

PILED RIVER

THE OFFICIAL PUBLICATION OF THE PILE DRIVING CONTRACTORS ASSOCIATION



| Q2 2011 Vol. 8, No. 2

Manson Construction Co.

2011 Project of the Year Award Winner:

Derrick Barge Hakkon Installs a “Boom Down” Battered Pile

Project Spotlight:

▼ **The West Toronto Diamond
Rail Grade Separation**

Associate Member Profiles:

- ▼ **JMC Steel Group**
- ▼ **JD Fields & Company, Inc.**
- ▼ **L.B. Foster Company**



The Passing of the Torch:

Outgoing President Don Dolly hands over the PDCA presidency to Herbert “Buck” Darling



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Published by:
Lester Publications, LLC
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New York, NY 10005
Toll-free phone: 866-953-2189
Toll-free fax: 877-565-8557
www.lesterpublications.com

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PileDriver magazine is published quarterly.

Visit the PDCA Web site at www.piledrivers.org for more information or to download an advertising media kit.

Individual articles can be provided upon request to the PDCA office. Requests should be submitted to the PDCA via e-mail at steve@piledrivers.org or by calling 888-311-PDCA (7322).

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On the Cover:
Manson Construction Co. installs a "Boom Down" battered pile on the Bayou Bienvenue Pile Foundation, Sill and Monolith project in Louisiana. Manson won a Project of the Year Award for this project.
Find out more about Manson Construction Co. on page 41.



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Who Are We And Where Are We Going?

By Buck Darling

“Lately, it occurs to me, what a loooooong strange trip it’s been!” Ok, I date myself. I am also quick to point out that I am not now, nor was I ever, a Dead Head in any way shape or form. I just always liked that line from the Grateful Dead song “Truckin’,” along with the fact that it speaks of “Truckin’... off to Buffalo” (NY), which just happens to be from where I proudly come.

“ I remember being able to talk about so many things that you just wouldn’t talk about with your local competition. ”

I use the line above in reference to my travels with and for the PDCA that bring me to my present circumstances. It started off innocently enough with my company becoming a contractor member in PDCA. From there it was a short hop and skip to attending a couple winter roundtables, and writing a couple of articles for *PileDriver*

Magazine (then known as *Piledrivers.org*). Along the way I met some fantastic people with whom I was able to relate and strike up relationships. In retrospect, that would turn out to be the most critical part of my journey. I was then invited to be on the Board, from where I worked my way “through the chairs”, finally, to finding myself as your incoming President. I now stand ready to work hard to see the PDCA continue to thrive in the pile driving industry.

But to what should we turn our attention? Where have we been and where should we be going?

Should things stay the same? Let the successful past of our organization be a model for the future and “let ‘er ride”? We now have an excellent working model that has stood the test of time over many presidential terms. Should certain things be changed?

Change. A simple six-letter word that is anything but simple. To some, it strikes fear in the heart for what lies ahead. How will I adjust? Will I be able to do my job under the new circumstances? Other, more adventurous spirits accept change as an ever present entity that for the most part is to be embraced and strived for. In this uncertain economic and political age, change is happening nationally and globally on an unprecedented scale whether we like it or not. Anybody’s view of the future is largely determined by which side of the change fence they stand on. I suppose that some would ride that fence for as long as possible until the view



PRESIDENT'S MESSAGE

became clearer. Either that or they will just fall off to one side or the other having lost their balance due to paroxysms of fear, or because of the prevailing wind at the time, or in response to the little voices inside their heads (no, it's not an illness! We all have them.). I stand on the side of the fence that says change is necessary and desirable if brought on in a thoughtful and respectful manner. One cannot effect meaningful change with an iron fist or by tossing hand grenades around.

I say all this with very good reason. These thoughts are what are continually going on in my head with my dealings with the PDCA, and never more so than now. Change in one of its most basic forms has hit me on the back of the head with a two-by-four. I have been elected your President. I often question myself as to why I would ever put myself in such a position. I had never once before in my going on 30-year career considered doing such a thing. I never fit in anywhere else where I could possibly get into such a position! PDCA was an agent of change for my whole outlook on my chosen profession!

How fortuitous was it that two of the first members I remember meeting were Van Hogan and John Linscott? I was able to talk to both these men about the state of the industry through our collective eyes. I remember being able to talk about so many things that you just wouldn't talk about with your local competition. I found out that there were people who thought about things the way that I did. They were facing the same situations in their businesses as I was. As time went on, I met more and more people, and found the same

attributes in them as I did with Van and John. In short, I was in the company of my peers. Under these circumstances, one can't help but want to make a contribution in return.

I started attending as many PDCA functions as I could reasonably make. I have been to two or three DICEP Conferences, the IFCEE joint conference, the PDPI, the Geo-Coalition conference, and two Executive Committee retreats, not to mention going to the Annual Conference every year. As time went on I grew more and more comfortable with my surroundings. These changes were slowly but surely affecting my whole outlook!

So, tying this all together, what do I see in the PDCA's future? In my mind, three things stand out as necessary to the continued success of the PDCA, none of which will require wholesale change. We must continue to support all of our standing committees. Through all these committees the real work of our organization gets done. Second, we must continue to especially support our Membership Development and Retention Committee in generating new members. Without you, the members, we of the PDCA are literally nothing. Our continued strength lies in increasing the membership numbers. Lastly, safety has been a steadily increasing concern for all contractors and suppliers over many years. At the last Executive Committee meeting, it was decided that the Safety Committee must become a more important and vital part of our fabric. At this time the Board of Directors has been recruited to oversee the start of a new and improved Safety Committee. Their first step is to determine what involvement PDCA takes. This is fraught with liability concerns that need to be taken into account. The first step taken for this committee is to investigate whether to make up an "IIPP" or Injury and Illness Prevention Plan that could be used by any member. Don Dolly of Foundation Constructors has given us a copy of theirs that they use in California. As of now, this could be seen as the logical replacement to the AHA, JSA, Health and Safety plan, or whatever job specific safety document that you live by. That is not so bad, is it? Of course there are many other things we could do as well. We will look for input on our course from anyone who is interested.

Lastly, I would be remiss if I didn't thank Don Dolly for his service over the last year as your President. I can only hope to be as effective in steering and coordinating the operations of the PDCA. He kept the meetings focused and under control, all the while bringing his extensive knowledge and expertise to bear in keeping the PDCA on the straight and narrow. I would also like to thank the Officers, Board of Directors, and our Executive Director Steve Hall for their service to the organization. The travel is heavy, and the hours long. Without all of you, we would not be who we are, namely, the agents of beneficial change to our industry. ▼



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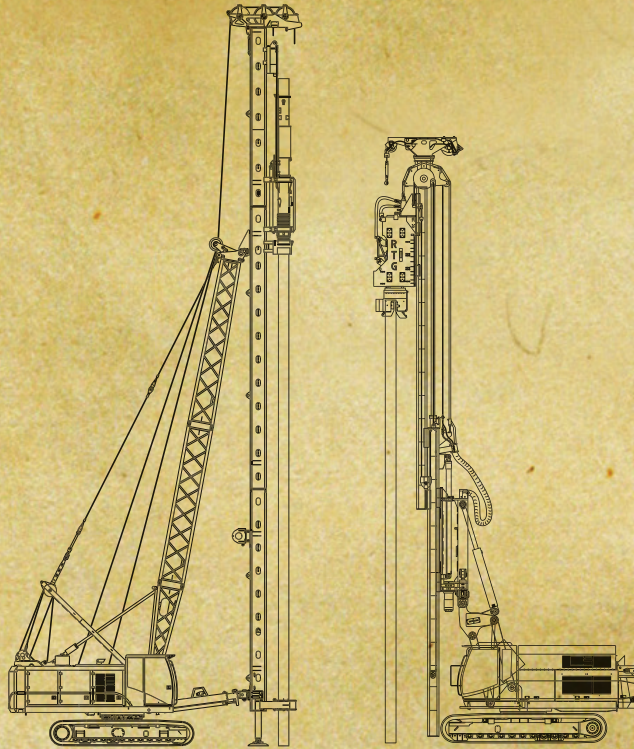
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Great Leaders of The Past

The Pile Driving Contractors Association has benefitted by great leaders in the past, who have helped the Association define the value and significance of the driven pile industry.

By Don Dolly

The current barometer of commerce appears to be reading black as opposed to red – hurrah! Through continued effort by your association, the driven pile industry has achieved many successes during these dire economic times. And, the payoff seems to be at hand in projects from coast to coast. Over the last year the value of driven pile has been revealed time and again as value engineering compares capacity to cost ratios – and our industry has surged forward.

The Pile Driving Contractors Association has benefitted by great leaders in the past, who have helped the Association define the value and significance of the driven pile industry. As I close out my term as President, my hope is that I have not diminished the high standard of office set by great leaders before me. The path forward of PDCA is set to be paved by another series of capable stewards. At the 2011 PDCA Annual Conference in Savannah, Georgia it was my great pleasure to introduce the next PDCA President, Mr. Buck Darling, hailing from Williamsville (outside Buffalo), New York. Mr. Darling's extensive empirical pile driving experience is augmented by the generational experience of the family business, Herbert F. Darling, Inc.

Buck and I have worked together for the past several years on the Board of Directors and various committees with the PDCA and I have found him to be of exemplary character and integrity. He has worked diligently to promote the driven pile industry through his many positions with PDCA as well as in his daily business. I am confident that the leadership of Mr. Darling will provide many opportunities for our association to advance our industry. Please make every effort to support Mr. Buck Darling as he leads our association and our industry to new highs in 2011 – 2012.

It was wonderful to see all of you at the 15th Annual International Conference and Expo 2011, at the Westin Savannah Harbor Golf Resort and Spa and the Savannah International Trade and Convention Center in Savannah, which by the way, must be the most gorgeous place on earth in April. The educational presentations were poignant in subject and excellent in content. The golf tournament was played on a truly championship course, and the companion program showcased the best of Savannah. Attendance was nearly record setting and the conference concluded with a savory dinner and dance on the last night. By all accounts



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it was a resounding success, and I look forward to next year! Please check out Piledrivers.org for upcoming events and the latest pile driving news.

