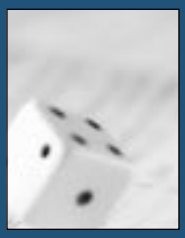
PDCA Introduces New Installation Specification

page 9

Timber Piles: An Overview

page 12



Understanding the Nature of Risk Management

page 31

PILEDRIVER

THE OFFICIAL PUBLICATION OF THE PILE DRIVING CONTRACTORS ASSOCIATION | Q4 2006 VOL. 3, NO. 3

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Contents

On the Cover:
Clark Foundations LLC brings their expertise to a job site.

Fight for your Market—True Stories

By Harry Robbins, PDCA President

Just because the plans and specifications call for augercast piles, drilled shafts, ground modifications, or whatever, it does not mean that driven piles might not be the best choice for the project. But it is up to you to convince the designer and the owner to at least consider a driven pile option. To do nothing is to allow a piece of your market to slip away without a fight.

A recent project here in Charleston was designed to be on augercast piles. The owner was justifiably concerned about the potential for disturbance to the neighbors from pile driving activities. The project is located in the heart of historical downtown Charleston. Residences, churches, retail and office buildings, many from the early 1800s, were all in the surrounding area. We worked with the designer and general contractor to explore the use of prestressed concrete piles. We overcame the vibration issue by providing successful case histories of similar projects. Product quality control was certainly a plus for driven piles. Driven piles were more cost-effective on the bid quantities. And, through dynamic pile testing, the final lengths were reduced by 13 percent saving the owner even more.

Another local PDCA member similarly got an educational facility changed from augercast piles to steel H-piles. Subsequent projects at that college were designed for prestressed concrete piles and steel H-piles. These two larger projects might have been lost to another foundation type had the first project been allowed to slip by uncontested.

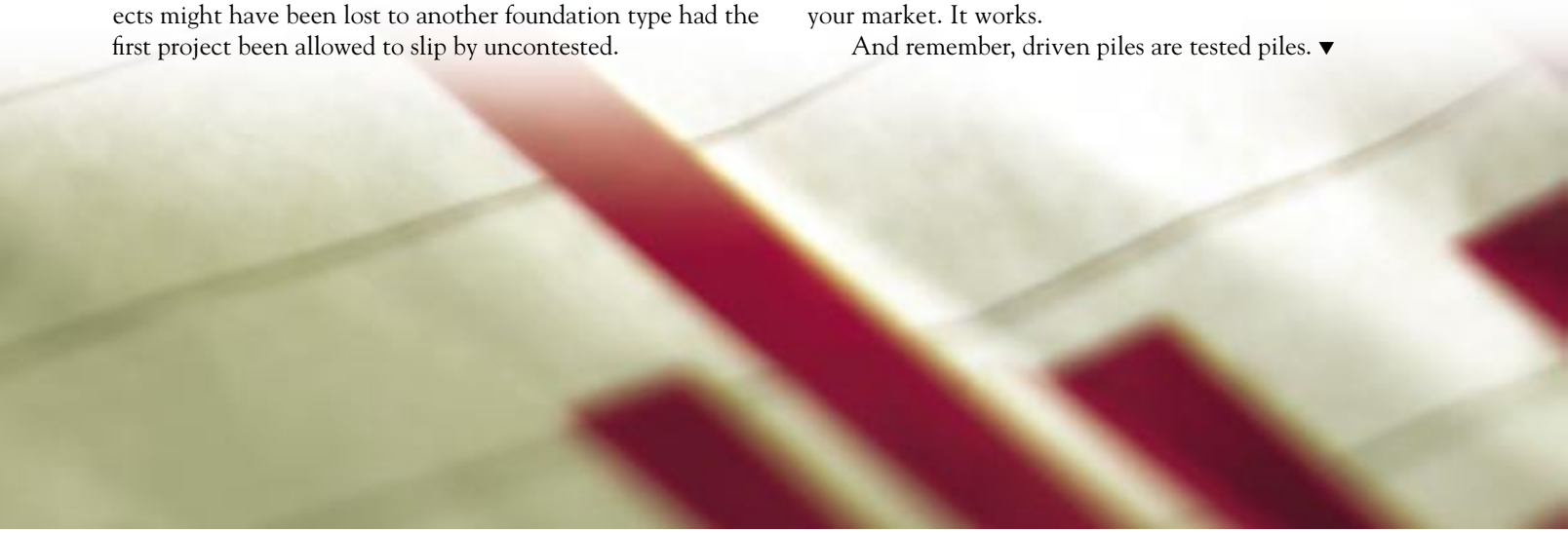
One football stadium in South Carolina designed for drilled shafts was changed to driven steel pipe piles with savings to the owner in both time and money. Another football stadium was designed on spread footings after specified ground modifications were made. This second stadium was changed to driven prestressed concrete piles in lieu of ground modifications—again saving the owner time and money.

A state highway department bridge project recently was designed to have the earthen approaches strengthened by ground modification. An enterprising local PDCA member, working with a geotechnical engineer, presented the highway department with a plan to replace the specified ground modification with driven prestressed concrete piles to accomplish the same thing at a greatly reduced cost. Again, the owner accepted the proposed change and the project is proceeding.

These are a few examples of what can be done if we fight for our market. PDCA of SC has emboldened local pile drivers and we have been successful. The Mid-Atlantic and the Gulf Coast chapters are the two newest PDCA chapters. They have the opportunity to make a difference in their local markets, and I know they will.

When driven piles are the best choice, it is our decision to fight for our market. By supporting each other in this quest, we can make a difference in our industry. Fight for your market. It works.

And remember, driven piles are tested piles. ▼



Good Communication is Vital

By Stevan Hall, PDCA Executive Director

This issue's topic, "Communications!"; Have you given it much thought? Every day we go around talking to friends, colleagues, employees, and clients; we read newspapers, magazines and books; we compose memos, emails, and letters, and each time we send information or receive information we are communicating or being communicated to. Are we doing a good job?

Effective communications is a vital link to the success of any business. If we cannot effectively communicate our message—getting information from one person to another in such a way that there is 100 percent transfer of that information—then we are failing to communicate, and in doing so, jeopardize our ability to be successful. Doing business without communicating effectively is like winking at a girl in the dark. You know what you are doing, but nobody else does.

Did you know that managers spend a majority of their time—up to 90 percent—on this skill alone? If you are spending 90 percent of your time trying to convey a message and nobody understands your point, then at the very least you are wasting a lot of your time.

Anyone who has taken a course in Project Management knows there are five processes to managing a project—five series of activities that bring about a successful result. They are Initiation, Planning, Execution, Control and Closing. In each of these important processes to achieve the maximum results, we need to communicate effectively.

In communicating, there is a sender, receiver, the media being employed, the environment and the message. To effectively communicate, you need to take all five of these components into account. The sender is the person responsible for either getting the train started on the right track or headed for derailment. Once the train leaves the station, you still have some control, but for the most part it is out of your hands. Longfellow said, "It takes less time to do a thing right than to explain why you did it wrong."; so, you need to get it right the first time.

The sender determines the best media to use to transfer the information, the content of the information, preparation of the information, effective control of the environment, which is everything between you and the receiver (including you and the receiver), transfer of the information, feedback and the responsibility to reinforcing the information.

What about the receiver of your message? Did you know that when someone reads your message, they will only retain about 50 percent of the content upon completion of reading the text? It gets worse: after two days they will only retain about 25 percent, and after one week about 10 percent. Therefore, as a sender of information, it is important that your message is concise, clear, and conveyed in an effective and appropriate manner.

Whether you are communicating to an individual or group, try to keep in mind who your audience is and consider both the external and internal environments affecting them and you when preparing your communications. External environmental issues include potential distractions, physical impediments, distance and time; while the internal environment deals with personalities, state-of-mind, language/accent, interpretation and background or education.

Finally, don't forget to seek feedback when called for by the context of your message. Feedback helps clarify any misunderstandings or ambiguities on the part of your receivers, eliminating confusion or problems.

The PDCA recognizes the importance of effectively communicating to our members and non-members. The PDCA's ability to attract new members and keep existing members is often based on our ability to effectively communicate the services and benefits associated with PDCA membership. If we cannot adequately convey what we do, when we do it, and in a manner that conveys value to our readership then we place all existing or potential memberships at risk.PDCA communication media is primarily through our magazine, Piledriver, our website, www.piledrivers.org, and emails. I am pleased to say the PDCA is focusing on all three and working to improve each one because we want our communications to you, the members and others who receive PDCA information, to convey a clear, concise and unambiguous message about the success we are having in today's association environment.

