the inland river system.

One advantage of SSP is their adaptability to various soil conditions. Typically, SSPs are installed by being lifted into position, aligned, then driven into the soil using one of a variety of driving methods. Ideally, this process is simple and straightforward. However, various site and construction conditions can occur which can cause the installation to deviate from the ideal. This article discusses various methods to improve SSP driveability and to make driving corrections when the installation does not proceed as planned.

Driving Assistance

Various methods are available to help drive piles in difficult soil conditions. The most common methods are water jetting, blasting and drilling.

Jetting

Under certain conditions, driving, vibrating and pressing of pilings can be optimized by using water jets. The objective of jetting is to use water pressure to loosen the soil and remove loose material from the toe of the piling. Jetting also helps prevent overloading the installation machine, helps prevent damage to the pilings, and reduces ground vibrations.

A pressurized water jet (connected to a supply pump on the ground surface) is located at the piling toe. The water jet reduces toe resistance of the piling and, depending on soil conditions, the rising water reduces surface and interlock friction. Jetting effectiveness is influenced by the soil density, the

available water pressure and the number of jetting pipes. Care must be exercised to ensure that the ground treatment does not endanger adjacent structures. Test driving to define the particular parameters of a site is recommended.

Both low- and high-pressure jetting methods are available. Low-pressure jetting is primarily used in dense, non-cohesive soils. When used in combination with a vibratory pile driver, low pressure jetting can enable pilings to penetrate very dense soils. Vibratory hammers with variable eccentricity have proven to be particularly successful with low-pressure jetting. Two to four water tubes are fixed to a pair of sheet piles. The toes of the tubes are placed at the same level as the pile toe, and jetting starts simultaneously with the driving to prevent intrusion of soil into the tube. In general, the soil characteristics are only slightly modified by low-pressure jetting, although special care must be taken when piles are subject to vertical loads.

High-pressure jetting may be used for driving in extremely dense soil layers. If there is a risk of settlement, high-pressure jetting is preferred to low pressure due to the reduced amount of water being used. Test driving in chalk, boulder clay and hard clay has demonstrated that soil mechanical characteristics are not modified by this method. The ground conditions determine the recommended nozzle diameter, as well as the number and arrangement of tubes. Intensive monitoring is required during the work to adapt the system to the local conditions.

Blasting

Blasting uses explosives to break up the soil or rock to allow pile driving to occur. This process is applicable to most types of soil that would previously have been classified as difficult or impossible for driving SSP, H-section, box and tubular pilings.

“Normal blasting” refers to the use of explosives lowered into drilled holes and covered with soil before detonation. The blast creates a V-shaped trench along the proposed line of the wall. The size of the fragments in the trench depends on the type and amount of explosives used. Note that after blasting, the driving conditions in the loosened area are still very difficult; therefore, pile toe reinforcement is recommended.

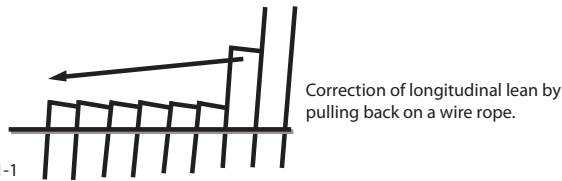


Figure 9.1-1

A. Pulling

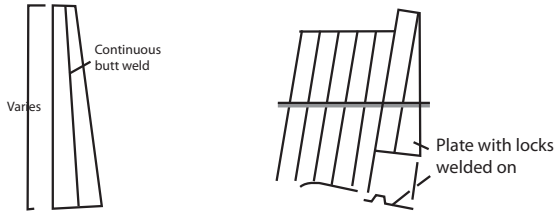


Figure 9.1-2

B. Use of Taper Piling

Figure 1 – Methods to Correct Longitudinal Lean

The shock-blasting process is a highly specialized blasting technique using very low-powered explosives. The principle of shock blasting is to reduce solid rock to a fine granular material without either displacing it or blasting a cavity into the rock, thus making the driving process much easier than for normal blasting. With shock blasting, the volume of rock affected is very small, typically just slightly larger than the steel pilings. The rock immediately adjacent to this zone remains intact. To obtain maximum benefit from shock blasting, the sheet pilings should be driven into this granulated zone as soon as possible after blasting. Driving the sheet pilings into this zone compacts the soil, thus ensuring adequate support for the embedded pilings.

Drilling

Easier impact driving, vibrating and pressing can be achieved by pre-drilling. Drilling can be used to make even hard rock layers suitable for driving. The drilling reduces the resistance of the soil strata by allowing soil distribution during subsequent pile driving. If soil loosening by an auger is not sufficient to allow driving, a power auger can be used to create a trench. Depending on the project conditions, this trench can either be filled with suitable material or left full of loosened soil.

Driving Corrections

The proper SSP position and orientation are indicated on the driving plan. Corrections may be necessary during driving when deviations from this theoretical layout occur due to soil conditions, drawing down or setting and driving procedures. Corrections are necessary when the installed piles exceed the driving tolerances listed in the accompanying sidebar.

Correction of Lean

Careful set up and driving procedures will help prevent leaning of the SSP. Before driving, the hammer should be positioned over the center of gravity of the piles and should be held vertically and firmly on the piles by efficient grips. Should a lean develop, corrective action depends on whether the wall has developed a transverse (out-of-plane) lean, or a longitudinal (in-plane) lean.

Efficient use of guide waling can be used to eliminate transverse leaning of sheet pilings. If pilings develop a transverse lean that needs to be corrected, the pilings should be extracted and re-driven using more efficient methods.

Longitudinal leaning in the direction of driving can be caused by either friction between the previously driven sheet pile and the sheet pile being driven, or by incorrect use of the hammer. Longitudinal leaning should be counteracted as soon as it becomes apparent. One method to correct the lean is to place the hammer off-center of the pair of sheet piles, toward the last driven pilings. Another correction method is to loop a wire rope around the end of the wall and attempt to pull the sheet piles into alignment. As a last resort, taper pilings must be employed to correct the error. These methods are illustrated in Figure 1.