I typically mention in my messages some topic I feel relevant to our industry and this message is no exception. Our place of residence, Earth, has endured some difficult times over the last few

years. We have weathered hurricanes, earthquakes, tsunamis, floods, landslides, oil spills, and nuclear meltdowns and on occasion it seemed they all happened at once. Those disasters really expose the magnificence of the human spirit as humanity pulls together from all over the world to overcome adversity. These difficulties make me wonder and reason the validity of our collective next step. What is our earthly strategic plan?

As our global society strives for the capacity to endure, the terms sustainable and sustainability have become indelible in the construction lexicon. However, the precise contemporary definition of sustainable or sustainability is not generally understood. My favorite high school drop-out, Albert Einstein, once said that *"Not everything that counts can be counted, and not everything that can be counted counts."* I often ponder that quote when concerning myself with global sustainability as the issue, when viewed as a whole, is so complex and intangible. Over the last four decades the meaning of sustainability has evolved into an all encompassing consideration and evaluation of the relationship between economy, society, and our environment. This contemplation of our world is intended to reckon a means to sustain mankind indefinitely. Certainly a meritorious goal, but what do we do today to achieve that end.

I believe that most construction professionals would hesitate to state that they possess a complete understanding of sustainability. However, a sign of significant progress toward an enduring society is that sustainability is now one of the primary goals of construction design. And, now primary goals are changing for contractors, construction managers, and supervision to include the issue of sustainability. Although sustainability in construction is not easily judged as compliant or successful, the fact that it has become a significant issue when considering a construction project is progress itself. The PDCA is keenly aware of the importance of sustainability and its effects on the global market in the years to come, and will continue to endeavor to make the driven pile industry part of the solution to create an enduring global society. ▼

“ It was wonderful to see all of you at the 15th Annual International Conference and Expo 2011. ”



PDCA 15th Annual International Conference and Expo 2011 Wrap-up

By all accounts, the PDCA has to consider this year's annual conference a resounding success.

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

The PDCA 15th Annual International Conference and Expo 2011 has concluded, PDCA has packed up and we are back in our Orange Park, Florida office ready for the next big event.

By all accounts, the PDCA has to consider this year's annual conference a resounding success. The conference was well attended; exhibitors showed up in force, the conference provided interesting and industry relevant presentations by some very dynamic speakers, social/networking activities were well supported, the Companion's Program provided all-day fun and excitement for the spouses/guests and Savannah was a gracious host.

I want to thank our Sponsors, which are listed separately on the following pages in this edition. Their generous financial support of the conference helped make everything we did possible for those attending. I also want to thank our exhibitors who provided the latest in industry technology, equipment, supplies and general services. This special group is also listed in this edition.

Herbert "Buck" Darling (Herbert F. Darling, Inc., Williamsville, NY) assumed the role of your association's President during the annual conference. I have had the privilege of knowing and working with Buck over the past several years, first as a Director and then as an Officer. Buck is a man of vision and integrity. He is focused, thoughtful, and well organized and I am sure his leadership qualities will serve the association and its members well as he leads the PDCA throughout his 12-month term.

I want to welcome Doug Keller (Richard Goettle, Inc.) and Eric Alberghini (Norwalk Marine Contractors, Inc.) as the newest Director members of the PDCA Board of Directors. The PDCA looks forward to working with these two gentlemen, as well as the existing leadership of the Executive Committee and Board.

PDCA wants to thank John King (Pile Drivers, Inc.), John Linscott (H.B. Fleming) and John Parker (Parker Marine) for their service on the Board. John King completed his Immediate Past President obligations this year after serving on the Board as a Director beginning in 2004, and then

as an Officer on the Executive Committee since 2007. John Linscott has served the PDCA faithfully as our Treasurer since 2008 and as a Board member since 2005. John Parker is retiring from the Board after completed his 3-year term as a Director, which began in 2008.

Don Dolly has relinquished the helm to Buck after serving as the association's President for the past 12 months. Don has done an outstanding job, providing solid leadership and guidance despite facing many challenges and new issues during his term. Don came into the PDCA as President in what could probably be considered the worst economic climate we have seen in many years. Despite this, he has maintained a positive attitude and always conveyed a positive message and image to the association and the industry he represented. I don't know if the PDCA could have had a more qualified and dynamic President to lead us during these trying times. I want to personally thank Don for his counsel. On many occasions, I received (solicited or not) encouraging and constructive advice that kept me centered and focused when I was listing. I know Don will continue to serve the Board in a vital role as Immediate Past President.

The PDCA has two more significant events coming up this year – the Professors' Driven Pile Institute and the Design and Installation of Cost-Efficient Piles Conference.

The Professors' Driven Pile Institute (PDPI) takes place on June 19-24, 2011. The PDCA will be back at Utah State University in Logan, UT with Joe Caliendo and his dedicated team to conduct one of the PDCA's most important programs – the PDPI. The PDCA has received an overwhelming response to this year's program from interested professors from all over the world. Twenty-five professors, teaching graduate and undergraduate courses in deep foundations, have applied to attend the program in June. All have been accepted and will receive formal notice in early May 2011. The PDPI is an extensive train-the-trainer program – or in this case – teach-the-teacher, focusing on Wave Mechanics, Pile Types, Special Design Considerations, LRFD, Axial and Lateral Static Load Testing, Design Parameter from Load Testing, Pile Driving Equipment, Wave Equation Modeling

EXECUTIVE DIRECTOR'S MESSAGE

and Applications, Driven vs. Drilled – Deep Foundations, Dynamic Measurements, CAPWAP Background and Examples, and Economics of Driven Pile Foundations: Soil/Pile Set-Up and Support Cost Components. The program includes classroom lectures, computer lab software training and data analysis, and field demonstrations. Field demonstrations will include a pile driving demonstration by Build, Inc. (Salt Lake City, UT), static and dynamic load tests, SPT energy measurements and CPT demonstrations.

Thanks to Build, Inc. for the pile driving demonstration, Load Test fabrication and set up, Goble PileTest for real-time pile driving measurements, Pile Dynamics for dynamic load testing, S&ME for load test supervision, Campbell Scientific for data collection, Conetec for the CPT demonstration, and Jay Apedaile Drilling for soil sampling and SPT measurements.

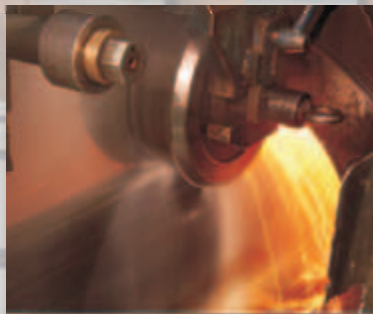
The PDCA wants to thank all of our members who have generously supported the PDPI. Your contributions support a program that will continue to have a long-lasting impact on professors and you are helping promote a better understanding of driven piles to engineering students.

The Design and Installation of Cost-Efficient Piles Conference will be held in Orlando, FL on Thursday, November 3. The PDCA (National) will conduct the program in cooperation with the PDCA of Florida Chapter. This one-day, engineering focused program will consist of approximately eight general session presentations and a

limited exhibitor show. The PDCA is seeking presentations for the conference, which initially consist of submitting a presentation title, paragraph summary of the presentation and, upon acceptance, a PowerPoint of your presentation. If you are interested in submitting a topic for consideration, please contact the PDCA office at 888-311-PDCA (7322) for more information.

Finally, I want to thank all the companies who continue to support the PDCA. The PDCA continues to work on your behalf, advancing opportunities for your business and your industry. Such an example was provided by Dale Biggers (Boh Bros, New Orleans, LA) during a PDCA Technical Committee meeting. Dale has been appointed to a committee task with revising the LADOT design and installation specifications for driven pile. Dale indicated the process would be much more difficult if not for the revisions the PDCA had approved and adopted (through the work of the Technical Committee) by AASHTO on design and installation of driven pile. As a result of the work accomplished by the PDCA, not only do you have a better, more advantageous design and installation spec for Federal DOT, but the work is now being adopted by state DOT's as well. These efforts depend on a strong association and your membership helps us accomplish our mission. If you have not renewed your PDCA membership in 2011, please do so now. If you are not a member of the PDCA, join us and help us promote and advance your industry. ▼

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In Memoriam



**Juri Jalajas April 23, 1938 –
January 18, 2011**

Juri Jalajas, 72, entered eternal peace on Tuesday, Jan. 18, 2011. A refugee from Estonia during World War II, he and his mother emigrated to the U.S. and settled in Summit, NJ.

Mr. Jalajas graduated Summit High School in 1956, and the Newark College of Engineering in 1960. His career in

civil engineering brought countless contributions to the general infrastructure of the tri-state area and California. He built his expertise while working for the Schiavone Construction Corporation and the Mergentime Corporation, both in New Jersey.

His most noteworthy work was with the Verrazano-Narrows Bridge, at one time the largest suspension bridge in the world. He was meticulous with his designs, showed great knowledge in his specialties (cofferdams and soil technologies), and as such was very valuable to his engineering community.

Juri Jalajas loved the beach and boating, and was a regular member of his local Coast Guard Power Squadrons throughout the years. He also had a passion for Latin music, jazz, and the blues. Combining all of these together, Juri Jalajas' desire was to retire on a yacht in Mexico, but this would always remain just a dream.

He spent much of the 1990s and 2000s caring for his mother, Leida Eelsaare, at her longtime residence in Summit, NJ. Finally, in 2007, a decision was made to move themselves to Virginia Beach.

Juri Jalajas is survived by son Peter Jalajas of San Marcos, CA; daughter Tina Chason of Cary, NC; and their mother Sigrid Jalajas of Cary, NC. Peter and Tina cherish the good times spent with Dad, as they were instrumental in nurturing the amazing families they have today.

Mr. Jalajas' ashes will be scattered at sea, off the coast of North Carolina, on June 24. With fair winds and following seas, his sails are now set for the sky. To pass along your personal stories of Juri Jalajas, contact Peter at petenkim02@aol.com.