The PDCA has established a new format for our magazine that will be consistent with each publication, so you will know what to expect. The revised

format will include a section titled, "The Business Hammer" featuring business-related articles; a "Did You Know" column posting short messages designed to inform; a series on the advantages of driven piles—including site and soil investigations, manufacturing, installation, and testing. We will continue to bring you industry relevant news and our member and project spotlight articles.

The PDCA contracted with a website development firm to do a total update of our website and database. Our website can and should be a flagship piece for the PDCA. By the time you receive this magazine, the new site should be up and running with state-of-the-art technology, clean graphics and a contemporary look. The site, still www.piledrivers.org, will have a member search capability with real time membership data for accuracy; online payment capabilities for membership applications and renewals, publication purchases and event payments; a PDCA store with an online shopping cart with fully automated transaction processing through PayPal and the ability to have your purchased products shipped directly through an overnight carrier, as well as many of the existing features from our old site.

The PDCA will also take advantage of email technology and produce an e-letter, titled, "E.nformation, the PDCA E-Letter". This is the most expeditious way for us to send you current information on upcoming events, activities, PDCA chapter news and much more. The email system (eventually) will appear to come directly to you—personalized, not as a BCC—but until then, please accept the BCC. This forum is open, meaning it can be used for all types of information—originating from the PDCA or from our membership.

Earlier I discussed the sender/receiver relationship. It applies within the PDCA circles as well. PDCA wants your feedback so we can improve. If PDCA does not know what you want from your association, we have one choice—give you what we believe or assume you want. Is everyone familiar with what happens when we "assume"? Let us know when we have made a mistake (typo, incorrect date, misspelled names), or what you would like to see from the PDCA. This is the fastest way for us to improve while providing the level of service you expect from your association.

I also discussed the environment of communications—that nebulous area between you and PDCA when we want to communicate. Well, we can't when the PDCA does not have a proper or adequate environment to convey the information to you. If the PDCA does not have correct contact information to send you messages; if you have changed your address, if you gave us an email account beginning with info@, if you haven't updated your email account name with the PDCA, or if we don't have key contact information, then we have a corrupt environment for sending you information. Any PDCA member can update their contact information, add contacts, or remove contacts by calling the PDCA office, toll-free at 888-311-7322 or by sending an email to execdir@piledrivers.org.

The three forms of communications by PDCA—the magazine, website and E-Letter—are intended to open a bigger door for clear, concise and unambiguous communications between the PDCA and the companies and individuals we represent. Help us make this system the best by reading the magazine and E-Letters and visiting our website. Then give us your feedback. ▼

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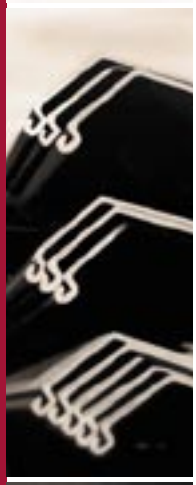

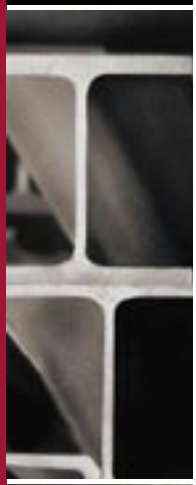

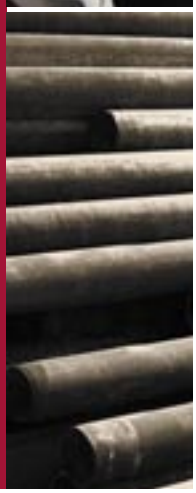

Committee Corner

Committee Corner is a new department in *Piledriver*, in which we will profile the chairs of various PDCA committees. In this issue, we highlight the work of Dale C. Biggers of Boh Brothers Construction in New Orleans, Louisiana, who is chair of the Technical Committee.

I have worked for Boh Bros. Construction for 38 years (I am not that old - when I started, child labor laws were not yet in effect). Boh Brothers does a variety of construction: heavy concrete, bridges, piles, marine, docks, asphalt paving, concrete paving, dirtwork, and piping. We generally work from Corpus Christi to Tampa. Since we specialize, I have always been in the same department; now I am Vice President of the Piling and Marine Department. Boh Brothers is a third-generation, family-owned company that began in 1909.

The PDCA Technical Committee is charged with developing and updating the PDCA Code Book, "Recommended Design Specifications for Driven Bearing Piles," as well as other technical initiatives.

The committee recently completed the development of a new installation specification for driven piles that can be utilized for private work. This specification incorporates current information on pile materials, pile accessories, installation methods, equipment, testing, measurement and payment. It was designed to make the use of the driven pile more efficient, and our members more competitive. A copy of the specification can be obtained from the PDCA office, or online at www.piledrivers.org.

Randy Dietel was chairman of the Technical Committee before me, and he initiated the specification writing process. It has been a pleasure to work with members from all over the country and learn about their problems and solutions. ▼

Introduction to the New PDCA Installation Specification for Driven Piles (PDCA Specification 101-06)

By Dale Biggers, PDCA Technical Committee Chairman

Some areas of the country, such as New Orleans, drive a lot of piles and have savvy engineers writing specifications and bid documents. However, in regions where piles are not as common, designers often seek guidance as to what to include in a bid package. There are also existing specifications with conflicting clauses and onerous conditions that appear and reappear. The Technical Committee of PDCA began to write an installation specification in 2004.

The basis of our new code was the AASHTO (American Association of State Highway Transportation Organizations) installation specification. We used their format and made changes with extensive commentary to explain our thinking. The results are two similar Installation Specifications: one for state highway departments and one for private industry. PDCA has submitted our state version to the T-15 committee (substructures and retaining walls) of AASHTO; they will meet with us for a third time this November and vote on adopting our changes.

The process was most enjoyable. We each had the paragraph in question on our computer with the screen controlled by a wizard (George Goble or Garland Likins). Then we discussed by conference call and saw the changes as they were made. The mix of contractors, suppliers, geotechnical, and academic types produced a broad overview of good practices.

The specification is 34 pages long and covers every type of driven pile, hammer, heave, refusal, splicing, testing, and payment.

For example, when pouring a pipe pile, it is not necessary to use a tremie (as is required for wall forms) because the pile itself is the tremie. Practical refusal is limited to 10 blows per inch or less and the engineer is advised to consider blows per inch rather than blows per foot.

The confusion between test piles, probe piles, and indicator piles is addressed, since some specifications use these terms in confusing ways. Guidelines are given for various types of load testing: static, dynamic, or rapid load testing. While ASTM D-1143 is the gold standard for static tests, it is actually a lapsed (who knew?) ASTM specification which will be reissued in the future.

There was a lively discussion of payment items. The committee recommended many pay items to reduce after-the-fact pricing. The commentary guides the engineer towards fairness in assessing changes. ▼

Any contractor, engineer, or owner can obtain copies of PDCA Specification 101-06 from the PDCA website (www.piledrivers.org) or the PDCA office. We encourage widespread use and distribution of this copyrighted material provided PDCA is referenced.


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Timber pile foundation system for American Airlines Terminal at JFK.

Timber Piles: A Brief Overview

By Dean Matthews, Timber Piling Council

Efficient pile foundations are based on good engineering practices—practices which include such important phases as adequate preliminary soil exploration at the site of the proposed structure, load tests on sample piles where these are deemed necessary to establish safe design loads, selection of contractors experienced in driving foundation piles, and thorough engineering supervision of driving operations.

Timber continues to be a major player in driven piles, along with steel and concrete. Timber piling is generally readily available and usually does not require long lead times for shipment. Because of its light weight timber piles are easier to handle and install than other types of driven pile materials. They are also easy to drive, cut to elevation and to dispose of the cut-offs.

Timber is a natural renewable resource and is replanted after harvesting. The South, where most Southern Pine trees are grown, is harvesting its fourth generation of forests, or more, since the

Europeans settled this country. Timber piling is an engineered material with published sizes, allowable design stresses and engineering design data.

Ninety percent of the timber piling in North America is Southern Pine. Douglas Fir is most of the balance. Other species are occasionally used, but they comprise less than one percent. About 90 to 95 percent of Southern pine piling is pressure treated with Chromated Copper Arsenate (CCA), the rest is creosote. About 85 percent of Douglas fir piling is pressure treated with Ammoniacal Copper Zinc Arsenate (ACZA) with the remainder treated with creosote.