Drawing Down Corrections

When SSPs are driven into soft ground – particularly when they are allowed to lean – the sheet pile being driven



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Recommended Driving Tolerances

General tolerances for a straight and plumb sheet pile wall should meet the following:

- a) Deviation from the wall line at the top of the pile ± 2 in./50 mm,
measured normal to the wall line
- b) Finished level deviation from nominal level of
top of piling ± 0.8 in./20 mm
toe of piling ± 4.7 in./120 mm
- c) Deviation from vertical $\pm 1\%$ of driving depth

may draw down the adjacent piling below its intended final level. To prevent "drawing down," several sheet piles can be bolted together with a waling, or the interlocks can be tack welded. As a further precaution against drawing down, a bolt can be inserted into the leading interlock of the sheet piles prior to driving. This both prevents the soil from entering the interlock and reduces friction for driving the next sheet pile. Alternatively, a clamping device for the SSP interlocks may be used, thereby avoiding two or more sheet piles from being drawn (or extracted) at the same time. If one clamp is insufficient, a supplementary clamp can be used on the next lock.

If drawing down does occur, a short piling length can be welded onto the affected pile to bring the top to the correct elevation.

Summary

Quality installation helps ensure optimum performance of the steel sheet piling installation. Driving aids, such as water jetting, blasting and drilling can allow successful SSP placement in even the most difficult site conditions. Methods to correct lean, such as pulling or the use of taper piles, and the prevention or correction of drawing down help ensure the SSP is installed according to plan.

About NASSPA

Founded in 2003, The North American Steel Sheet Piling Association (NASSPA) is dedicated to providing information and guidance for the efficient design, construction and maintenance of hot-rolled steel sheet piling systems. NASSPA's members represent the producers of hot-rolled steel sheet piling that supply the North American market. The association is involved in a broad range of education, technical, research, market, and communications activity. ▼


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International Foundation Congress and Equipment Expo '09

By Stevan A. Hall

After more than two long years of exhausting preparation, the PDCA recently concluded the International Foundation Congress and Equipment Expo '09 in Orlando, Fla. with our partners, GeoInstitute of the ASCE and ADSC. This program not only took the place of the PDCA's annual conference, but was also the first time the PDCA conducted a joint program with other associations that share interests in the deep foundation and earth retention environment. After concluding the program on March 19, 2009, and a brief champagne toast with the managing organizations, I am pleased to say the program was a complete success in every way. PDCA is grateful to the leadership of this organization whose vision in 2005 recognized the positive benefits of PDCA's involvement in this program and moved to accept the invitation.

Over 2,800 individuals from around the world descended upon the Buena Vista Place Hotel and Spa in Buena Vista, Fla. for the five-day conference. In today's economy, the overwhelming participation indicated the importance of such a program and the value it brought to the deep foundations industry and its representatives.

As with any conference of this size, there are bound to be some issues that create minor inconveniences, but for the most part, the conference was very well run and managed by the Congress partners and managing team members. PDCA would like to congratulate Mohamad Hussein, (GRL – Orlando) for the excellent job he did as congress chair. Along with Mr. Hussein, PDCA is grateful for the support and cooperation received by GeoInstitute (Carol Bowers, Linda Bayer and Lauren Tighe) and the ADSC (Scot Litke, Michael Moore, and Jan Hall). There are many others who made this conference a big success and PDCA would like to thank all of them for their commitment and hard work.

If you are a PDCA member and did not make it to the expo, you missed an excellent opportunity to see the latest in driven pile equipment and industry supporting technology, not to mention the dynamic and informative presentations. For our manufacturers and suppliers that did not make the expo, you not only missed the above, but you also missed an opportunity to showcase, rent and/or sell your products before what was probably the largest group of individuals in the deep foundations business to ever gathered under one roof.

Another opportunity for those who attended was to see the technology behind our most serious competitors – drillers and augers. These industries were well represented at the IFCEE '09. This gave pile drivers an excellent opportunity to

see the technological direction in which our competition is heading.

PDCA wants to thank all of its members who faithfully supported this program with their attendance, sponsorships and as exhibitors. In walking through the outdoor exhibit area, I don't think there was a hammer manufacturer or hammer supplier who missed this exceptional opportunity. Present were APE, Bauer Maschinen GmbH, Birmingham Foundation Solutions, Equipment Corp of America, Hammer and Steel, International Construction Equipment, Jinnings Equipment, LLC, Junttan Oy, Pileco, and Sun Piledriving Equipment. All of these companies had their products looking great, freshly painted and on display for the world to see. It was impressive. PDCA was well represented in the indoor exhibits as well. Both outdoor and indoor exhibits were sold out, as were the conference sponsorships.

The PDCA would like to congratulate Garland Likins who received the PDCA Presidential Award for Distinguished Service. Garland received this award for his outstanding support and participation to PDCA and the contributions he has made to PDCA over the years. The PDCA would like to congratulate Van Komurka (Wagner Komurka Geotechnical Group) who received the PDCA Professional Engineers Service Award for his contributions to the PDCA and the driven pile industry; and Dale Biggers (Boh Brothers) who received the PDCA Committee Chair of the Year award for his work as the Technical Committee Chair. The PDCA would also like to congratulate Clyde N. Baker, Karl Terzaghi Award and Ed Kavazanjian, Ralph B. Peck Lecturer.

PDCA Project of the Year Awards went to Sun Marine Maintenance, Inc., Seaport Canaveral Contract for Tanks and Manifold Piles (Land – Greater than \$2 Million); Taylor Brothers Marine Construction, Inc., Morris Island Lighthouse Stabilization Project Phase 1 (Marine – Greater than \$2 Million); Giken America, Channel 05, The Wintersburg Channel (Land – \$500,000 to \$2 Million).