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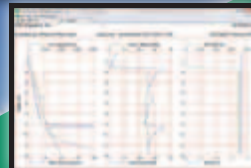
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MEMBERSHIP BENEFITS

General Membership Information

We are the premier association for pile-driving contractors

The PDCA was founded in 1995 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 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 have 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.

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



“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.



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 website 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. ▼



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.
- Engineering Affiliate** – Any Engineering company, firm, corporation, or individual (Structural, Geotechnical, Civil, etc) involved in the design, consulting, testing or other engineering aspect associated with driven piles, deep foundations or earth retention systems.
 - Engineering Affiliate – 1-5 offices (\$100 per office)
Listing up to 5 Individuals per office at no additional charge
 - Engineering Affiliate – 6-11 offices (\$90.00 per office)
Listing up to 5 Individuals per office at no additional charge
 - Engineering Affiliate – 12+ offices (\$80.00 per office)
Listing up to 5 Individuals per office at no additional charge
- Technical Affiliate** – Any individual employed full-time by a university or college and teaching Undergraduate or Graduate courses in engineering; or an individual employed full-time by the US Government.
 - Individual teaching Undergraduate or Graduate Courses (\$100.00)
 - Government Employee (\$100.00)
- Individual Member** – (\$50.00)
An individual employed full-time by a university or college and teaching Undergraduate or Graduate courses in engineering; or an individual employed full-time by the government. This is a non-voting membership category.
- Retired Industry Member** – (\$50.00)
Individual who has reached retirement age, left active employment, and wishes to remain a member. This is a non-voting membership category.
- Student Member** – (\$20.00)
Full time students studying towards a bachelor, master or doctorate degree in a regular university program. This is a non-voting membership category.
- Affiliate Labor Organization Member** – (\$100.00)
Concerned with pile driving for the purpose of gathering and sharing information. This is a non-voting membership category. Must be approved by the PDCA Executive Committee.

Step 3: 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 and Engineering Affiliates Members – check all products and/or 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 Splicer's |
| <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"/> Other |
| <input type="checkbox"/> Safety Equipment | | |

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"/> Other |
| <input type="checkbox"/> Synthetic Material Piles | <input type="checkbox"/> Timber Piles/Treated Lumber | |

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"/> Other |
| <input type="checkbox"/> Materials Testing | <input type="checkbox"/> Pile Driving Monitoring | |

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"/> Mexico |
| <input type="checkbox"/> Europe | <input type="checkbox"/> Germany | <input type="checkbox"/> Other | | | | | | |

Step 5: Method of Payment

I am providing payment in the amount of: _____

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

Card Number: _____ Expiration Date: _____

Name on Card: _____ CVV Code: _____

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PZC 41	41.8 204.1	803.6 109,700	76.1 4,090

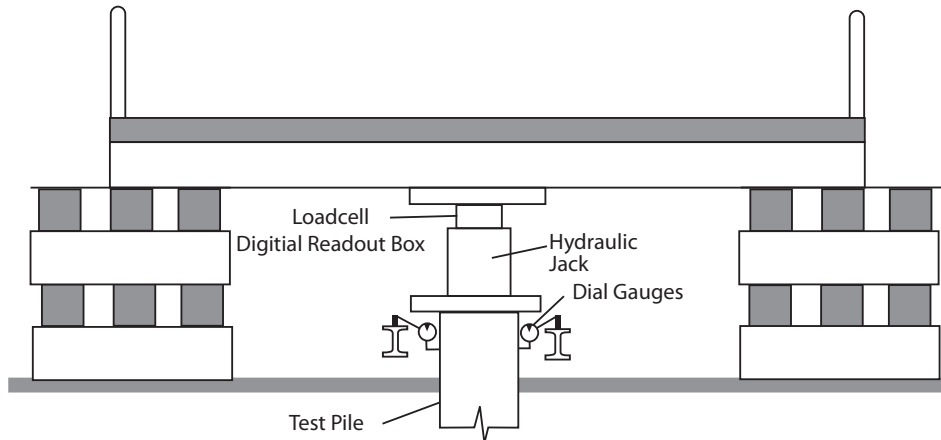
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Subpart CC – Cranes and Derricks in Construction: Qualified Rigger

This fact sheet describes the qualified rigger requirements of subpart CC – Cranes and Derricks in Construction, as specified in 29 CFR 1926.1401, 1926.1404, and 1926.1425. These provisions are effective November 8, 2010.

When is a qualified rigger required?

Employers must use *qualified riggers* during hoisting activities for assembly and disassembly work (1926.1404(r)(1)). Additionally, *qualified riggers* are required whenever workers are within the fall zone and hooking, unhooking, or guiding a load, or doing the initial connection of a load to a component or structure (1926.1425(c)).

Who can be a qualified rigger?

A *qualified rigger* is a rigger who meets the criteria for a qualified person. Employers must determine whether a person is qualified to perform specific rigging tasks. Each *qualified rigger* may have different credentials or experience. A *qualified rigger* is a person that:

- possesses a recognized degree, certificate, or professional standing, or
- has extensive knowledge, training, and experience, and
- can successfully demonstrate the ability to solve problems related to rigging loads.

The person designated as the *qualified rigger* must have the ability to properly rig the load for a particular job. It does not mean that a rigger must be qualified to do every type of rigging job.

Each load that requires rigging has unique properties that can range from the simple to the complex. For example, a rigger may have extensive experience in rigging structural

components and other equipment to support specific construction activities. Such experience may have been gained over many years. However, this experience does not automatically qualify the rigger to rig unstable, unusually heavy, or eccentric loads that may require a tandem lift, multiple-lifts, or use of custom rigging equipment. In essence, employers must make sure the person can do the rigging work needed for the exact types of loads and lifts for a particular job with the equipment and rigging that will be used for that job.

Do qualified riggers have to be trained or certified by an accredited organization or assessed by a third party?

No. Riggers do not have to be certified by an accredited organization or assessed by a third party. Employers may choose to use a third party entity to assess the qualifications of the rigger candidate, but they are not required to do so.

Does a certified operator also meet the requirements of a qualified rigger?

A certified operator does not necessarily meet the requirements of a *qualified rigger*. Determining whether a person is a *qualified rigger* is based on the nature of the load, lift, and equipment used to hoist that load plus that person's knowledge and experience. A certified/qualified operator may meet the requirements of a *qualified rigger*, depending on the operator's knowledge and experience with rigging.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For more complete information:



U.S. Department of Labor

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OSHA[®] FactSheet

Subpart CC – Cranes and Derricks in Construction: Signal Person Qualification

This fact sheet describes the signal person qualification requirements of subpart CC – Cranes and Derricks in Construction, as specified in 29 CFR 1926.1419 and 1926.1428. Other requirements related to signal persons can be found at 29 CFR 1926.1404, 1926.1430, 1926.1431, and 1926.1441. These provisions are effective November 8, 2010.

When is a signal person required?

A signal person is required when:

- The point of operation is not in full view of the operator (1926.1419(a)).
- The operator's view is obstructed in the direction the equipment is traveling.
- Either the operator or the person handling the load determines that a signal person is needed because of site-specific safety concerns.

What does a signal person need to know?

The signal person is considered qualified if he or she:

- Knows and understands the type of signals used at the worksite.
- Is competent in using these signals.
- Understands the operations and limitations of the equipment, including the crane dynamics involved in swinging, raising, lowering and stopping loads and in boom deflection from hoisting loads.
- Knows and understands the relevant signal person qualification requirements specified in subpart CC (1926.1419-1926.1422; 1926.1428).
- Passes an oral or written test and a practical test.

How does a signal person become qualified?

Employers must use one of the following options to ensure that a signal person is qualified (see 1926.1428).

1. *Third party qualified evaluator.* The signal person has documentation from a third party qualified evaluator showing that he or she meets the qualification requirements.
2. *Employer's qualified evaluator* (not a third party). The *employer's qualified evaluator* assesses the individual, determines the individual meets the qualification requirements, and provides documentation of that determination. This assessment may not be relied on by other employers.

Refer to 1926.1401 for definitions of qualified evaluators.

How will an employer show that a signal person is appropriately qualified?

Employers must make the documentation of the signal person's qualifications available at the worksite, either in paper form or electronically. The documentation must specify each type of signaling (e.g., hand signals, radio signals, etc.) for which the signal person is qualified under the requirements of the standard.

When are signal persons required to be qualified?

The qualification requirements for signal persons go into effect on November 8, 2010.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

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Sponsored by the Geo-Institute, the ASCE will be publishing a Geotechnical Special Publication (GSP) volume titled “*Foundation Engineering in the Face of Uncertainty*” (subtitled “*Site Heterogeneity, Property Variability, Risk, and Reliability-Based Design*”), honoring Professor Fred H. Kulhawy, Ph.D., P.E., G.E., D.GE, Dist. M.ASCE. Mohamad Hussein, Kok-Kwang Phoon, and James Withiam will serve as editors.