From the Rocky Mountains east there are many huge rivers which have dropped silt where the water flow slows as it approaches the ocean or passes through a relatively flat area such as the Mississippi River valley. Many cities grew up on those areas, and timber piles have and continue to be used in these areas. The same is true in the west, but the predominant use of timber piles is East of the Rocky Mountains.

On many jobs timber piling will save owners considerable money as they are usually less expensive. Dollars per ton of load carry capacity is a key comparison.

Timber Pile Performance

A home built on timber piles in Pearlington, Miss., is reported to be the only one along the Biloxi coast which survived flooding from Hurricane Katrina. Timber piles extend from below the ground to the second floor level. Water came within several inches of the girders, but never entered the house.

Similarly constructed beach homes, meeting coastal wind load standards, are prominent along the Eastern and Gulf coast from New Jersey to Louisiana.

Timber piling resists attack from both alkaline and acidic soil, and corrosion protection is not required. They are also unaffected by electrolysis from stray electrical currents. Timber piling installs with standard, readily available equipment and takes advantage of a plentiful renewable resource.

Timber marine piling is well suited to small boat marinas and heavy marine construction as it resists battering by

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wind, wave, storms and tides as wood is a resilient material. This is because wood has high damping characteristics which provides built-in shock resistance against hurricanes and earthquakes.

Piling History

Credit for the concept of a pile has been given to a Neolithic tribe called the Swiss Lake Dwellers who lived in what is now Switzerland around 6,000 years ago. They built their homes on platforms supported by timber piles for protection from the wildlife. Evidence of these structures still exists today in Lake Lucerne.

Around 1620 B.C. the Romans built a timber bridge across the Tiber River in Rome which lasted over 1,000 years. Some of the Roman roads and aqueducts were supported on timber piles which were still in good condition 1,900 years later. The Romans also built the first bridge across the River Thames in London on timber piles in about 60 A.D. The Venicians built their homes on timber piles from about 100 B.C. to 400 A.D.

The Romans had several methods for driving piles. One was to build a tripod out of three large trees with a pulley up in the top. With slaves on one end of the rope and a rock on the other end, the slaves pulled the rock up and dropped it on the pile enough times to drive it in the ground. That must have been the first drop hammer!

The modern age of wood preserving began in England in 1832 when the concept of injecting chemicals into wood was developed. The first treating plant in North American was built in 1848 for treating railroad ties. Today, 96 percent of railroad ties are still wood and most of them are creosote treated. Piling was the second major product to be pressure treated which began in 1865.

Timber piles support many notable structures. The Temple of Diana in Western Turkey, 600 B. C.; Campanile Tower in Venice, 900 A.D.; Pont Notre-Dame bridge in Paris, 1507; Royal Palace of Amsterdam, 1600; and the ferry terminal at the foot of Market Street in San Francisco, 1906. All are still standing on timber piles.

Testing Program

In 1999 and 2000 the timber piling industry sponsored full scale tests of both Southern Pine and Douglas Fir piling. These tests were conducted by EDM International, an independent laboratory in Ft. Collins, CO. Historically, stresses were based on tests of small clear samples and the results adjusted for wood characteristics by the procedure outlined in ASTM D2899 for timber piling.

Not only were these full scale tests run, but an additional step was added to the program which is not required by testing standards, nor a usual step in laboratory testing programs. Timber piling producers were surveyed to determine where they obtained the logs used for piling. The Southern Pine timber was from Virginia, Georgia

Driving timber piles at a shopping center in New Jersey.

Many field load tests have been conducted over the years on timber piling. These tests showed that loads up to 75 tons could be safely supported on timber piles with a factor of safety of at least two.

Timber foundation piling system for New Jersey condominiums.

Timber piling is the mainstay for small boat marinas.

and Florida. Douglas fir timber was from Oregon, Washington and British Columbia. Samples for the tests were selected in those growing regions in proportion to the amount used for piling.

EDM first conducted bending tests to failure and these tests showed the bending stresses could be up to 53 percent higher than currently allowed for bending strength design. While bending is not often a factor in foundation piles, it can be important with marine piles where the piles must resist the wind forces from the sides of ships, barges or small boats. These wind forces are resisted in bending by the marine piling.

Following the bending tests, an approximately three foot piece was cut from both the butt and tip ends and these were tested in compression. These tests showed that compressive stresses could be increased 12 percent more than currently allowed, thus allowing more load carrying capacity.

The testing program demonstrated that allowable stresses currently published in the National Design Specification (NDS) are conservative. A new ASTM standard under development will provide the protocol for developing stresses from full scale tests. Following ASTM approval and peer reviews by wood product testing laboratories, and academia, the resulting allowable working stresses will be published in the American Forest & Paper Association's "National Design Specification." This document is included by reference in the International Building Code.

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Venice Grand Canal today. Many Venetian buildings were constructed on timber piles.

Many field load tests have been conducted over the years on timber piling. These tests showed that loads up to 75 tons could be safely supported on timber piles with a factor of safety of at least two.

Durability of Timber Piles

The durability record of timber piles is an often asked question. The conclusions of the Federal Highway Administration (FHWA) are:

- Foundation piles submerged in ground water will last indefinitely.
- Fully embedded, treated, concrete capped foundation piles partially above the groundwater will last 100 years or longer.

Source: FHWA HI 97-103, "Design and Construction of Driven Pile Foundations."

It should be noted that the design life of steel is 100 years, also.

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Timber Piling Standards and Treatments

ASTM D25, the oldest ASTM wood standard still in use, provides the requirements for wood characteristics in timber piling, defines the required straightness and provides size tables from which to obtain size information to design the timber piling foundation system. Timber piles are required in PDCA specifications to be pressure treated in accordance with the following American Wood Preservers Association (AWPA) Use Category Standards:

- AWPA Use Category for Timber Piles
  a. Foundation, land and fresh water piling UC4C (formerly C3).
  b. Highway construction UC4A and UC4B (formerly C14).
  c. Marine construction (saltwater) UC5A, UC5B, UC5C (formerly C18).

The AWPA Standards were originally written in the 1920s, based on the performance of creosote, Any preservative allowed in Standards after that had to be equal to or better in performance than creosote. CCA came into the AWPA Standards in the 1930s. ACZA, which is used to treat Douglas Fir, was developed about the same time. It is not generally possible to treat Douglas Fir with CCA and consistently meet AWPA Standards.

Allowable Working Stresses

Allowable timber piling stresses are published in the "National Design Specification" (NDS), published by the American Forest and Paper Association, which is the recognized publication for all allowable design stresses in the forest products industry. The NDS is an ANSI and AF&PA Standard and is incorporated by reference in the International Building Code.

Timber piling stresses are also published in the Timber Piling Council's, "Timber Piling Design and Construction Manual." This 150page manual may be downloaded from www.timberpilingcouncil.org ▼

The Timber Piling Council provides technical information and promotes the use of timber piles in the construction industry. More informtion is available on our web site at www.timberpilingcouncil.org. The Council is part of the Southern Pressure Treaters Association which represents utility pole and piling producers of Southern Pine. Dean Matthews, P.E. represents the Timber Piling Council and may be reached at 800-410-2070 or dean@timberpilingcouncil.org ▼

A Driven Pile Advantage: Batter Piles

By Edward Kavazanjian, Jr., Ph.D., P.E., Associate Professor and Interim Chair, Department of Civil and Environmental Engineering, Arizona State University

Introduction

The ability to install driven piles on an angle, or batter, gives them a distinct advantage with respect to their ability to carry lateral loads. Batter piles carry lateral loads primarily in axial compression and/or tension while vertical deep foundations carry lateral loads in shear and bending. When subjected to lateral loading, batter piles will therefore generally have a greater capacity and be subject to smaller deformations than vertical piles of the same dimensions and material. Large shear and moment loads induced at the pile head have been a source of performance problems with batter piles in some cases. However, these problems can be mitigated by appropriate design and detailing of the pile-structure connection.