PDCA would like to remind all of its members that we will resume our regular conference program, May 6 to 8, 2010 at the Coeur d'Alene Golf and Spa Resort, Coeur d'Alene, Idaho. This will be another spectacular event with educational programs, exhibitor events, social and networking time, Lake Coeur d'Alene lake cruise, golf and tennis, Companion's Program and a special annual dinner to wrap things up. Put this date on your calendar and plan on attending – you won't be disappointed. ▼



Mike Elliott, Mike Wysocky, Robb Jolly



PDCA draws a big crowd during the Business and Awards Luncheon



2008 PDCA President Van Hogan addresses members during luncheon



PDCA President Van Hogan presents Achievement Award to Mohamad Hussein, IFCEE '09 Congress Chair



2009 Vice President Don Dolly and Dermot Fallon enjoys the company of fellow PDCA members



PDCA Executive Director Stevan Hall addresses PDCA members during luncheon

PDCA President Van Hogan presents Mike Jahnigan, Sun Marine Maintenance with Project of the Year Award



Retiring Board Member and Immediate Past President Mark Weisz accepts award from President Van Hogan

PDCA President Van Hogan presents Committee Chair of the Year Award to Dale Biggers



2009 President John King acknowledges
2008 President Van Hogan



2009 President John King presents
Van Hogan with Congratulatory letter
from President George W. Bush



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- John King, President
- Van Hogan, Immediate Past President
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Ethics Is Good Business

By John Horan and John G. DeGooyer

We are lawyers and we are going to tell you about ethics. Yes, we know it sounds funny; but seriously, hear us out. You need a code of business ethics and conduct. Your lawyer can help you create and implement one. Having a well-drafted and properly implemented ethics code is good business. It can help you stay out of trouble; protect you if you get into trouble; and in the end, maybe even save your company.

FEDERAL GOVERNMENT REQUIREMENTS

If you are engaged in federal procurement contracting, you are required to have a code of business ethics and conduct if (i) the contract value will exceed \$5 million and (ii) the contract performance period is 120 days or more. Federal Acquisition Regulations (“FAR”) 3.1003(a)(1) and 3.1004(a), as amended effective Dec. 12, 2008. 73 Fed. Reg. 67064 (Nov. 12, 2008). FAR 3.1004(a) provides that the contract clause at FAR 52.203-13 must be included in solicitations and contracts that meet those two criteria.

The contract clause imposes many requirements on you, including the following:

- Within 30 days of contract award, you must have a written code of business ethics and conduct and give a copy to each employee engaged in contract performance.
- Unless you are a small business or the contract is for a commercial item, you must also establish (i) an ongoing business awareness and compliance program, and (ii) an internal control system.

- You must timely notify the government of certain unlawful conduct by a principal, employee, agent or subcontractor of your company. Your failure to do so could result in your company being suspended or debarred.
- You must exercise due diligence to prevent and detect criminal conduct and promote an enterprise culture that encourages ethical conduct and compliance with the law.
- Finally, you must flow the contract clause down to subcontracts that meet the \$5 million and 120-day threshold criteria.

YOUR ETHICS CODE

The primary objectives of your ethics code should be to (i) prevent unethical and illegal activity in your business, (ii) affirm your company’s commitment to business integrity and lawful behavior, and (iii) mitigate adverse consequences to your company if unethical or unlawful activities occur. Your ethics code should be suited to the size of your company; facilitate the timely discovery and disclosure of improper conduct; and ensure that corrective measures are promptly instituted and consistently carried out. At a minimum, your ethics code should contain:

- A message from your company’s leadership emphasizing the importance of ethical and legal behavior.
- A statement of the company’s vision, mission and core values.

- A statement of the company's commitment to shareholders, customers, suppliers, lenders, investors, employees, and the community.
- A clear description of what business conduct is required or permitted, and what conduct is prohibited.
- Topics addressing discrimination, harassment, safety, alcohol, drugs, etc.
- Topics addressing use of company assets, intellectual property, maintaining accurate books and records, etc.
- Topics specific to government and international business – bribery, kickbacks, Truth in Negotiations Act, political contributions, lobbying costs, hiring government employees, export and import compliance, etc.
- A certificate to be signed by each employee that he or she has received the ethics code and agrees to comply with its requirements.

BENEFITS OF AN ETHICS CODE

The benefits of having a code of business ethics and conduct are many, and this is true whether you are required to have one or not.

Reputation. Having a sound ethics program will enhance your company's reputation among investors, lenders, customers, suppliers, and vendors, because those groups have confidence in companies that practice good corporate governance and business ethics. In short, your ethics code can lead to more and better business for your company and more referrals from customers and suppliers that have similar values and are committed to their own ethics programs.

Education. Your code will facilitate educating and training your employees on how to identify legal and ethical pitfalls; do the "right thing" from the company's perspective; make "right" decisions; and address legal or ethical issues in a consistent fashion.

Recruitment. Your ethics program can be a valuable recruitment tool, as employees are usually happier, more productive, and possess greater self-esteem and morale in an environment in which responsibility, accountability, honesty, teamwork and ethics are expected and rewarded.

Mitigation of Adverse Consequences. Having a well-drafted and properly implemented code of business ethics and conduct cannot guarantee that your business will not get into trouble some day. If that should occur, however, the fact that you have a rigorous ethics program – strong ethics code, education and training programs, and internal controls – will be considered in mitigation of any criminal liability your business may face. See United States Sentencing Commission, Guidelines Manual, § 8B2.1 (Nov. 2008).

Another consequence of getting into trouble is the possibility of being suspended, debarred, or proposed for debarment, which can devastate your business. The causes for debarment and suspension are listed in FAR 9.406-2 and 9.407-2. As mentioned above, the causes now include a knowing failure to disclose certain unlawful activity. If you are debarred, suspended or proposed for debarment, you will be excluded from receiving new contracts, as well as subcontracts larger than \$30,000. Also, your business will be entered into the Excluded Parties List System ("EPLS"). See FAR 9.404 and 9.405. The effect of this listing is to place all federal agencies, as well as the general public, on notice that you are excluded from participating in any procurement or nonprocurement transaction during the period of the

The benefits of having a code of business ethics and conduct are many

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listing. This restriction is government-wide for all departments, agencies, etc., and covers essentially all government programs, which means that, if you are debarred as a contractor, you are also debarred from participating in nonprocurement programs.