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Abstracts for proposed papers dealing with topics related to the main theme are being sought for consideration. Possible topics include:

- Geologic modeling for ground characterization
- Spatial variability (natural ground, modified ground)
- Test measurement errors (laboratory/field)
- Transformation uncertainties pertaining to design properties
- Soil/rock property statistics (distributions, correlations)
- Model/bias factors in design equations
- Probabilistic/reliability methods
- Random finite element methods
- Limit state design (ultimate, serviceability, economic, etc.)
- Reliability-based design (RBD)
- Simplified RBD (partial factor design, LRF, MRFD, etc.)
- Bayesian updating (from quality control, load tests, monitoring, etc.)
- Risk assessment and management
- User-friendly design/analysis tools
- Role of field measurements and testing in improving reliability
- Case histories

Deadline for a maximum 300-word abstract is July 31, 2011. Finished manuscripts are expected in July 2012. The GSP will be released at a specialty symposium during the G-I's 2013 annual meeting. All papers will be subjected to the standard ASCE technical papers review process. E-mail your abstract to Mohamad H. Hussein at: MHussein@pile.com. ▼



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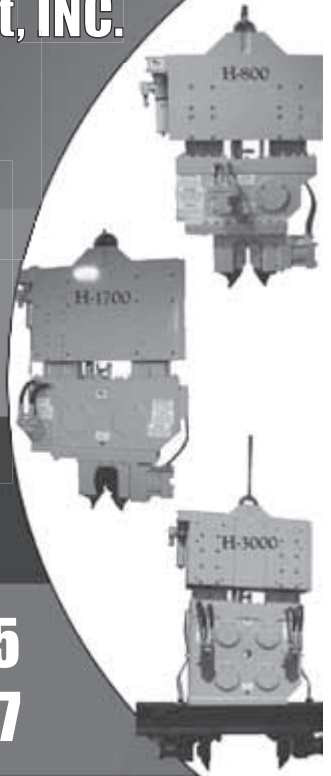
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Early jobs included building timber docks that served Puget Sound's Mosquito Fleet of steam passenger boats, along with fish traps and bulkheads. The company then grew into providing ferry landings, small bridges, and foundations. In time, it became clear that larger equipment was needed for new steel and concrete structures. Part of Peter Manson's innovation and imagination included expanding the

size and number of his floating equipment fleet.

As the fleet expanded, Manson reached out from Seattle to find work in Alaska, Oregon, California, and other locations worldwide. Today, branch offices in California, Louisiana, and Florida manage much of the work that keeps Manson active on all three coasts and at the forefront of the marine construction and dredging industries.

Being at the forefront of these industries, however, is not enough for the company's leadership: Manson is a company that wants to be at the forefront of safety. Manson values people above all else. Each new employee is introduced to Manson's guiding principles during a standard new hire orientation, and he or she is expected to work and to lead by these principles:

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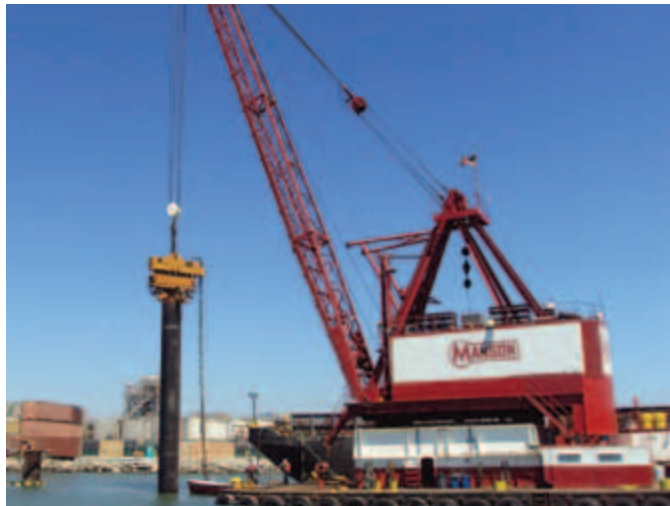
We take care of our equipment.

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Photos courtesy of Manson Construction Co.



GIWW Crew



Derrick Barge Hagar Installing Monopile 48-inch

We Take Care of People

For Manson, taking care of people starts with safety. Manson uses its Incident and Injury Free (IIF) Culture as a means to ensure a safe, healthy and environmentally sound workplace. To be Incident and Injury Free is to develop a people-based culture that encourages and empowers everyone, from the apprentice to executive leadership, to champion safety for ourselves and for the people around us.

Safe production, not safety and production, is Manson's motto. Safe production means that our employees instinctively incorporate safety from the pre-bid process right down through the implementation of our work plans. It means our employees are not just empowered but rather they are compelled to speak up when they see an unsafe or unhealthy work practice or condition. It means that we will protect the environment during the execution of our work plans. It means that our employees, subcontractors and worksite visitors will return home to their families each night absent a workplace injury or illness.

While there is always room for improvement, Manson's leadership is proud of the company's focus on safety. Manson's clients have noticed it, too. Our safety program was praised in a recent letter of appreciation from the New Orleans District Corps of Engineers District Commander.

We Take Care of Our Equipment

Manson's heavy marine equipment fleet has come a long way during the last century. What began with one small steam-powered pile driving rig has developed into one of the largest and most modern fleets in the nation. The Manson fleet boasts 30 derrick and spud barges, 8 dredges, more than 50 material barges, and over 30 tug and assist boats. For Manson, maintaining its equipment is equivalent to maintaining worker safety, project schedules, the environment, and the company's competitive edge in the industry.

Manson continually invests in its fleet to make certain that it is in top mechanical condition and meets even the most stringent air quality requirements. Diesel powered equipment is constantly updated to stay ahead of emission standards for marine vessels. This vigorous maintenance program protects against mechanical downtime to help keep projects on schedule.

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Derrick Barge Valkyrie at POLA Berth

In addition to maintaining existing equipment, Manson has been custom building new equipment, such as the recently christened derrick barge E.P. Paup. This 380' long derrick barge has an American MG 509 crane. The boom measures 265' and is rated at a capacity of 1,000 tons over the stern and 900 tons fully revolving.

We Do Quality Work

By taking care of the company's key assets—its people and its equipment—Manson has positioned itself to tackle the most complex and challenging marine projects.

One of Manson's most notable projects was the construction of the Skyway segment of the San Francisco to Oakland Bay Bridge. Manson was part of the joint venture that completed this massive contract for the California Department of Transportation. Our derrick barges and our crew members performed work on the foundation work for the bridge. A total of 28 foundation piers support the superstructure. Each foundation is supported by four or six steel pipe piles battered at 1:8 that are 96 inches in diameter and up to 360' long. The piles were driven in two sections with a 350-ton hydraulic impact hammer, rated at 1.7 million foot pounds of energy.

More recently, Manson collaborated on the construction of the Inner Harbor Navigation Canal (IHNC) surge barrier in Louisiana. When complete, this floodwall, which measures several miles in length, will reduce the risk of storm damage to some of the region's most vulnerable areas, including New Orleans East, metro New Orleans, the 9th Ward, and St. Bernard Parish. Manson has been involved with two major contracts on this project: the GIWW Bypass Gate and the Bayou Bienvenue Gate. Each of these contracts involved extremely demanding pile driving requirements.

One of the major pile driving challenges was on the Bayou Bienvenue project, which required the underwater installation of two hundred concrete piles, each measuring 24" square and 135' in length. These piles were driven in a cofferdam footprint only 136' long by 76' wide. The piles were a combination of plumb piles and piles battered in opposite directions. The distance between each adjacent pile outside face was approximately 2'. The design tolerances for the pile installations were +/- 6" in elevation and +/- 3" from center line. The battered pile tolerance was not more than 1/8" per foot of longitudinal axis. These tight constraints and stringent tolerances left little room for error and emphasized the need to pick a common point in the xyz frame to measure the exact top of each pile.

One of Manson's largest ongoing pile driving contracts is the \$100 million TransPacific Terminal Expansion project at the Port of Los Angeles. This container wharf project is the first major development at the Port of Los Angeles in over five years. The work will modernize and expand TransPacific's 7,642,440 square-foot container terminal, adding 2,906,280 square feet of additional capacity, including a 3,700' pile-supported wharf.

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- Tensile Properties
- Charpy Impact Testing


In the USA, each piece of piling Atlas manufactures is bar coded and has an original Mill Test Report (MTR) from the producing mill. All mill MTR's are backed by coil certificate from our suppliers which are reviewed before the coils are shipped to our plants. This procedure ensures that the product meets the highest quality requirements. Look at the mill stencil and heat number on a pipe or the MTR and you will have probably seen JMC – Atlas Tube piling on your project. Atlas has your back covered with our ISO quality procedures (ISO 9001:2008 certified).

In addition to the MTR documentation, Atlas provides fabrication services. We can bevel the ends and attach driving shoes in order to deliver the product to you in a cost effective manner and save on site labor. Many names have been given to the applications of our products by our customers: pipe piles, driven piles, drilled shafts, caissons, mini caissons, micro piles, piers, and casings. Call it what you want, we have the strength to deliver.

Manufacturing Philosophy – Customer Focused

The culture in every JMC plant is built on safety first. In addition, our ERW manufacturing process delivers superior quality and speed that is unmatched by our competitors. Our mill operators have the experience and "know how" to deliver your project on time. "Our mentality is that we will do whatever it takes to meet a customer's delivery deadline. Our sales and operations team takes full advantage of our four week cycle times and "drop-in" rolling process to meet any piling project delivery schedule given to us." "Pipe piling projects ...nothing's too big for us to handle!" "Bring it on, we love it!" says Nick Shubat, General Manager - Operations.

Atlas' facilities operate two shifts daily, which allows us to produce up to 2000 tons of prime product, per day, that is ready to ship immediately. In addition, we produce our sizes every 4

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weeks. For our customers, this translates into a product that is consistently high in quality, readily available, delivered to your project site and sold at an economical price.

For larger projects, Atlas offers special drop-in rollings, due to our flexible rolling schedule and manufacturing efficiencies. When a quick turnaround is required Atlas can receive QC slit coils, and roll finished material off the mill, and within a week have product ready to load on to truck, rail, or barge.

Our specialized piling sales team is personally available to assist you with all your piling requirements. In addition to our sales team, Atlas has a strong web presence. Our easy to navigate website, www.atlastube.com, allows you the ability to check inventory, view rolling schedules, see available tons in upcoming rollings, and place orders online.

The customer's needs and requirements are the team's focus until the last pile ships.

Facilities**Plant profile:** Harrow, ON Canada**Size range:** 16 NPS maximum**Wall thickness:** .688 maximum
nominal wall**Lengths:** 85 ft maximum

Harrow's rolling schedule has some sizes cycling more than once per month. In Harrow, we can set up the mill and roll production weekly to meet the more demanding project. Value added services are in house and all welding is done by CWS welders. Material is shipped in two piece bundles.