Until the 1990s, batter piles were a common means for carrying lateral loads, particularly when the lateral loads were large, there was a large unsupported length, or there were weak soils at the ground surface. Examples of such situations include seismic design of bridges and design of marginal wharfs and other port and harbor structures. In the 1990s, following the poor performance of batter piles in a series of earthquakes, some engineers began advising against the use of batter piles. However, once the reason for the poor performance of batter piles was understood, engineers developed design strategies to address these problems. Using these strategies, batter piles have once again become an important weapon in the engineer's arsenal for designing foundations subject to lateral loads.

Historical Overview

Sources of lateral loads on deep foundations include not only seismic loads but also winds, blasts and other impacts, waves and currents, and lateral earth pressures and displacements. Throughout most of the 20th century, batter piles were employed routinely to carry lateral loads. Retaining walls founded upon soft soils, anchored bulkheads, pile supported decks, breasting dolphins, and bridge piers regularly employed batter piles. In fact, batter piles were the preferred methods for deep foundations subject to lateral loads until well into the second half of the 20th century. Reasons for this include the extremely poor moment (bending) capacity of some of the more common deep foundation types employed in

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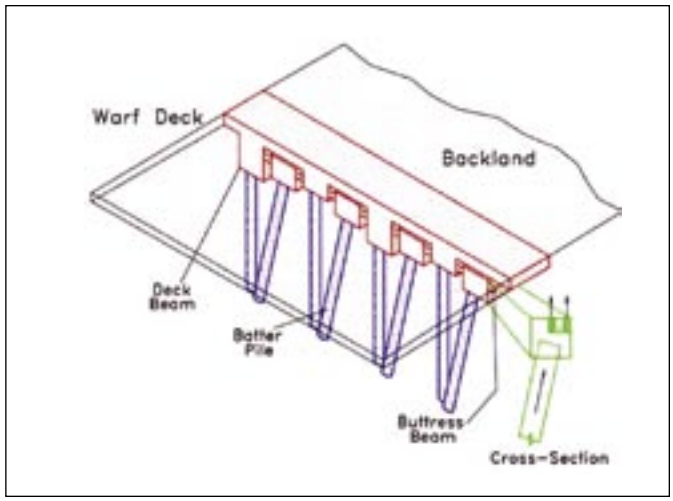

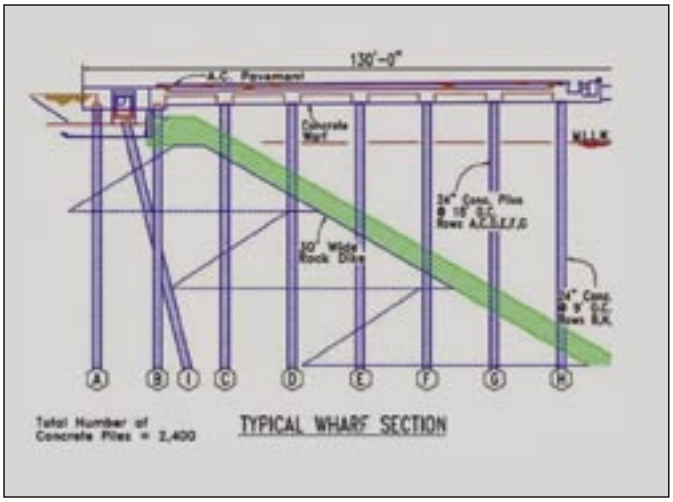

Graphics Courtesy of Mukhopadhyay, G., 2001, Geotechnical Challenges and Solutions for a Fast-Track Container Terminal Project at a Contaminated and Seismically Active Site at Pier A At the Port of Long Beach. *Proceedings of Ports 2001 Conference in Norfolk, Virginia, April 29 – May 3, 2001.*

STRUCTURAL FUSE SCHEME

the first half of the 20th century, e.g. timber piles, Franki™ piles, Raymond Step Taper™ piles, and the difficulties in analyzing vertical piles subject to lateral loads.

Through the 1960s, major bridges routinely employed a large number of relatively small driven piles (e.g. 14-in. H-Piles) to support the main piers, including several rows of batter piles to carry the lateral loads. In the 1970s and 1980s, more and more bridges employed large diameter drilled piers as foundation elements. The increased popularity of large diameter drilled piers for bridge foundations was due in large part to the development of reliable procedures for their design and construction, including the development of p-y analyses for design of piles and drilled piers subject to lateral loads. However, batter piles still remained a popular means of carrying the large lateral loads associated

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with pile-supported decks and for limiting the displacement of foundations subjected to lateral loads.

Towards the end of the 20th century, poor performance of batter piles in a series of earthquakes cast batter piles in a poor light. The performance of prestressed concrete batter piles supporting container cranes at the Port of Oakland 7th Street Terminal in the 1989 Loma Prieta earthquake was the first of several such incidents. Liquefaction-induced lateral displacement of a rock fill dike through which the batter piles were driven resulted in shearing of the pile heads. The pier was retrofitted using large diameter vertical drilled piers to replace the batter piles at this location. Similar damage was observed in prestressed concrete batter piles in the Port of Los Angeles in the 1994 Northridge earthquake and in the 1996 Manzanillo, Mexico earthquake. As a result of these incidents, some engineers began advising against the use of batter piles. For instance, a 1998 monograph on Seismic Design of Port and Harbor Facilities published by the American Society of Civil Engineers Technical Council on Lifeline Earthquake Engineering advised that "The use of batter piles at ports is typically not encouraged because of their poor seismic performance during past earthquakes."

As the cost of not employing batter piles for many seismic design problems became apparent, many engineers began to question the conclusion that batter piles were unsuitable for seismic loading. Forensic analysis of the observed failures suggested that the poor performance of batter piles in seismic events was due to the fact design analyses typically assumed the head of the pile was "pinned", i.e. free to rotate, and thus was not designed to sustain any moment loading. However, due to the design details, the heads of the prestressed concrete piles could not rotate freely and thus were subjected to large shear and moment loads, resulting in failure at the pile head. This suggested that the observed deficiency in the performance of batter piles could be remedied by a combination of strengthening the pile head so that it could resist the applied moment and shear loads and providing sufficient ductility to the pile head or pile-structure connection to allow it to rotate without a loss of capacity. With this understanding of the source of the observed poor performance and how it could be mitigated, in the past few years batter piles have re-assumed their traditional role in withstanding large lateral loads applied to deep foundations. The piers for the new San Francisco Bay Bridge East Span Replacement structure are perhaps the best example of this renewed acceptance of batter piles for lateral loads. Each pier is supported by six 8-ft diameter steel pipe piles driven on a batter through the underlying bay mud to firm bearing.

Batter Pile Design Philosophy

Several different approaches to the design of batter piles are now used in practice. One approach, presented in Chapter 7, Foundation Design Requirements, of the 2000 National Earthquake Hazard Reduction Program design guidance for buildings, states that "The connection between batter piles and grade beams or pile caps shall be designed to resist the full strength of the pile acting as a short column. Batter piles shall be capable of resisting forces and moments from the load combinations ...". An alternative to this "brute force" method of batter pile design is the use of a structural "fuse" to limit the forces at the pile head. One manifestation of this approach is the proposed AASHTO guidelines for seismic design of bridges, which allow for "capacity protected" pile caps in which the columns above the pile caps are designed to yield without forming a collapse mechanism before the elastic limit of the batter piles and pile cap connections are exceeded. Another example of this approach is the innovative design of the Port of Long Beach Pier A pile supported deck, where the prestressed concrete piles are connected to a steel beam below the deck that is designed to yield and rotate after the piles undergo 1 inch of elastic compression.

Conclusion

Batter piles can provide driven pile foundations a significant advantage over drilled piers and other vertical elements for deep foundations subject to lateral loads. Batter piles are particularly advantageous when there is a large unsupported pile length or in weak soils where there is little lateral support, as vertical foundation elements typically carry lateral loads by bending over their top 10 diameters of length below the pile cap. Over the range of batters typically employed in practice the bending capacity of a batter pile is essentially the same as that of a vertical pile, thus lateral load carried as axial load by the batter pile is essentially entirely "additional" lateral capacity for the pile Batter piles are not suitable in all situations. Batter piles are particularly problematic when the soil through which the pile is driven may settle, as the settlement will impose lateral loads and bending moments along the entire length of the pile. Furthermore, careful attention is required to the design of the pile / structure connection to provide either sufficient strength to resist applied moment and shear loads or sufficient rotational ductility to limit loads at the pile head to the pile capacity. However, with proper attention to these details, batter piles remain the most economical way to carry lateral loads in many common situations, providing a true driven pile advantage. ▼

Wharf Construction - Structural fuse can be seen in foreground.