Federal government debarment has other far-reaching consequences. Virtually every state government routinely reviews the EPLS and, upon learning that you have been suspended, debarred, or proposed for debarment by the federal government, the state will exclude you from bidding on state work. The same is true of many counties and municipalities throughout the country as well. But that is not the end of the story. Many commercial companies will refuse to do business with you if you are suspended, debarred, or proposed for debarment by the federal or state government. In short, federal debarment could mean the death of your company, even if most of your business has nothing to do with federal contracting.

However, the bright side of this otherwise bleak prospect (if you have an ethics code) is that debarment officials, like the judges, are directed to recognize the existence of a strong ethical compliance program – ethics code, education and training, internal controls, etc. – as a mitigating factor that must be considered in connection with any proposed debarment. FAR 9.406-1(a)(1).

CONCLUSION

As you can see, having an effective code of business ethics and conduct is far more than just a legal requirement. It is a valuable asset that can enhance your reputation and stature in your business dealings, help you avoid ethical and legal pitfalls that could damage your business, and protect you from disaster if an employee's transgression causes your company to face criminal charges, false claims act liability, or suspension and debarment. Your ethics code is, in fact, an insurance policy against these possibilities. In short, having an ethic code is just good business.

John Horan and John G. DeGooyer are partners respectively in the Orlando, Fla. and Washington, D.C. offices of Foley & Lardner LLP. This article is intended for informational purposes only and does not constitute the giving of legal advice or counsel. ▼



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Edward Kavazanjian, Jr.

Professor, practicing engineer and researcher wins Ralph B. Peck Award

By Gloria Taylor

A geotechnical engineer, researcher and teacher whose multi-faceted work has advanced the cause of better foundations for bridges, buildings and other structures has been presented with the 2009 Ralph B. Peck Award by the American Society of Civil Engineers (ASCE).

Edward Kavazanjian, Jr., Ph.D., P.E., M.ASCE and associate professor in the Department of Civil, Environmental and Sustainable Engineering at the Ira A. Fulton School of Engineering at Arizona State University, formally accepted his award at the International Foundation Congress and Equipment Exposition in March.

The Peck Award recognizes Kavazanjian's outstanding contributions to the geotechnical engineering profession through the publication of documented case histories on his work related to waste containment systems. This includes both the design of landfills to withstand seismic activity and post-closure development of the landfills.

The award is a special highlight for Kavazanjian in a multi-faceted career marked by numerous honors and accomplishments. Not content to develop his career within the walls of Stanford University at Stanford, Calif. where he took his first teaching job in 1978, Kavazanjian worked in the private sector for 20 years before returning to academia, joining Arizona State University in 2004.

Special Award

It is not uncommon for recipients to be presented with an award in the name of a distinguished person whom they have never met. This was not the case for Kavazanjian who recalls two connections to the former professor for whom the award is named.

"When I was in undergraduate school in MIT (Massachusetts Institute of Technology), the soils lab was taught by Dr. John Garlanger, a former student of Dr. Peck's. For whatever reason, he took an interest in me and my career and convinced me to take his class in foundation engineering the next year."

Garlanger helped once again when he wrote a recommendation that helped Kavazanjian get into graduate school.

"I'm sure this was instrumental in my being offered financial aid to graduate school," said Kavazanjian. "Without Dr. Garlanger, I probably wouldn't be where I am today."

Later, Kavazanjian took a class taught by Peck.

"Dr. Peck had retired from the University of Illinois at the time, but he was convinced to come to the University of Berkeley to teach an accelerated course in foundation engineering," said Kavazanjian. Dr. Peck was known for the case history method of teaching geotechnical engineering.

"He would teach the class case histories, then the students had to write up case histories on one page. Whatever you could get on one page, he would take a look at," said Kavazanjian.

"So, getting the award from Prof. Peck, besides the fact it's a great honor, there is a personal connection. It's a very special award for me."

Landfill Work

Fate takes a hand in many lives, and before 1992, Kavazanjian could not have anticipated that he would be working with landfills.

"The economy was in recession. I was working for a company that was doing mostly infrastructure work and the work was slowing down. I was approached by some of my colleagues at a company called GeoSyntec Consultants (in Huntington Beach, Calif.) which did mainly landfill work," said Kavazanjian.

"These were classmates of mine from Berkeley, who had approached me before but I was not interested in landfills. But this time, I said yes and went to work for GeoSyntec."

The government at the time was implementing some regulations pertaining to the need to design landfills to avoid disasters in the event of earthquakes. Kavazanjian was asked to do a seismic design for a landfill. He agreed, asked for the properties of the waste that goes into a municipal



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landfill and found that no one could supply the answers.

“So, over the last 16 or 17 years, I’ve been collecting that information so we can properly design landfills for earthquakes and non-earthquake zones,” he said.

Kavazanjian’s work also required that he deal with the potential hazards related to the slippery plane created by liners placed beneath landfills to prevent waste leaching into the ground.

In at least one high-profile incident, several hundred thousand cubic meters of hazardous waste moved over such a liner, tearing it. The question became, “If this happens without an earthquake, what happens with an earthquake?”

The result was not to recommend removal of the liners “but take into account the fact that there is a liner and configure the slopes and place the waste in a manner that provides stability.”

The work contributed to the development of standard approaches to evaluating landfills in order to resist instability and established his reputation as a leading expert on Seismic Design of Municipal Solid Waste Landfill Facilities.

“... over the last 16 or 17 years, I’ve been collecting that information so we can properly design landfills for earthquakes and non-earthquake zones”

- EDWARD KAVAZANJIAN, JR.