Plant profile: Chicago, IL USA**Size range:** 20 NPS maximum**Wall thickness:** .625 maximum
nominal wall**Lengths:** 105 ft maximum

Chicago has the ability to run multiple projects back to back with storage available in our pipe yard. Rolling cycles are based on a 4 to 8 week cycle with drop in capacity. The 16, 18, and 20 NPS sizes are a big plus for our Chicago works plant. Having domestic MM USA coils in stock, positions this location as a partner for those who need on time delivery with large quantities of pipe piles needed in a rather short period of time on time.

JMC Steel Group

The JMC Steel Group is a privately owned company with an 80+ year history of making pipe and tube products. Since the founding of the company in 1877, when John Maneely first began selling pipe, valves and fittings in Philadelphia, our products—Hollow Structural Sections (HSS), pipe, electrical conduit and fittings—have been used in some of the best known structures in North America, because our pipe and tube solutions deliver superior quality and value that have earned the trust of customers who demand the very best.

Today, we are the largest independent pipe and tube manufacturer in North America, producing 2 million tons of pipe and tube annually in our 11 manufacturing plants. In addition, we have the financial strength to continuously improve facilities in our three divisions: Atlas Tube, Wheatland Tube, and Picoma, where the latest technology and processes come together. Our investments in facilities, systems and people give us the strength to deliver, both in robust markets and in these ever changing times. Simply put – You can count on JMC Steel Group to be there for you. ▼

Photos courtesy of JMC Steel Group





JD Fields & Company, Inc.

Technically speaking: new leadership, new services and new opportunities, still in the traditional pipeline at JD Fields & Company, Inc.

By Pat Burk

Established in 1985, JD Fields & Company, Inc. is an American family owned and operated steel distribution company whose rich history has established a tradition of service driven excellence. The company's founder and presiding Chairman and CEO, Jerry D. Fields, began his career in the steel industry nearly 45 years ago with L.B. Foster Company. Jerry served in a variety of sales management positions, ultimately ran their Tubular Products Division before founding JD Fields & Company, Inc. with three partners. A lot has happened since that modest beginning in 1985. Today, the company has grown to become a recognized leader in the supply of steel products, earning numerous awards and recognition as one of Houston's "Top 100 Private Companies".

With Jerry Fields still at the helm, JD Fields is now a multi-generational company. President Jay D. Fields and Executive Vice President Pat Burk began their transitions into corporate leadership nearly a decade ago, and although this natural transition brings new leadership, direction and opportunities moving forward, a familiar theme remains within the JD Fields culture: "Stay agile to quickly adjust to each market opportunity, while remaining lean enough to deliver customer-focused, service-driven excellence." It is occasionally true that a distribution company can be built to generate revenue and market share with superior prod-

ucts, but sustained success must be earned everyday through dependable service and customer satisfaction.

Headquartered in Houston, TX, JD Fields has a total of 11 domestic offices, with stocking yards across the country, including their new state of the art 40 acre facility near the Port of Houston. JD Fields has represented some of the most recognized USA mills, and on several occasions has been an exclusive representative for various products. Established as a household name in the line pipe industry, the pipe division has historically represented the lion's share of the company's business. However, the company's diverse structure employs a unique combination of Tubular & Piling inventories and personnel. JD Fields brings decades of experience to each relationship, project and transaction. Through the years the industry has seen much change, but JD Fields has remained true to its original business model with two international business units; sourcing construction products for deep foundation/piling applications, and providing API line pipe and accessories to oil and gas markets.

Today, JD Fields remains a global buyer and supplier of a diverse variety of steel products, maintaining long term relationships with numerous pipe mills in the U.S. and all over the world. They carry revolving inventories up to 100,000 tons of bare steel and coated API line pipe in a broad range

MEMBER PROFILE - ASSOCIATE

of sizes and material grades, enabling JD Fields to consistently stay among the primary material sources to energy companies, contractors and suppliers who demand service excellence, premier products and straight shooting.

The Construction Products Group carries its own inventories, with stocking locations throughout the country which support sales and rentals and a wide range of new and used steel products. The core products of the Construction Products Division have traditionally been H-Pile, Pipe Pile and various types of steel sheet pile. Similar to the line pipe side of the business, Construction Products has domestic and international mill relationships that date back more than 25 years. From original international partners such as Corus/British Steel and Hoesch, to Nucor Yamato, and other domestic mills, JD Fields has been a reliable source for sheet pile, pipe pile, h-pile, combined wall systems, structurals, and other special steel sections. Today, JD Fields has eleven offices and eight stocking locations strategically located throughout the US to serve the piling and geotechnical markets for North America, Puerto Rico, Panama, and the greater Caribbean.

The piling landscape is once again changing and customers are realizing that they have more than a couple of choices. There have been several key domestic mills built in the past several years; however, of the hot rolled sheet pile shapes available, only three mills have been actively marketed in the states, two of which produce domestically. As the contractors and industry leaders work through the slow economy and market volatility-product viability, customer service and technical performance advantages will

become more important than ever. The company has recently made some key personnel additions to further enhance the services available to their ever-growing customer base. JD Fields' new Technical Sales

Division is poised to make great strides in assisting engineers and contractors find commercially sensible and technically superior alternatives to designs that haven't been challenged for quite some time. These new services and products, along with their well established, "can-do" sales force will lead the company's Construction Products Group into the next era and should create the same type market presence that their Line Pipe Division has earned through the years.

JD Fields has recently entered into an exclusive agreement with ThyssenKrupp GfT Bautechnik, the sales and marketing arm for the Hoesch Sheet Pile and Peine Beam mills. Holder of the original hot rolled sheet pile patent, Hoesch is considered to be a pioneer in the industry and the next evolution in hot rolled sheet pile has begun.

Literally, hot off the mill cooling bed are the newly designed Hoesch 2607 & 1807 Z sections. JD Fields is the source for this latest evolution in hot rolled sheet pile technology. In addition to their domestic blend of piling products, JD Fields now brings one of the broadest material offerings in sheet pile systems and high modulus wall solutions to the North and South American piling markets.

Setting the new piling standard, these new sections are part of a wider, lighter, stronger sheet pile series. With a 700 mm width, the strength-to-weight properties push the structural envelope, providing a delicate balance between bending strength, and section weight. Their deep section height increases pile stability and resistance to deflection. In addition, the new Z sections are designed with an improved Larssen double hook connection for a stronger transition between the flange and interlock. This allows the section to take greater tensile forces to resist declutching, while still providing a sufficient swing angle.

This material partnership is a long term commitment to offering an extensive range of innovative piling products and services to North and South American mar-



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kets. ThyssenKrupp GfT Bautechnik and their mill families bring a century of steel piling and geotechnical technology. JD Fields has in-depth market knowledge, nationwide facilities, and an experienced sales team. Driven to make these innovative materials and technical resources available to design and construction professionals, JD Fields is setting a new standard in pile technology. "As most in the piling industry know, we were exclusive with British Steel/Corus for years before their mill was sold and subsequently closed. For the last five years we have been patiently looking for the right opportunity to align our services with another premier sheet pile manufacturer. Fortunately, during that same period, ThyssenKrupp/Hoesch was making serious investments in their future and looking for the right fit for their re-vamped products in North America. They haven't had a significant U.S. presence for quite some time, yet their quality products are well known and often preferred throughout the industry. The timing is right and there is no finer structural mill group in the world to service a marketplace that is much overdue for innovative alternatives to the sections and systems that have dominated the hot rolled piling industry for the past decade.

"We are very pleased to be moving forward with a complete product line of steel pipe and piling, representing world class domestic and foreign manufacturers." – Pat Burk

Since 1985, JD Fields & Company, Inc. has stayed its course by only selling the finest products, employing the best in the industry and always being prepared to adapt to the ever-changing steel marketplace.

JD Fields is the exclusive distributor of ThyssenKrupp GfT Bautechnik and related geotechnical products. To learn more about our complete products and services, please visit us at www.jdfields.com ▼

Photos courtesy of Pat Burk

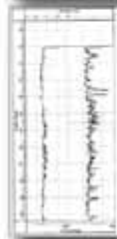
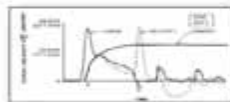


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Unit photo courtesy of PDJ



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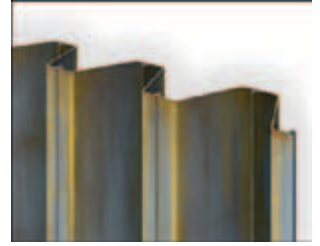


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L.B. Foster supplied steel sheet piling for use in the Panama Canal Expansion Project and for the Port of Miami (below).

L.B. Foster Company

A leading supplier of steel pile to the construction industry for over 85 years

By Jake Fuellhart

L.B. Foster Piling has been a leading supplier of steel pile to the construction industry for over 85 years. Our professional team works closely with customers to provide quality service from initial planning through project completion. L.B. Foster's long experience in the production and application of piling extends to today's current line of innovative sheet piling sections. We maintain a wide range of sheet, pipe and structural piling and accessories for sale or rent at convenient regional stocking locations throughout North America.

L.B. Foster has the experience needed to manage critical project requirements and timely delivery schedules. Our company has provided logistics management for many major contracts including the shipment of approximately 17,000 tons of steel sheet piling for use in the Panama Canal Expansion Project. The sheet piling traveled by rail, ship and truck from manufacturing plants in the US to a staging area in Panama. The successful logistics required to move steel piling from Virginia and Texas to the construction site demonstrated the best efforts of the professionals at L.B. Foster and Gerdau Ameristeel.

The team provided extraordinary logistics management to assure on time shipments by 161 rail cars, four oceangoing vessels and 880 truckloads of construction material to Central America. L.B. Foster personnel were also onsite at the staging area adjacent to the Pedro Miguel Locks to supervise the managed lay-down of the material to expedite later access. Additional special logistical considerations included customs approval and environmental concerns with regard to stacking timbers.