Photo Courtesy of Mukhopadhyay, G., 2001, Geotechnical Challenges and Solutions for a Fast-Track Container Terminal Project at a Contaminated and Seismically Active Site at Pier A At the Port of Long Beach. *Proceedings of Ports 2001 Conference in Norfolk, Virginia, April 29 – May 3, 2001.*

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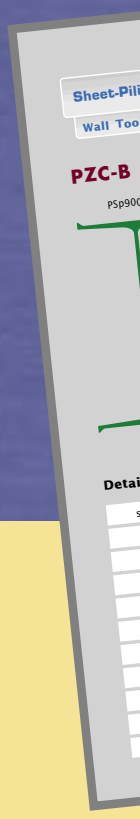

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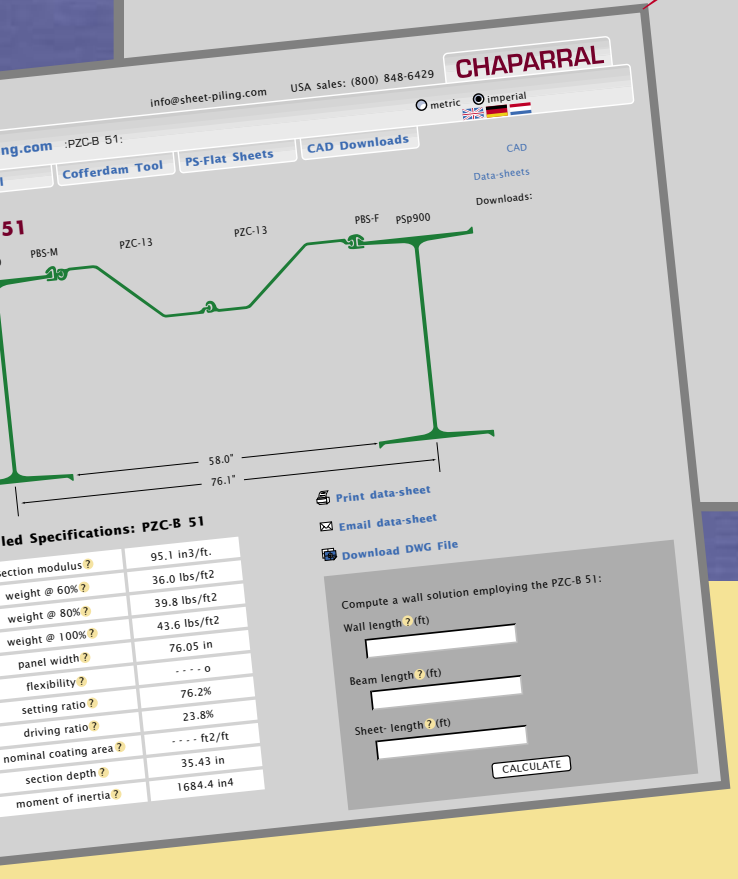
PZC 18		33.5	24.2	25.00
PZC 19		36.1	26.4	25.00
PZC 25		45.7	29.9	27.88
PZC 26		48.4	31.8	27.88
PZ35		48.9	35.0	22.64
PZC 28		51.2	34.0	27.88
PZ40		61.3	40.0	19.69
PZC-B 41		75.7	34.2	76.05
PZC-B 45		83.9	34.8	76.05
PZC-B 51		95.1	36.0	76.05
PZC-B 57		106.8	37.2	76.05
PZC-B 62		116.3	38.9	76.05
PZC-B 65		120.3	39.7	76.05
PZC-B 68		126.2	40.8	76.05
PZC-B 70		129.7	41.4	76.05
PZC-B 77		143.4	44.8	70.29
PZC-B 89		165.7	50.0	76.05
PZC-B 98		181.9	53.2	94.87
PZC-B 100		188.4	54.5	94.87
PZC-B 106		197.8	56.2	94.87
PZC-B 109		203.4	57.3	94.87
PZC-B 118		219.0	61.0	89.11
PZC-B 140		261.3	71.0	94.87
PZC-B 151		280.6	75.6	89.11
PZC-B 160		298.5	82.5	84.39



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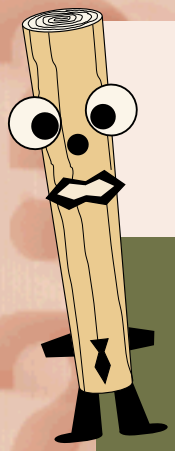

Did You Know?

In this new department the PDCA asks "Did you know...?" and provides quick facts and tips of use to members.

Heavy Ram + Short Stroke = Reduced Driving Stresses

According to PCI, "To reduce driving stresses, use a heavy ram with a low impact velocity (short stroke) to obtain the desired driving energy rather than a light ram with a high impact velocity (large stroke). Driving stresses are proportional to the ram impact velocity."

Junttan Announces **New Dealership Agreement**

Submitted by Junttan Oy

Junttan Oy, one of the world's leading manufacturers of hydraulic pile driving rigs, has signed a dealership agreement with Sun Piledriving Equipment, LLC (SPE). SPE is a highly respected supplier of pile driving equipment in its area, having over 20 years of experience in the pile driving industry. SPE will take care of Junttan product line sales, service and spare parts in South Eastern Coast of United States.

This agreement is part of the Junttan's strategy to expand its distribution network through independent companies with a strong presence amongst the area's pile driving industry. SPE's strength is in its solid experience in sales and servicing pile driving equipment.

"Our new partner has a strong service network for securing customers' effective use of pile driving equipment. The arrangement will strengthen Junttan's market position in the United States," says Tommi Lindbom, managing director of Junttan Oy. ▼

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Understanding the Nature of Risk Management

By Jimmie L. West, Ph.D., PMP, Vice President, Dean, PM College

Think of a previous project that you worked on, whether it was viewed as successful or unsuccessful. Now recall, if you can, the project plan and its components. As you review this project, make a list of all the things that went wrong. Also make a list of all the things that went as planned or better than planned. Add to the list those things that you didn't anticipate that went wrong or turned out to be beneficial for the project. For all the things that went wrong, what did you learn? What did you learn from the things that went well or better than expected? In a nutshell, these activities represent the heart and soul of an effective risk management process. The important point is that whether consciously or unconsciously, by doing these things, you and your project team are engaged in risk management.

Risk management has become a recommended best practice in the field of project management. It is even given its own section in the Project Management Body of Knowledge (PMBOK). This recognized standard forms the basis for much of the theoretical description of risk management. The definition of risk contains three important elements; an event, probability, and impact. Of these, the most important is the event. Risk is a discrete event that has a singular occurrence. It is something that happens. An example of an event is that your subcontractor failed to deliver a specific component to you. Another is a key resource leaves the project unexpectedly. And a third is the customer goes out of business. The point is events have a specific description that allows others to get a common picture of the risk. Precision is important in describing the risk event. Not only because others need to understand what it is, but it will influence how one might approach the resolution or management of that risk. For example, the risk of a vendor being late is too general. For your project, you need to state which vendor and which component might be late. If you don't clarify the difference in the risk events, the analysis, prioritization, and subsequent mitigation strategy may be flawed. There are also events that can be classified as a compound risk. This is a risk event that is composed of smaller risk events. A classic example of a compound risk is the system cutover of a telephone system. Because of the multiple components being tested, any of them could cause a failure of the system cutover. These events can be decomposed into smaller risk events for better management.

The second element is probability of occurrence. There are two sides to this probability; the likelihood of the event happening and the likelihood of the event not happening. The default interpretation is that the event will happen. Probability of occurrence means anywhere from one percent to ninety-nine percent. If an events probability is zero, it is clearly not an event. If the probability is one hundred percent, it becomes a fact, not a risk event.

The final element is the impact of the risk event on the project. Impact is defined as the outcome of the risk event if it is not managed. The implication here is that the event will change the projects outcome from the desired outcome. Typically, impact areas are confined to cost and schedule implications. But any practicing project manager will tell you that there are other areas that can be equally effective. For example, customer satisfaction can be impacted by a risk event. Similarly, the areas of quality, resource availability, contractor or vendor relationship, and even the organization can be impacted by the occurrence of a single risk event. The point is that project managers should become more aware of areas of impact in order to better analyze the risk event.