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Diverse Career

Kavazanjian is upfront about the fact he enjoys doing different things. Teaching, working on the front lines and research are all part of his stellar career. Today, his work involves three different areas.

He is the principal investigator developing a five-day training course for the US Federal Highways Institute on seismic design of bridge foundations and non-structural features of transportation systems such as highway embankments. It will be offered through the National Highway Institute and is a revision of a two-and-a-half-day program he helped develop in 1998.

He also has a National Science Foundation research project underway to further improve seismic design.

“The methods we use now are good; they provide safe landfills but are probably a little conservative,” he said. “So we’re trying to develop more accurate methods for evaluating the earthquake response of landfills.”

He is very excited about the third area that he calls biogeotechnical engineering. He heads up a team looking at the interaction between soil and the microbes in the soil.

“One gram of soil has as many microbes in it as there are people on the earth – billions – and microbial processes can have a significant effect on the behavior of soil. They can cement it, they can transform one mineral into another, so we’re trying to learn how to harness those processes for engineering processes for engineering purposes such as better foundations for buildings,” he said.

He gets a lot of enjoyment from his practical experience of working on solid foundations for bridges and buildings.

“Getting involved in one of the monumental structures is one of the joys of engineering. To work on a signature cable-stayed bridge and to drive over that bridge or just drive by that bridge, there is as much satisfaction in that as anything else I do.”

His practical experience also includes geotechnical investigation, analysis and design for major infrastructure projects including highways, tunnels, bridges, pipelines, port and harbor facilities.

He is co-author of the US FHWA guidance document on Geotechnical Earthquake Engineering for Highways and the US EPA guidance document on Seismic Design for Municipal Solid Waste Landfill Facilities.

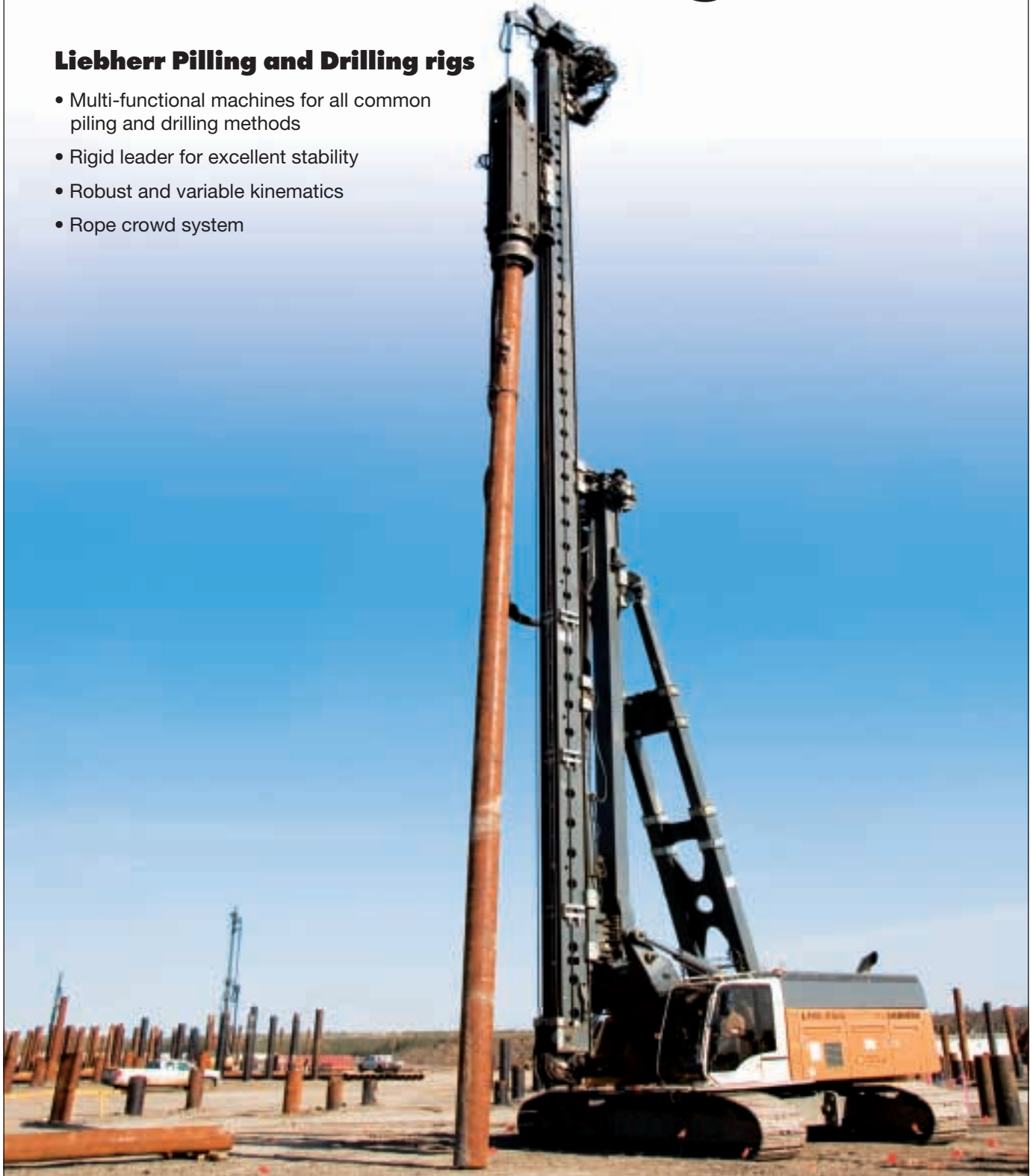
Kavazanjian is also the vice president and president elect of the American Society of Civil Engineers Geotechnical Institute. ▼



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Cost Evaluation of DP vs. CFA or DS

By Aileen Goos

When Henry Whitty spoke to the PDCA about economical solutions, you could say he was preaching to the choir. The room was filled with industry pros whose ears perked up when he broke out the spreadsheets and showed them – associated cost by associated cost – how much they could save on projects.