Other critical projects required similar attention. The Piling group at L.B. Foster created a dedicated yard in New Orleans to maintain adequate amounts of steel piling for use in the United States Army Corps of Engineers (USACE) rehabilitation of the Louisiana levee system. Piling staff also worked with the USACE to implement an active inventory control program that efficiently monitors stocking levels and manages material deliveries.

L.B. Foster is dedicated to providing customers with more than just construction materials. Our company also stands ready with innovative construction solutions for difficult piling needs. We work with PND Engineers, Inc. to offer material for their patented OPEN CELL SHEET PILE® system for high load, deep water and critical soil applications.



OPEN CELL® bulkheads are an innovative technology for use primarily as docks and marine structures. These unique bulkheads simplify construction processes, reduce construction schedules and eliminate labor intensive tie-backs. OPEN CELL structures are flexible steel sheet pile membranes supported by soil contact with embedded sheet pile tail anchor walls. The system delivers proven performance for ideal and extreme conditions.

L.B. Foster can also provide all the materials necessary for the construction of Combi-Wall systems. These efficient piling structures are comprised of two main sections: steel sheet pile and a king pile. Combi-Walls are an efficient way to achieve high section modulus for those structures which require strength exceeding that available from traditional sheet pile sections. The use of king piles, typically wide flange, pipe pile or peiner beams, in conjunction with steel pile and extruded connectors, produces an efficient, cost-effective system.

Innovative PZC™ sheet piling is also available nationwide and internationally from our company. This unique steel piling is domestically produced by Gerdau Ameristeel and delivered by L.B. Foster. We work closely with our strategic partner to provide the cost savings of innovative PZC sheet piling to commercial customers and government agencies.

PZC sheets are manufactured to be wider, lighter and stronger than traditional Z piling. Their unique design maximizes production, minimizes the amount of required steel and increases strength per pound. Wider PZC piles maximize jobsite production in setting and driving sheets. Lighter PZC sheet piles minimize the amount of steel needed for project installation. Stronger PZC sheets strengthen section modulus and moment of inertia. The positioning of interlocks at the outer fibers of the wall also assures piling's published section modulus.

L.B. Foster has now introduced the strongest domestically produced, hot-rolled sheet piling sections available. New PZC 37, PZC 39 and PZC 41 are designed and manufactured by Gerdau Ameristeel to meet the highest load requirements. These innovative pile sections feature the Gerdau Sheet Piling ball-and-socket interlock that allows easy, flexible setting and more durability through driving.

Gerdau Ameristeel PZC, PS, Wide Flange and H- Pile meet all requirements of the Buy America and Buy American Acts. Materials fully melted and manufactured in US.

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Photos courtesy of Jake Fuellhart

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The West Toronto Diamond Rail Grade Separation

By Michael D. Justason, P.Eng., MBA, and Dawn C. Tattle, P.Eng.

In January 2009, long-time competitors Anchor Shoring & Caissons Ltd. of Toronto, and Bermingham Foundation Solutions of Hamilton, joined forces to tackle one of the Greater Toronto Area's largest deep foundation projects, the West Toronto Diamond Rail Grade Separation. The two companies formed the "West Diamond JV" and were successful in obtaining this contract from the Canadian National Railways for the project. This deep foundations contract formed the first and most significant part of the \$277-million grade separation project.

The site is situated in an area of mixed-zoning including light industrial, commercial, and residential buildings. The neighbourhood is commonly referred to as 'The Junction', so-named because of the heavy rail-traffic. The neighbourhood is located approximately 10-km (6-miles) to the North-West of downtown Toronto.

The West Toronto Diamond is a railway junction where the North-South tracks of Canadian National Railway meet at a level crossing with the East-West tracks of the Canadian Pacific Railway. The goal of the project is to convert the West Toronto Diamond into a grade-separated junction by depressing the CN lines under the CP lines, thus allowing commuter rail carrier GO Transit, intercity carrier VIA Rail, and CN freight trains to pass through a new underpass.

The majority of the project involved the installation of 2.7-km (1.7-miles) of interlocking pipe pile wall. The pipe was 914-mm (36-in) diameter x 16-mm (5/8-in) wall, with lengths ranging from 11-m to 24-m (37-ft to 80-ft). The interlocks were a so-called "P-T" connection that would later be cleaned

and grouted (in a following contract). These connections were needed to provide a water-tight barrier as the excavation for the lower-level rail would be below the water-table. The total number of installed 914-mm piles was 2,440, with the largest portion of piles being installed along the center-line of the new underpass (about 1-km or 0.6-miles), and 0.8-km (0.5-miles) of wall installed on either side of the underpass.

The primary method of installing the interlocking pipe piles was to use large diesel impact hammers (Berminghammer B-6505s) on 110-ft of Bermingham's L-23 vertical travel leads. The hammers were all equipped with hydraulic trip cylinders for starting the hammers, as well as direct-drive helmets, and Bermingham's variable throttle control. These systems were installed on two 165-ton Terex cranes and one Kobelco 160-ton crane. "The hammers have 200,000 ft-lbs of rated energy and will drive the piles to depths ranging from thirty to eighty feet," explains CEO Patrick Bermingham. "We're building both a foundation wall and cofferdam, as the train tracks will be passing below grade as well as below the water table."

The JV employed several moveable templates to ensure that the position of the piles met the project's tight tolerances. The piles were installed in groups of 5, in the order "1, 3, 5"; then "2, 4". Early in the contract several of the longer piles were checked for verticality using a slope-inclinometer lowered inside a tube placed inside the 'P' interlocks.

Other challenges faced by the JV included noise and vibration concerns. In areas where sound was a concern, the JV employed innovative three-level noise control shrouds developed by Bermingham's equipment division. These shrouds



reduced the peak sound levels by 10 to 15-dB – a significant reduction. The shrouds were hydraulically opened to facilitate loading the piles and then closed to completely surround the pile at the start of driving. As the pile penetrated the soil and the hammer entered the shroud, the ‘top-level’ of the shrouds were opened hydraulically to allow the hammer to breathe, but the lower levels still kept the pile shrouded. The ‘middle’ and ‘bottom’ sections of shrouds were opened as the pile penetrated further. The use of these shrouds had a minimal impact on production rates; dropping production to 8-9 piles-per-day from the ‘un-shrouded’ production rate of 10-piles-per-day (typical).

Dawn Tattle, President of Anchor Shoring & Caissons, notes, “not only is the site located in a densely populated area adjacent to homes and businesses, the crews are also working adjacent to active rail lines with numerous trains passing daily. During the 7-hour working day, approximately sixty (60) trains passed through the site in very close proximity to working crews.” Safety was paramount. While trains were passing through the site it was a CN requirement that all equipment and men stop work. In addition, while a train was passing through the site, all personnel were required to stay 20-ft from the tracks and were required to ‘face’ the tracks. For the faster commuter trains this work interruption could last as little as 2-3 minutes, while interruptions caused by the slower freight trains could last as long as 10 minutes. The amount of disruption caused by the trains was a big unknown faced by the JV going into the project, but crews adapted quickly to the very unusual work environment.

In some areas the 36-in pipe was installed at a distance of less than 3-m (10ft) from existing buildings. In this area installation vibrations were the biggest concern with allowable levels at the building foundations of less than 8-mm/s (0.3-in/s). In these areas the Joint Venture team used two different strategies to minimize vibration. The first strategy was to use a PTC variable-moment high-frequency vibratory hammer model HFV-48 with a geophone feedback circuit. This methodology was effective in some areas where the ground was soft enough for the vibro to insert the pile. In another area where the separation between the

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foundation of a very old building and the pipe pile wall was as little as 2-m (6.5-ft), the JV made use of a Giken Silent Piler imported from Japan.

Although the installation of the 2,440 interlocking steel pipe piles was a significant portion of the project, the contract also required installation of over 1,100 secant piles ranging from 750-mm (30-in) to 1-m (39-in) in diameter for the main alignment of the underpass and to protect adjacent structures during the future track diversion. This drilling was completed using a combination of Anchor Shoring's Bauer BG-28 and BG-24 rigs and Birmingham's BG-36 and BG-22 rigs. The project also included 40-m (130-ft) of sheet pile cut-off walls of average depth 22-m (72-ft).

Both companies contributed equally to the project's equipment requirements while about 2/3 of the 60 on-site personnel were supplied by Anchor Shoring and 1/3 were supplied by Birmingham. Birmingham contributed additional manufacturing and custom-equipment support. The JV was a truly equal and successful partnership and a collaboration of the two firm's extensive experience.

This first contract for the deep foundation installation was completed in October 2010. Anchor and Birmingham have teamed up once again for the next phase of the contract which consists of drilling-out the 2,440 36-in pipe piles, concreting the piles, and cleaning and grouting the 'P-T' interlocks. Stay tuned for future project updates. ▼

Photos courtesy of Michael D. Justason, P.Eng., MBA, and Dawn C. Tattle, P.Eng.





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The Need for Quality Testing

By Garland Likins, President, Pile Dynamics, Inc.

Any deep foundation needs both sufficient structural strength and geotechnical capacity. Foundations that lack either aspect create problems that require remediation, and remediation is very expensive, particularly once the structure the foundation supports is in place.

Structural defects can be detected by various non-destructive testing (NDT) methods. Depending upon foundation diameter and length, the structural integrity of drilled shafts and augercast piles can be evaluated by cross-hole sonic logging, low strain integrity testing, or thermal integrity profiling. However, for many projects, NDT testing of drilled foundations may not be specified or may be limited to a relatively small percentage of the foundation elements.

For driven piles, defects are relative rare. Generally the pile driving log of blow count versus depth, taken as standard practice on every project, already gives assurance that pile integrity is adequate - as PDCA says, "a driven pile is a tested pile". If there is any doubt, dynamic testing can be used to evaluate if a defect might be present and, if present, its severity.

Deep foundations, while often necessary, can also be expensive. Finding the optimum solution that has sufficient capacity, yet not overly excessive capacity so the foundation is efficient economically, is a challenge designing engineers regularly face. The capacity of driven piles can be estimated several ways.

The American Association of State Highway and Transportation Officials (AASHTO) has required load and resistance factor design (LRFD) since 2007. Their guideline document uses resistance factors that reflect current perception of accuracy among the various capacity evaluation methods.