Risk Management Process

The risk management process includes several steps that take the project manager and his or her team from identification to control. The steps as defined by the PMBOK 2000 include risk identification, risk analysis, risk quantification, risk mitigation, and risk control. These steps are intended to guide the project team through the development of a risk plan that can be integrated into the larger project plan. There are two things to remember about the risk management process. First, when you begin a project, the risk management process is linear. Each of these steps is done prior to beginning the subsequent step.

The team should not begin to analyze risks until they feel that all potential risks and opportunities have been identified. The quantification phase doesn't begin until the high risks have

been identified and so on. Adhering to this principle allows the team to focus on the deliverable for that phase. The deliverable of the identification phase is a comprehensive list of risks and opportunities. The deliverable for the analysis phase is a prioritized list of risks based on their overall value. The deliverable from the quantification phase is an in depth quantification of the potential impact of the most important risks. The deliverable from the mitigation phase is a detailed strategy for each risk that is implemented at the appropriate time in the projects life cycle.

The second thing to remember is that once the project begins, the risk management process becomes iterative and immediate. The project team has a prioritized list of risks with selected strategies to manage the most severe. Using this list, the team begins to monitor existing risks and identify new risks. Each new risk can be immediately analyzed, compared with the existing risk list, quantified if necessary, mitigated, and controlled. This is the active part of the risk management process. By using their existing plan, teams can minimize the need to over react to each new risk by comparing it to their plan.

Conclusion

Risk management is nothing more than increasing the level of awareness of the project team to events that both pose threats to the success of the project and the opportunities for enhancing the success of the project. Engaging in proactive risk management indicates a conscience management decision to be prepared to reduce the probability and impact of threats and increase the occurrence of opportunities. The risk management process encourages an on-going awareness of risk and provides the project team with a better opportunity for delivering their project on time, within budget, and achieving higher customer satisfaction. ▼

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Sample Risk Analysis - Pile Installation

Pre-Work

No.	Guideword	Cause	Consequence	Safeguards	Risk Assessment				Comments	Rec. #	Recommendations
					C	L	Cat.	R			
1.1	Hammer transport and assembly	Traffic accident during transport	Injury to people; damage to hammer and/or associated equipment	Permitting requirements for transportation of equipment	5	B	P	M		1	Owner and Hammer Manufacturer to agree equipment tie-down plan and Hammer Manufacturer to ensure that the load is properly secured prior to leaving yard.
										2	Ensure the hammer transport includes an escort.
1.2	Hammer transport and assembly	Lifting of hammer and associated equipment during offloading and assembly	Dropped objects, pinch points, etc. resulting in personnel injury	Qualified crane operators and riggers. Certified slings and shackles. JSA / Pre-job safety meeting. Pre-designated signal man. Restricted access to area. Onsite HSE personnel.	4	C	P	M	These hazards apply to all lifts / objects during the pre-work and driving operations.		
1.3	Hammer transport and assembly	SIMOPS	Onsite transportation affected during unloading of equipment; Delays on other project (operational / asset issue only)	Project coordinator (Mike Hanson).					OPS issue only		
1.4	False rotary	Set up of rotary in area of hole	Fall or dropped objects / pinch points / crush points, slips, trips resulting in personnel injury	Qualified crane operators and riggers. Certified slings and shackles. JSA / Pre-job safety meeting. Pre-designated signal man. Restricted access to area. Onsite HSE personnel. Personnel working around hole will have fall-protection.	4	C	P	M		3	Review and approve configuration of false rotary.
										4	Determine the tie-off point to be used during installation of false rotary.
1.5	Double-jointing operations	Double-jointing operations and lifts	Dropped objects, pinch points, etc. resulting in personnel injury	Qualified crane operators and riggers. Certified slings and shackles. JSA / Pre-job safety meeting. Pre-designated signal man. Restricted access to area. Onsite HSE personnel.	4	C	P	M			
1.6	Double-jointing operations	Welding	Personnel injury from heat, arc flash, etc.	Proper PPE for welding. Designated fire watch and fire extinguishers in area.	2	C	P	L			
1.7	Double-jointing operations	Heat stress / stroke	Personnel injury	Water, frequent breaks	4	B	P	M		5	Consider using a canopy over stationary work.

Sample Risk Analysis - Pile Installation (cont.)

Driving Operations

No.	Guideword	Cause	Consequence	Safeguards	Risk Assessment				Comments	Rec. #	Recommendations	Responsible	Due Date
					C	L	Cat.	R					
2.1	Lift and set of 1st double-joint onto rotary	Pad-eyes are not properly engineered or welded	Dropped objects resulting in personnel injury (due to personnel standing near wellhead); potential damage to the crane due to boom retraction and damage to pipe.	Qualified crane operators and riggers. Certified slings and shackles. JSA / Pre-job safety meeting. Pre-designated signal man. Onsite HSE personnel. Restricted access - essential personnel only.	4	C	P	M		6	Review and approve the design of the pad-eyes.	Jason Newlin	5/15/06
2.2	Lift and set of 1st double-joint onto rotary	Poor lift plan	Dropped objects resulting in personnel injury (due to personnel standing near wellhead); potential damage to the crane due to boom retraction and damage to pipe.	Qualified crane operators and riggers. Certified slings and shackles. JSA / Pre-job safety meeting. Pre-designated signal man. Onsite HSE personnel. Restricted access - essential personnel only.	4	C	P	M		7	Develop lift plan for the pipe and hammer, including equipment layout at well.	Mike Hanson	5/15/06
2.3	Stab second joint (single) and weld	Stabbing of joint	Dropped objects, pinch points, etc. resulting in personnel injury	Qualified crane operators and riggers. Certified slings and shackles. JSA / Pre-job safety meeting. Pre-designated signal man. Restricted access to area. Onsite HSE personnel.	4	C	P	M					
2.4	Stab second joint (single) and weld	Welding	Personnel injury from heat, arc flash, etc.	Proper PPE for welding. Designated fire watch and fire extinguishers in area.	2	C	P	L					
2.5	Stab second joint (single) and weld	Severe Weather	Potential for shocks resulting in personnel injury; inability to complete the welding operation in a safe, timely manner; piping craned in unsafe position for weather loads (high winds, lightning) potentially resulting in dropped pipe and personnel injury	Welding procedures do not permit welding during rain	4	B	P	M		8	Determine the wind speed and other weather conditional (lightning) limits for crane operations and communicate with crane contractor.	Mike Hanson	5/15/06
										9	Determine a safe weather window for welding operations on a connection-by-connection basis.	HSE Tech (Ken Bartig)	Onsite
2.6	Lift and set of triple-joint into soil, including release of shackles	Release of shackles from triple-joint (at ~40 ft above ground)	Potential fall resulting in personnel injury. Potential dropped object resulting personnel injury and/or equipment damage	Qualified personnel and man-lift operator. Tie-offs for personnel, tools and equipment at height.	4	C	P	M		10	Determine if the hammer drive sleeve will interfere with the pad-eyes.	Doug Scaggs	5/15/06
										11	Evaluate the use of hydraulically-operated shackles for this operation.	Jim Hale / Mike Hanson	5/12/06
2.7	Attach hammer and drive to depth (if necessary)	Hose and control line management	Damage to equipment and potential personnel injury; hydraulic oil spill to environment	Equipment layout (power pack in respect to hammer, crane, etc.); Gasmer onsite ER team and spill kit in area	3 1	C	P E	M L		12	Ensure hose and control lines are visually inspected prior to use onsite.	HSE Tech (Ken Bartig)	Onsite
										(7)	See above recommendation (7) for lift plan	Mike Hanson	
2.8	Attach hammer and drive to depth (if necessary)	Lifting of hammer (87 tons)	Dropped object potential resulting in personnel injury	Qualified crane operators and riggers. Certified slings and shackles. JSA / Pre-job safety meeting. Pre-designated signal man. Onsite HSE personnel. Restricted access - essential personnel only.	4	C	P	M		(7)	See above recommendation (7) for lift plan	Mike Hanson	
2.9	Attach hammer and drive to depth (if necessary)	Hammer operations	Noise, resulting in personnel injury and/or potentially exceeding limit of 85 dB at property line (7am-7pm).	Hearing protection for personnel in area. Noise monitoring during operations.	2	C	R	L		13	Evaluate noise reduction methods and determine contingency path forward should shutdown be required due to noise complaints.	Doug Scaggs	5/15/06
										14	Evaluate means to minimize hammering operation duration.	Don Campo	Onsite
2.10	Cut off 5 ft of joint	Operation of cutting torch	Potential fire resulting in personnel injury	Proper PPE. Restricted access - essential personnel only. Designated fire watch and fire extinguishers in area.	3	C	P	M					
2.11	Stab subsequent joints (single or double) and weld	Same as stabbing of second joint (see 2.5 above)											
2.12	Attach hammer and drive to depth or refusal	No new hazards (same as hammer operation above)											

Foundation for a Successful Career

Clark Foundations LLC

By Barbara Edie

A project executive for Clark Foundations LLC, Irv Ragsdale has managed many diverse and highly technical construction projects in the Washington D.C. area. Clark Foundations LLC is the wholly owned subsidiary of Clark Construction Group, the seventh largest general building contractor in the United States.