“It’s like a horse race: the auger pile is leading in the first round, and then oops, it falls back, and by the time you get to the finish line, the auger pile is dead last,” said Whitty. “My point is: once you look at all the associated costs, driven piles are the most economical solution.”

Having been in the business almost all his life (his father started SK Whitty in 1950 when Henry was just 6 years old, and nearly every building on Port Street in New Orleans that SK Whitty had a hand in creating), Whitty wants to share what he’s learned and give engineers some tools they can use to find the most suitable pile type for the projects they design.

The examples he shared at the conference brought considerable savings. The first is a large high school, where augered cast-in-place (ACIP) piles were specified. The piles

where 12-inch diameter ACIP piles about 40-feet long for a 25-ton design load. Prior to the bid date, 45-foot class B timber piles were allowed as a contractor option. These piles were to be pre-drilled 30 feet by the wet rotary method.

When the bids were received, the timber pile option was about \$100,000 less than the ACIP piles. This was the bare cost difference, without factoring in the spoils removal and reinforcing steel cost.

After the test piles were driven and load tested, the pile length was shortened to 40 feet in most cases. In some areas of the site piles were shortened to 35 feet. And the pile specification was changed from a 12-inch at three-foot butt seven-inch tip to a seven-inch tip with a natural taper to the butt.

The overall piling contract amount was reduced from \$728,000 to \$565,000, or an additional savings of \$163,000.

The second project is a job in New Orleans, in which the original design was on 125-foot 30-inch ACIP piles for a 150-ton design load. On this project and prior to bid time, a contractor option of 18-inch and 14-inch 130-foot long

precast pre-stressed piles were allowed.

The driven pile proved to be more economical when other costs were factored in. Through valued engineering suggestions additional savings were realized. Looking at test pile data on adjacent projects, Whitty of Professional Construction Services, working with Chad Held of Eustis Engineering, felt that a 90-foot 14-inch pile could achieve 75 to 80 tons. Using twice as many 14-inch 90-foot piles as the 130-foot 18-inch piles specified a saving of about \$75,000 to \$100,000.

The original geotechnical report didn't give pile capacity estimates for piles shorter than 120 feet. With additional cone test and engineering analysis it was felt that a minimum safe design load of 100 tons could be achieved at about 90 feet. A pile load test was conducted and the 100-ton design load was proven. The total savings was \$162,000, or about 17 percent.

Both examples showed that when the total cost of the pile type was factored in, the assumed most economical pile wasn't the most economical after all.

It All Adds Up

The pile cost quoted by a pile installer shouldn't be used without knowing the total pile cost. Some hidden costs to be accounted for are:

1. **Layout:** On the surface the layout cost would be approximately the same for all pile types. As Whitty points out, however, the cost of maintaining the layout for ACIP piles might be more due to the constant tracking back and forth.
2. **Cut-off:** This will vary in cost by pile type and size, as well as the driving conditions. Many times driven piles can be driven to grade. If the cut-off is more than two to three feet below grade, the ACIP piles cannot be "dipped" to grade and must be cut off.
3. **Reinforcing steel:** Precast concrete and timber piles do not require reinforcing steel. ACIP piles should, as a minimum, have the upper 15 to 20 feet reinforced with a cage of steel and a single bar their full length. Today the cost of reinforcing steel, including tying and placing, can be a dollar or more per pound.
4. **Spoils control and disposal:** Control and disposal of spoils can vary in cost. The smaller volume and the relative quality of the spoils from pre-drilling for driven piles may make disposal unnecessary for these piles.
5. **Grout overtake:** The large volume, grout spillage and waste mixed with the spoils from ACIP piles usually require the control and disposal of the drill



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spoils. If the piles are installed in a brown field or contaminate soils, this spoils disposal can be as much as \$200 per cubic yard.

Grout overtake is unique to ACIP piles. In most cases the ACIP contractor limits the amount of overtake in their proposals. In a favorable soil condition, the overtake may only be 10 percent to 15 percent. In New Orleans, Whitty has heard that the overtake is usually more than 50 percent, and there have been jobs where the overtake has been 100 percent.

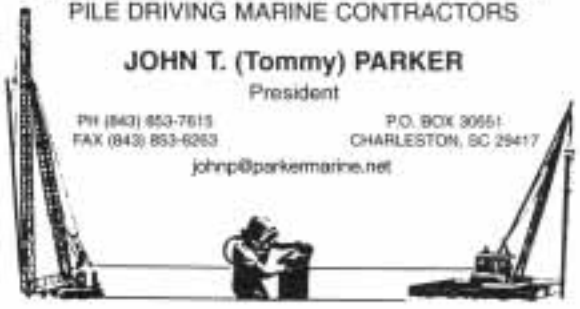
6. **Pile cap size and cost:** In an attempt to convince an owner that using twice as many 25-ton timber piles would be cheaper than a 50-ton ACIP pile, Whitty suggested that using twice the pile cap concrete would more than offset the pile savings. "Try as I might, I couldn't persuade him that that was not the case," he said. As it turned out, the added concrete was not twice as much, but 25 percent less. Using three pile diameters or 5 percent of the pile length as the pile spacing for the timber piles would be three-feet on center, where the ACIP piles would be four-foot-six-inches. The pile cap depths would be two-foot, six-inches and three-feet respectively. For the timber pile the pile cap concrete would be 0.88 cubic yards per pile and 2.25 cubic yards for the ACIP pile.

7. **Inspection and testing:** For most driven piles the pile material is inspected at the point of manufacture. The pile capacity and installation procedure is usually determined by a test pile and pile load test program. Every hammer blow tests the pile integrity. Good driving records document the pile integrity. ACIP test pile programs also determine the installation procedure and confirm the pile capacity. Usually there is no integrity test for ACIP piles. The grout volume is the only measure of the pile integrity, which in many cases isn't a very good measure of the soundness of the pile. It's common to see pile tops sinking – from a few inches to several feet. There are also difficulties in placing the

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re-steel, and heavy equipment used to force the steel into the pile. These could all be indications that the pile is not sound. Counting strokes of a calibrated grout pump is not a reliable means to measure the grout going into a pile.