For static analysis methods of driven piles, resistance fac-

tors are relatively low (which are equivalent to high safety factors), reflecting the high statistical uncertainty of these methods. Different static analysis methods have different resistance factors, reflecting varying uncertainty. Static analysis is necessary in the design phase for bidding, but is rarely the controlling criteria for driven piles. Static analysis is however a common method for the design of drilled deep foundations. Since drilled foundations use generally conservative factors, they usually are not the most cost effective solution.

The AASHTO resistance factors for dynamic formula (0.40) and wave equation analysis (0.50) for driven piles are somewhat higher (equivalent to lower safety factors), but the highest resistance factors (lowest safety factors) are reserved for the actual field testing methods of static load testing (0.75) and dynamic pile testing (0.65 for minimal amounts of testing, and 0.75 if all piles are tested). If both static and dynamic testing are used on the same project, the resistance factor is the highest (0.80). AASHTO requires "signal matching" (e.g. CAPWAP®) for dynamic testing.

AASHTO's suggested resistance factor (0.65) for dynamic testing is only a guideline for State Departments of Transportation (DOT) to adopt. States with more experience or confidence may adopt other factors. For example, Ohio DOT (ODOT) tests mainly during installation and uses a higher resistance factor of 0.70, recognizing that long term service capacity will generally be higher with time. ODOT regularly conducts dynamic tests on driven piles for all new bridge foundations not driven to bedrock. For the years 2006 through 2010, ODOT spent an average of \$22,600,000 per year on driven piles, and \$408,000 for dynamic testing, slightly less than 2% of the pile cost. Static testing costs averaged \$41,000

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per year on typically one project per year. The total testing cost is minimal compared with the cost savings achieved through using higher resistance factors and the benefits to the public of a solid foundation.

Driven production piles are installed to the same criteria (usually a blow count) as the test pile that successfully passed the static or dynamic testing. However, only a limited percentage of piles are actually tested; the remaining production piles are assumed to be equivalent to the test piles since they are installed to the same criteria. Inspection quality in recording the blow count logs on production piles should not be compromised.

Static testing in compression should be conducted according to the guidelines of ASTM D 1143; similar standards for static uplift tests are in ASTM D 3689 and for lateral tests in ASTM D 3966.

For static testing, this article will focus on the axial compression test of D 1143. The reaction system should be installed at least the specified 5 pile diameters (or minimum 8 ft) distance from the test pile. Reaction piles that are installed by vibratory hammers may significantly reduce the test pile capacity, an undesired and uneconomical result, particularly if the reaction piles are installed after the test pile and below the pile tip (this should be avoided). Reference frames for the displacement measurement similarly must be supported far from the pile with the same distance requirements as the reaction piles. Spherical bearing plates and a properly calibrated load cell should always be used, and are required for compression tests over 100 tons. Failure to follow the ASTM guidelines and produce less than quality testing is likely to result in errors in the test result, misleading conclusions, and possible physical danger to the testing personnel.

Static test results (curve of load versus pile movement) for driven piles are usually evaluated by the Davisson method, which is generally quite conservative. Drilled shafts often are evaluated by more liberal failure definitions, so either the design for drilled shafts should be kept very conservative or the

structure must be capable of tolerating larger settlements.

It is often desired to obtain load-transfer information to evaluate the soil resistance distribution. This can be accomplished through strain measurements along the driven pile or drilled foundation length. In a driven pile, these strain measurements are converted to force by multiplying by the known area and elastic modulus values. For drilled foundations, this conversion can be more problematic due to uncertainties in the area (and even elastic modulus) of drilled foundations as a function of length. Naturally this strain measurement is performed at extra cost, but the cost can often be justified on a large project when trying to optimize the design for highest capacity at lowest cost for production piles.

Dynamic pile testing is routinely used on driven pile projects beyond the very small ones. Capacity is estimated at the time of the testing (e.g. end of drive or during restrrike), including resistance distribution information. On smaller projects, such as smaller highway bridges, testing is often performed only during driving or with restrikes after a few hours. This is generally a conservative approach, but since the bridge foundation has only a few piles, the entire installation of the bent or abutment piles may only take a day or two, so elaborate testing programs are not justified.

Since capacity often increases substantially with time due to set-up, particularly in fine grain or cohesive soils, the optimum foundation design and minimum foundation costs would benefit from a restrrike test program on larger projects. Bullock (2005) clearly shows the benefits of even multiple restrikes during the first day in projecting the capacity with time to aid in decision making. Komurka (2003) demonstrates how the set-up and resistance distribution information from CAPWAP signal matching can be used to minimize "support costs", which are defined as the cost per unit load supported, and thus lower the overall foundation costs.

The usefulness of dynamic testing for driven piles is not limited to capacity evaluation and minimizing foundation costs. As previously mentioned, it can evaluate if a pile has



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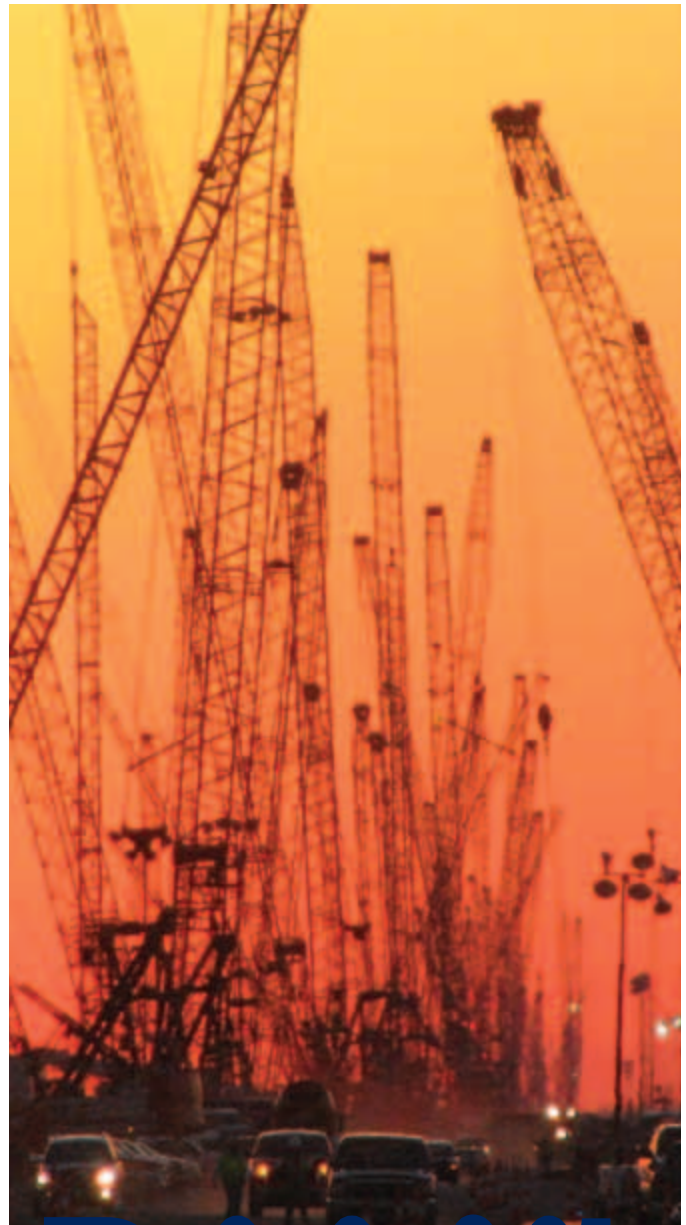
sustained damage. It can reveal driving stresses in both compression and tension for every blow during installation of driven piles; tension stress information is particularly important for concrete piles. Knowing the driving stresses allows the installation procedure to be adjusted to prevent damage. The energy transferred from the hammer to the pile can be measured to assess hammer performance and reveal if there are any hammer deficiencies.

The direct output of dynamic testing, however, is measured forces and velocities of the pile as a function of time, which must then be evaluated to extract the pile capacity and other solutions. While the benefits and reliability of the dynamic testing method are well proven, a well-qualified engineer properly versed in the theory underlying the test method is required for optimum foundation solutions and reliable pile installation guidance.

Solutions are only valid for data of good quality, and data of good quality cannot be assessed by the unknowledgeable. Dynamic testing should not be treated as a “black box” technology. Only engineers with a good grasp of all aspects of dynamic testing should perform dynamic testing. Inadequate ability may result in either not knowing when data quality is unsatisfactory (garbage in, garbage out) or dispensing bad advice, particularly when faced with a situation outside the tester’s experience base.

Concerning quality of dynamic testing, the testing engineer has traditionally been on site during the test, but technology now allows remote testing with the equipment on site but engineer in the office, connected to the site via internet. Since there is a growing demand for testing due to LRFD requirements, remote testing by experienced engineers offers an efficiency and cost advantage, avoids scheduling conflicts, and allows quicker results because of reduced travel time. Obtaining results faster leads to earlier decisions, keeping the project on schedule.

The key to good testing is knowledge. Knowledge can come from sufficient formal personal training, specific seminars or group workshops, mentoring by an experienced knowledgeable associate, or extensive personal study of manuals and published literature.



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How does a contractor, an owner such as a highway department, or a consultant desiring dynamic testing service determine the ability of a dynamic testing consultant? They may assess the quality of the testing results and the dynamic testing consultant by educating themselves at seminars or workshops - PDCA has been offering dynamic testing workshops typically twice per year for several years, and many specifiers or others seeking services have benefited from these learning opportunities.

Another alternative to assessing and assuring ability is evaluation of the testing engineer's knowledge by a standardized proficiency test. Such a test should evaluate all aspects of state-of-the-art dynamic testing including knowledge of theory, evaluation of data quality, interpretation of the data, applications of the method, and signal matching, which is state-of-the-practice.