Ragsdale joined the parent company in 1979 and a year later moved to the Foundations Department, which in 1996 became Clark Foundations LLC. Throughout his career with Clark, Ragsdale—a civil engineer—has been working with support of excavation and piling projects, and seems to have found the foundation for his success.

Ragsdale says his typical projects include office buildings and other large commercial sites that require excavation support systems. In addition, Clark Foundations provides underpinning, pile driving, façade support structures, slurry walls and concrete placement. "We install pile foundations of steel H-piles or pre-cast concrete piles," says Ragsdale. "Right now we're driving piles for the new baseball stadium for the Washington Nationals."

The baseball stadium is one of many unique, high-profile projects Ragsdale has managed. He notes the company just finished a pile driving project for a military hangar for the Marine Corps training facilities in Quantico, Virginia. Clark

Foundations has also driven steel piles for the Washington National Airport, the Fed Ex Field Stadium (home of the Washington Redskins football team), the National Museum of the American Indian and a new metro station in Washington D.C.

Another project representative of Clark Foundations' expertise and diversity includes the Pentagon basement renovation. That job required some innovative underground engineering to install more than 1,800 low head room pipe piles, each 40-feet long, from within the existing basement of the Pentagon, without impacting the operations of the building above.

These large-scale projects, among others, reflect Clark Foundations' more than 36 years of experience in underground construction in the Washington metropolitan area.

While Clark Construction Group has a 100-year history in building projects around the U.S., Clark Foundations operates specifically in the mid-Atlantic region, from northern Virginia to Baltimore, and only on select Clark projects in other parts of the country. For example, when Clark Construction's base building projects have a special engineering requirement, it's often the Foundations' engineers who get the call.

In order to support the field operations, Clark Foundations works with the main equipment yard of the Clark Construction Group, and therefore has access to a huge inventory of underground specialty equipment.

With annual revenues of more than $60 million and a professional staff of 15, Clark Foundations provides all of the functions of mid-sized construction company. Those services

Clark Foundations works on the Washington Nationals ballpark in Washington, D.C.

include: preconstruction, estimating and bidding on new projects, budgeting for work-in-hand, designing earth retention systems and managing self-performed construction tasks related to earth support and foundations. In addition, the company contracts its services to owners interested in beginning foundations work prior to bidding on the core and shell portions of a project. The ratio of public versus private projects is "about 50/50," says Ragsdale.

While Clark Foundations has completed many technically challenging building projects within the Washington, D.C. area, Ragsdale says the biggest challenge is always the same—scheduling. Getting it done on time and under budget is vital to the success of every project, he says. "From a pile driving standpoint, usually the key is trying to get things done on time. The foundation is always one of the earliest portions of any project. So the most difficult part is to hurry up and complete the foundation or excavation work or we'll hold up the rest of the job." Safety, control over costs, scheduling and quality during the early phases of the underground work is crucial to the success of the overall project.

The geology of the Washington – Baltimore region is quite variable, from rock zones along the west to sand and gravel layers interspersed with clay and marine deposits along the rivers. Determining the most economical and practical pile type, length, and load capacity for each particular project is always a challenge. Short steel piles less than 30' long, that may stop on rock, or concrete piles over 90' long, driven through soft clays, are some of the different piles we have driven in this area.

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However, there are benefits to using driven piles rather than other types of deep foundation options, says Ragsdale. "The cliché is that a driven pile is a proven pile." He adds, "You're driving a pile with a hammer and therefore have a way of monitoring the force it takes to install the pile… you can make a judgement call as to the capacity of the pile very quickly."

The mid-Atlantic chapter of the PDCA is still relatively new, says Ragsdale, but the association has been helpful in developing interest and knowledge within the industry. "We're just forming the mid-Atlantic chapter and are trying to generate some sense of community within the competition to get to know each other and spread the word regarding driven piles—to owners, architects and engineers. A driven pile is an economical foundation system, and we want to generate some education among ourselves and the building construction industry."

He adds that although his chapter is still in its "infancy stages," the PDCA as a parent organization is well organized. "It's clear in its vision to bring together people within the industry in a non-competitive environment, to exchange ideas and knowledge that will benefit the industry as a whole —suppliers, vendors, designers and owners."

A graduate of Virginia Tech, Ragsdale has a Bachelor of Civil Engineering and received his professional engineering license in 1982. "I've been involved in foundation work ever since," he adds, with a note of satisfaction. Dedicated to the profession, he is also a member of "The Moles," a group of contractors based out of New York who construct heavy underground projects such as tunnels for bridges, highways or subways.

In addition, Ragsdale is on the board of trustees for the apprenticeship school for carpenters and pile drivers in the Washington area.

When not managing large-scale foundation projects, Ragsdale likes to "play a little golf, do a little hunting and work around the house." He is married with two grown sons and a grandchild, who he also enjoys spending time with. ▼

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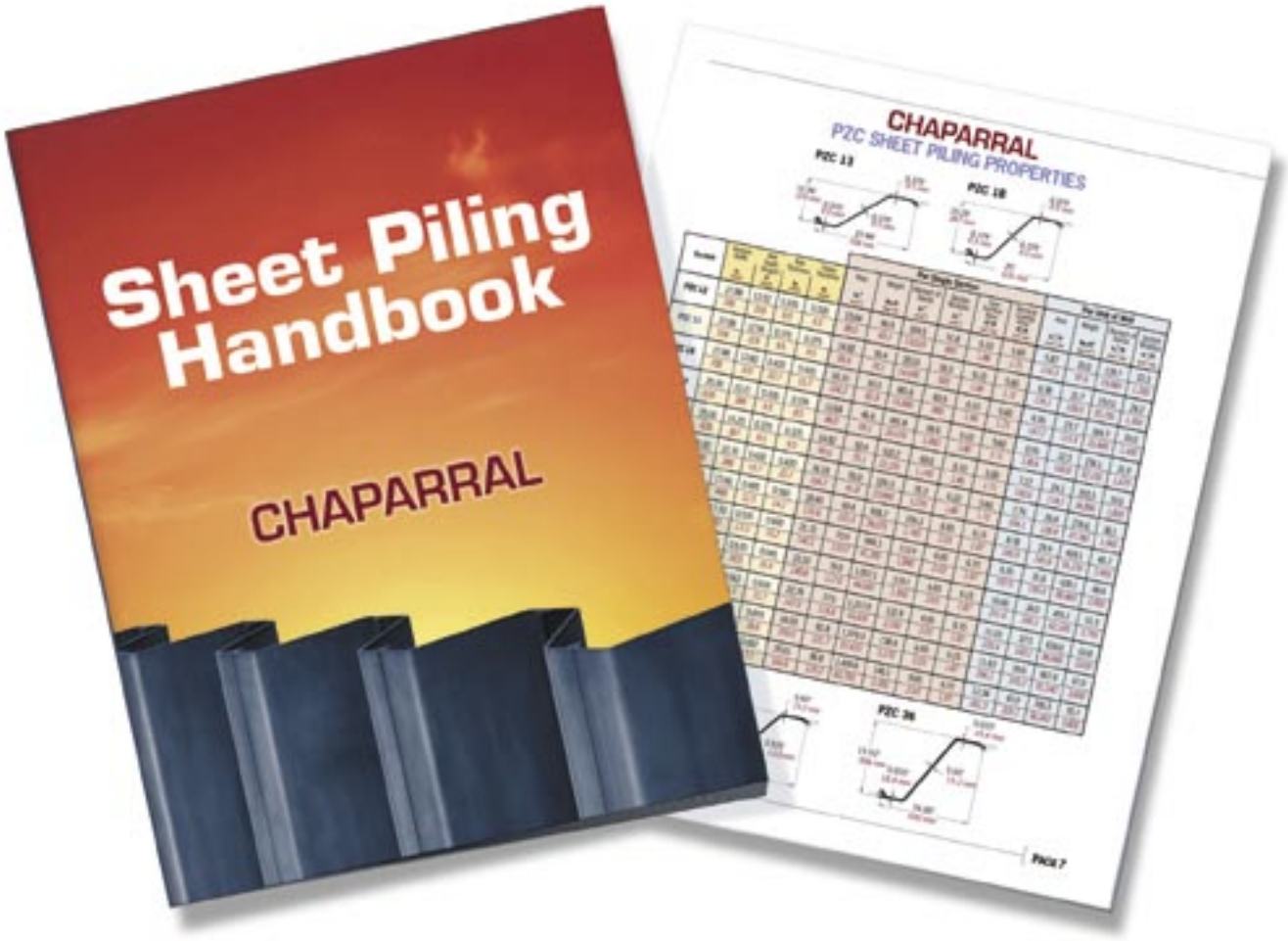