"I would suggest that to have the same level of assurance with an ACIP pile as with a driven pile, every ACIP pile should be tested by the low strain integrity test method," said Whitty.

The cost of inspecting timber piles at the treating plant is about 10 cents per foot. Inspection of PCPS piles can be in the 30 cents to 50 cents per foot range. Pile logging cost about \$450 per day.

For ACIP piles, the installation inspection is about the same as the driven pile, but the pile integrity testing costs about \$1,500 per day and an additional cost of \$30 per pile tested. This can be as much as \$60 per pile. Cross-hole sonic testing can be much more.

8. **Time:** Though time spent waiting for piles to be manufactured can be anywhere from two to four weeks for PCPS piles, timber pile lead time can be as little as a couple days.

Because of not being able to install adjacent ACIP piles, it can take one day times the number of piles in a cap to complete a cap, thus making that cap unavailable to pour at least that long. Usually no work on pouring pile caps can be done on an ACIP job until all the piles are installed. Production of ACIP piles can be much slower than driven piles. The lost time in pile production usually is made up by the faster installation, and completing the pile in a more orderly and expeditious fashion.

"Any pile driving contractor would be happy to furnish you with budget pricing, comparative cost, and/or scheduling for pile projects, but be sure you discuss any and all cost factors to get a complete cost analysis," said Whitty. "Wherever possible, allow one or more options of pile types. Market conditions are constantly changing and pile cost and availability change with them." ▼



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Project Of The Year

By Michael R. Jahnigen, Cyril N. Okoye, Mike McClung and Kati Niskanen

Sun Marine Maintenance, Inc. of Frankford, Del. brought together recent technological advances that included a new Emeca/SPEUSA mechanical splice joint, two Junttan hydraulic impact hammers and pile driving rigs in the execution of the major long precast concrete pile project at Seaport Canaveral Tank Farm, Fla. The project involved design and construction of pile foundations for support of above-ground fuel storage tanks, and included driving in excess of 6,100 production piles for tanks and manifolds on land. The pile driving for this project took place during the period of late April 2008 through mid-November 2008.

Site Subsurface Conditions and Pile Selection

With groundwater table at a depth of about five feet below grade, the site is underlain by sequences of soft clay and loose-to medium-dense granular soils with occasional inter-layering of soft coquina rock to the depth 90 feet to 95 feet. Below the inter-layered strata of weathered coquina rock and granular soils graded between medium dense and very dense conditions to the depth 130 feet. Based on feasibility evaluation performed by the client's (Seaport Canaveral, LLC) geotechnical engineer, 100-foot long, 18-inch square precast concrete pile was selected for 90-ton allowable compression load. The reason for such a large 18-inch square cross section for the

pile was primarily stiffness requirement for a 100-foot pick-up length. Based on a value-engineering option, Sun Marine Maintenance won the bid with significant cost savings by re-designing the foundation for 100-foot long, 12-inch square precast, pre-stressed concrete piles that were jointed at the 50-foot mid-point with Emeca/SPEUSA mechanical splices (pile joints) for 120-ton allowable compression load per pile.

For this project, the allowable structural compression capacity of the 12-inch square precast concrete pile was calculated to be 128.84 tons, while the allowable design compression load selected for the pile was 120 tons. With such tight ratio of 0.93/1.00 for the ratio of Allowable Design Load / Allowable Structural Capacity, the subject project enjoyed a remarkable optimization of pile load design; there was practically no design waste for the project pile material. The client engaged Atlantic Metrocast, Inc. to cast the piles on site for cost savings.

Long-Term Load Test Results

Both dynamic and static load tests were performed on the selected piles for capacity verification. In anticipation of this project, test piles were driven and tested two years in advance in 2006. Because of the short duration of soil freeze (dissipation of excess pore pressure after pile driving) in 2006, which



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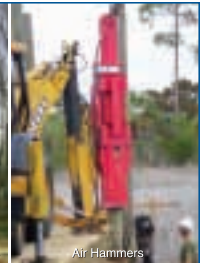
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typically ranged from two days to two weeks, the dynamic test capacities were consistently greater than the static test capacities for the same test piles. Based on a correlation developed from the 2006 static and dynamic test results, the safety factor requirement for production piles monitored with only dynamic testing (using the Pile Driving Analyzer and the Case Pile Wave Analysis Program) was initially set to be 2.27. This would make more stringent criteria than the International Building Code (IBC), which calls for safety factor of only 2.0 for dynamic or static load testing.

In an attempt to improve the previous correlation and hence reduce the safety factor, another round of static and dynamic load tests were performed in 2008 on the same test piles from 2006. The results of the 2008 test indicated a correlation factor of close to unity between the static and dynamic test capacities. This showed that for the soils of the subject project site, comparison of static and dynamic pile capacities should be based on long-term conditions instead of short-term conditions. Therefore a safety factor of 2.0 was used for production pile capacity monitoring using the dynamic method with a requirement of soil freeze duration of typically six to eight weeks for the tests. Based on this approach, unnecessary over driving of production piles into deeper strata for a safety factor of 2.27 was avoided.

Emeca/SPEUSA Mechanical Splice Used

Historically, long precast concrete piles have had shortcomings that put them at a disadvantage in competition against other pile alternates, especially drilled piles. One disadvantage is length and weight of long precast concrete piles, which translate to considerable costs in association with the need for special handling of the piles, and high-capacity cranes that may require special rigging and working surface or splice joint hardware that is often expensive and may include field splicing delays. These potential cost factors were eliminated by the use of the Emeca/SPEUSA mechanical splice for the Seaport Canaveral Tank Farm project, which was reasonably priced with field installation time of less than five minutes per pile.

A concern that is often associated with the use of mechanical splices is with respect to the ability of the splice to transmit stress waves of the impact hammer, and not hinder pile integrity and capacity evaluation performed using the Pile Driving Analyzer (PDA). The results of the PDA tests on the spliced piles of the subject project indicated that the presence of the splice did not impede adequate transfer of wave stresses through the joint. By design, the diameter of the locking pins of the Emeca/SPEUSA splice joint is slightly larger than that of the side holes. As a result, when driven into the side holes, the pins induce some compression loading on the adjoining base plates. This positive compression is responsible for the ability of the Emeca/SPEUSA

splice to conduct adequately stress waves of hammer impact across the jointed pile during driving.

Equipment Used

Equipment used for the subject project was two Junttan PM 20 purpose-built pile driving rigs mounted with the Junttan HHK 5A hydraulic impact hammers. Prior to production the client requested three pile driving rigs, but with the efficiency of the Junttan rig three rigs were not necessary. The two Junttan rigs drove on average 30 100-foot piles per rig per eight-hour day. The two-man crew (operator and ground man) per rig dramatically reduced the risk of injuries, and the labor, overhead and insurance costs. The telescopic leader, hydraulic pile arms and many other Junttan unique features ensured fast and accurate pile driving. And, best of all, the data of each pile was recorded on the energy measuring device, so that at the end of the day, the piling data was given to Seaport Canaveral's engineers.

Pile driving in the U.S. has been traditionally dominated by diesel and air hammers, which can be ineffective for long



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SALES AND RENTALS



precast concrete piles installed through soft soils, as was the case for this project site. Therefore, Sun Marine Maintenance chose to use the Junttan HHK 5A hammer. This hydraulic impact hammer with relatively heavy ram weight and versatile energy delivery system presented in a single package effective solutions to the inherent problems of both the diesel and air hammers vis-à-vis detrimental high-tensile stresses in precast concrete piles driven through soft soils.

For this project, Sun Marine Maintenance used the gumwood cushion material as for all other concrete pile projects. Due to its more conducive heat absorption properties, which accounts for its durability, gumwood outlasts plywood by a margin of five to six for precast pile driving with the hydraulic hammers.

Cost and Environmental Savings

The use of a cost-effective Emeca/SPEUSA mechanical splice allowed the application of the 12-inch square pile, which would have been ordinarily too slender for 100-foot-long pick-up length. When the cross sectional area of 144 square inches for the value-engineered 12-inch square precast concrete pile is compared to the cross-sectional area of 324 square inches of the originally design 18-inch square precast concrete pile, the material savings is about 125 percent.

In addition to material cost savings, we believe that significant cost savings can be attributed to the high production

pile driving rate of this project, which was about 3,000 linear feet of piling per rig per day. These cost savings were realized by the client in terms of completion schedule and by Sun Marine Maintenance in terms of profit margin.

Using the Junttan pile driving rigs for this project did not only save money but also left a smaller eco-footprint behind. These rigs generate less noise, vibration and harmful emissions as well as use less fossil fuel than conventional diesel hammers and mechanical piling rigs.

Project Completion

It was eight months through tropical hurricanes; a lot of rain and thunderstorms, and very hot sun at times, being away from the family and loved ones, however, the crew still stayed focused day in and day out, ending the project safely and successfully with no injuries, and in record time. Now that the project is completed, if all the driven piles were laid end to end, they would extend from Florida's east coast to west coast.

All of this made possible by the Emeca/SPEUSA mechanical splice, two Junttan rigs and a crew of seven hard-working professionals (two operators, two ground men, two forklift operators and job-site manager), and the help of a great support team in Delaware. It was definitely a team effort that made this an award-winning project. ▼



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▼ PDCA Safety Tips

PDCA recently received pictures of a motor vehicle that was transporting steel sheet pile. Apparently, the load was not secured adequately and when the driver stopped abruptly the load moved forward slamming into the cab and pinning the driver under portions of the cab and load.

If you transport loads such as steel, concrete, timber or other such material you need to be sure to secure the loads properly.

Not specific to transporting loads, OSHA Standards include the famous “General Duty Clause,” which states, “Section 5(a)(1) of the OSH Act, requires employers to “furnish to each of his employees’ employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.” Section 5(a)(2) requires employers to “comply with occupational safety and health standards promulgated under this Act.”

Additional information on workplace safety and transporting loads can be found on the OSHA Web site, www.osha.gov; Federal Motor Carriers Safety Administration, www.fmcsa.dot.gov. Additional information is available on the Web site. ▼



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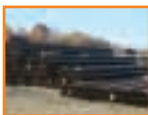


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Passing

Leroy Louis Bolduc 77, of Fond du Lac, formerly of Minneapolis, Minn., passed away on Feb. 20, 2009, at the Rolling Meadows Nursing Home in Fond du Lac.

Leroy worked for many years for L. H. Bolduc Company, Inc., a pile driving company founded in 1879 in Minneapolis by his great-grandfather, Louis Henry Bolduc. The L. H. Bolduc Co., Inc. has been recognized as America's oldest pure pile driving company by the Piledrivers Local Union 1847, of which Leroy was a member.

Leroy was also a member of Union 49, which is the union for operating engineers. Later in his career, Leroy worked for B. F. Diamond Company in Florida, as well as Geo-Con, and Fru-Con managing construction and engineering projects both nationally and internationally. ▼



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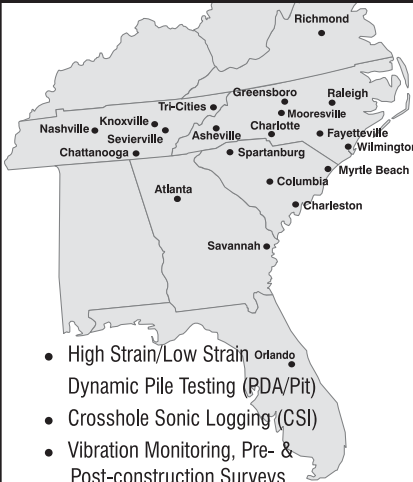
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