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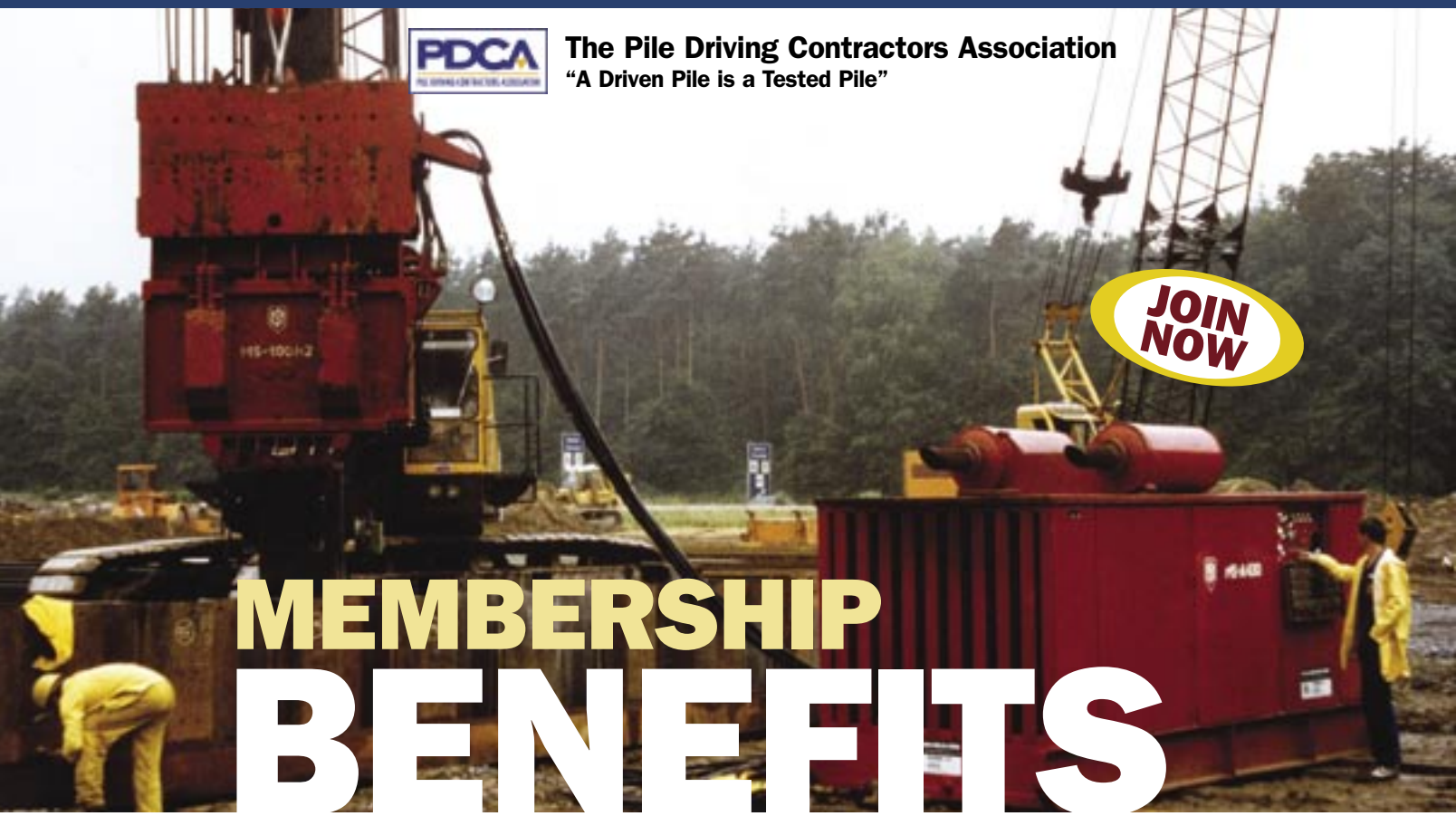

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Email: info@spe-usa.net

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 technical experts, suppliers to the piling industry and contractors. This conference focuses on the key issues faced by pile-driving contractors and features discussions and presentations as well as an extensive exhibit area.

- The Design and Installation of Cost-Efficient Driven Piles Conference (DICEP), held each September since 2000, is a nationally recognized two-day 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 College Professors Piling Institute, held at Utah State University in Logan, Utah. Up to 25 professors, from major engineering schools, are invited to participate in an intensive, week-long 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.

"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.

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

PDCA also offers the "*Installation Specifications for Driven Pile-PDCA Specification 101-06*" 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 interesting 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 the 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. ▼

PDCA

MEMBERSHIP APPLICATION

Step 1: Select Membership Type

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

❑ **Contractor** ❑ **(Annual Gross Sales >$1 Mil./year: $725/year).**
❑ **(Annual Gross Sales <$1 Mil./year: $350/year)**

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

❑ **Associate ($725/year)**

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

❑ **Technical Affiliate ($95/year)**

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

❑ **Retired Industry Member ($50/year)**

A Retired Member shall be defined as any individual who has reached retirement age as defined by U.S. law, who has left active employment and who wishes to remain a member.

I am retiring as a: ❑ Contractor ❑ Associate ❑ Technical Affiliate

Step 2: Demographic Information

Company Name _____ Phone _____

Your Name _____ Fax _____

Address _____ Email _____

City/State/Zip _____ Home Page _____

Step 3. Method of Payment

Attached is my payment of $_____ for annual dues.

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

I am making payment in full by

❑ Check # _____

❑ Credit Card: ❑ MasterCard ❑ Visa ❑ American Express

Card Number: _____ Expiration Date:_____

Name as it appears on card: _____ Signature: _____

Please send this completed application to: PDCA | P.O. Box 66208, Orange Park, FL 32065
Phone: (888) 311-PDCA (7322) | Fax: (904) 264-9531 | www.piledrivers.org

Applications Systems

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

Equipment

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

Services

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

General

❑ Rental ❑ Sales ❑ Other _____ ❑ Other _____

C. Technical Affiliate Only (check all that apply)

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

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

(All applicants check all that apply)

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

Step 5. Sponsorship: Who told you about PDCA?

Member Name_____

PDCA
PILE DRIVING CONTRACTORS ASSOCIATION

JOIN TODAY!

Please send this completed application to: ***PDCA***
P.O. Box 66208, Orange Park, FL 32065

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Fax: (904) 264-9531
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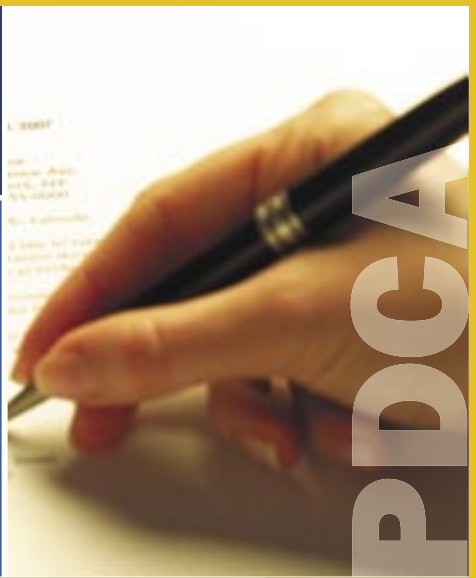

Advertiser **Index**

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