Pile Dynamics has developed a “Dynamic Measurement and Analysis Proficiency Test” to evaluate the knowledge of dynamic testing practitioners, and PDCA will help provide opportunities for those desiring to take this proficiency test, including workshops to review important material about dynamic testing. Pile Dynamics and PDCA encourage all engineers doing dynamic testing to take this proficiency test so they can assess their own level of knowledge.

Depending on how well those that take and pass the test do, certificates stating rankings of BASIC, INTERMEDIATE, ADVANCED, MASTER or EXPERT will be granted by PDCA and Pile Dynamics. Although this proficiency certificate has no expiration date and no yearly renewal fee, it does suggest that engineers scoring at lower levels should be motivated to improve their knowledge and improve their ranking. The goal of every testing engineer should be to provide the highest quality service, and that is only possible if the engineer obtains a broad knowledge of the method and can rightly apply the knowledge.

It is recommended that those entities seeking services insert into project documents requirements that the testing firm demonstrate minimum standards of knowledge, such as achieving at least the ADVANCED ranking on this proficiency test for the engineer responsible for issuing the report. Several State DOT's have already adopted this general approach. Such requirements will then cause the testing engineers to increase their understanding and as a result the overall quality of dynamic testing services will improve, benefiting the project and the project owner. ▼

Photos courtesy of Garland Likins, President, Pile Dynamics, Inc.



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Why Deep Foundations Contractors Should Have a Casual Understanding of Design

By Jerry A. DiMaggio PE, D.GE, M.ASCE, Principal, at Jerry A. DiMaggio Consulting, LLC, Crofton Maryland

This article addresses the need for the modern driven pile contractor to become proactive and familiar with design, and construction's influence on design. Contractors, will also in some situations, need to serve a leadership role in educating project owners and in fact, designers regarding best practices in driven pile design practice.

In the good old days when deep foundation projects were relatively simple and easy, a deep foundation contractor could survive and make a good reasonable profit without the benefit of deep foundation design knowledge. Back then, a contractor could sit back, be disengaged from the entire design process (including specification and plan note development), and bid on the job. Unfortunately, enormous changes in project complexity, delivery and constraints have occurred during the past two decades and have dramatically changed this landscape and as a result the necessary and very important role of contractors in the design process. No longer can contractors sit on the bench and wait for project advertisements. Remember if you don't get a chance at bat you will never hit a homerun.

Unfortunately, on a daily basis, driven piles are excluded from projects during preliminary design because the project team is poorly informed or misunderstands the advances and tools which can be applied to mitigate environmental issues, the determination of geo-material properties, optimize structural and geotechnical load resistance issues, specify special installation and constructability techniques and correctly apply advanced methods of load testing and construction monitoring. If you are a contractor reading this and haven't a clue of what I am speaking about, this message is directed at you.

Perhaps, the greatest opportunity which has been presented to the driven pile industry during the past twenty five years is the current American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge and Structures specifications.

The Load and Resistance Factor Design (LRFD) platform has replaced the traditional allowable stress design (ASD) platform in the surface transportation public sector. The benefits and advantages of this approach to design are also growing everyday in other public and private segments of the deep foundation industry. Much has been and will be written regarding LRFD from both a negative and positive viewpoints. Without diving into those issues and the technical details of the code with equations and numbers, two statements which must be clearly understood by the driven pile construction community regarding LRFD are: first, LRFD is here to stay

(it is not a fad and will not go away) and second, LRFD provides the driven pile construction community a once in a lifetime opportunity to become more competitive and at the same time better serve project owners, the industry as a whole and the public. Perhaps, the greatest advantage of the AASHTO LRFD specification is not the fact that it addresses technical topics such as wave equation analysis, geo-material properties, corrosion/deterioration, soil setup and others. The true hidden and largely untapped hidden advantage and opportunity is that these technical topics are presented and addressed in a rationale and logical manner and sequence. The specification and commentary format of the code guides the designer sequentially through the appropriate steps of the project development process so that project requirements and constraints are addressed in a "non cookbook" fashion.

No small additional benefit is that a best practice state of the art approach to selection, design and construction of driven piles is advocated by non-industry organizations: AASHTO and the US DOT Federal Highway Administration (FHWA). If that isn't a good housekeeping seal of approval I don't know what is!

Now the challenge for the driven pile construction industry is to educate the driven pile community, first themselves and then others. They must clearly understand what the code contains, how it should be correctly applied to meet project specific performance requirements and restrictions, and finally how to best achieve and capture the benefits of its application. The Pile Driving Contractors Association (PDCA) has for a long time recognized the benefits of having a robust and practical national driven pile design and construction code and has been instrumental in developing the current content. Perhaps what they underestimated were the potential benefits of their efforts which will in the long-term extend far beyond public sector highway projects.

A superficial examination of the LRFD specifications as compared to the traditional allowable stress design (ASD) platform might suggest that LRFD is simply a different way of presenting factors of safety. Although this is true, such a view barely begins to completely and correctly communicate the benefits of LRFD for the driven pile community. Many of these benefits are admittedly not the direct result



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of LRFD principles, but are in fact for the first time they are completely presented in a logical and sequential fashion within the AASHTO code.

The following examples illustrate this global statement:

- The deep foundation selection process is more completely defined within both the specification and the associated commentary.
- AASHTO LRFD Section 10.4, for first time in the approximately 75 years of AASHTO bridge and structures guidance, requires a logical and rational approach to subsurface explorations, soil and rock testing and geo-material property determination for design and construction. This section of the specification is often overlooked by users of the LRFD but truly provides an enormous benefit for driven piles by leveling the playing field and minimizing “unbuildable” driven designs.
- The structural resistance of driven piles can be greatly increased by use of LRFD as compared to ASD. Under certain and ideal conditions, factored axial structural resistances can be up to three times greater than allowed by ASD guidance.
- Lateral and vertical deformation protocols are specifically advocated.
- Appropriate application of time related geotechnical resistance changes (setup and relaxation) are addressed in terms of both design and construction.

- Both general and specific approaches to quantify the benefits of additional and more accurate field determination of geotechnical resistance can be realized.
- Design tools such as driveability and wave equation analyses for geotechnical resistance estimation are now correcting and appropriately communicated within the code.
- By its structure, LRFD requires a significant improvement in communication between the structural and geotechnical design communities. The longstanding separation between these communities has often been the source of many design and construction deep foundation issues.
- The application of soil structure interaction tools such as P-y and strain wedge methods are recognized and required by the code.
- Traditional environmental disadvantages of driven piles, such as noise and vibrations, are now considered on a project by project basis and in a rationale manner.
- A growing number of private project designers and contractors have recognized the advantages of AASHTO’s LRFD guidance and have become progressively more interested to apply these same principles to projects which are governed by other codes, such as the International Building Code (IBC). ▼

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Soil conditions from the clay near New Orleans are terrible, and crews can't drive into bedrock, says Capt. Nicholas Cali of the U.S. Army Corps of Engineers. The HP16s are long enough to create a friction grab, he said, and by oversizing the steel, it also compensates for any corrosion over time.

Photo courtesy of Tim Pearia, Frank Coluccio Construction



New H-Pile Sizes

Save Money on Material, Labor for Heavier Design Loads, Column Applications

By Mike Engstrom, Technical Marketing Director at Nucor-Yamato Steel.

The first new H-Pile sizes in decades can provide a more economical way to handle not only heavier design loads for pile foundations, but they can also save money on column applications, according to piling contractors and structural engineers.

The new sections of HP16 and HP18 – the country's largest H-Piles ever produced – give engineers and contractors a more economical way to construct deep foundations for buildings and bridges. Another possible benefit of these shapes: using them as columns in building construction.

"HP shapes have webs that are the same thickness as the flanges, in contrast to W-shapes where the web usually is thinner. A thicker web will reduce the need for stiffeners and doublers," says Charlie Carter, AISC's vice president and chief structural engineer. "Stiffeners cost hundreds of dollars each and a typical doubler plate might cost a thousand dollars. Total these numbers per moment-connected column and that'll add up quickly. Plus, the HP section weight might be less than the W-shape weight required to eliminate the stiffeners and doublers."

The ASTM standard specification for structural shapes and piling products now includes a total of 10 new HP16 and HP18 profile sections and footweights. Six are within the HP16 range, varying from 88 to 183 pounds per foot in 20-pound increments, and four are within the HP18 range, varying from 135 to 204 pounds per foot with about the same

increments. Until now, the industry has relied only on four nominal sizes of H-Piles: HP8, HP10, HP12 and HP14.

These larger sizes can save as much as 30 percent on both labor costs and time to drive the piles, says Michael Wysocky, president of Thatcher Foundations, a leading piling contractor that hosted a test for the new H-Piles – driving a 150-foot long HP16x141 to bedrock to demonstrate its usefulness as a foundation component.

"As you get into larger structures, taller buildings, heavier loads, where a column would have a 15-pile cluster, now it might take only 10," Wysocky says. "They drive great, too. You can put big hammers to them and they hold up really well. You can drive through hard clay and dense silts and get to rock so you get to use the majority of the available strength of the steel."

Saving on Material and Labor

The new H-Pile sizes should help save a total of almost \$20,000 in material and labor on a sewer project in Hawaii, says Tim Pearia, an engineer with Frank Coluccio Construction.

The job will require bigger shafts for two reasons: it's a gravity line, not a pump station, so it needs to be deeper. And also, the sewer line will have a 72-inch diameter – twice the size of a typical project, Pearia says. Until now, this type of project would have likely required wide-flange 14-inch sections that needed to be doubled up in some parts. Because



The new HP16s used to build a steel-reinforced concrete floodwall near New Orleans have “significantly” extended the life of the structure, says Capt. Nicholas Cali of the U.S. Army Corps of Engineers. “We know it could support the 100-year storm event and then some.”

Photo courtesy of U.S. Army Corps of Engineers



The first new H-pile sizes in decades should help provide a more economical way to handle heavier design loads, including this sewer project in Hawaii, where an engineer said he expects to save a total of almost \$20,000 in material and labor.

Photo courtesy of Tim Pearia, Frank Coluccio Construction

of the new HP16 x 183 sections, though, Pearia says crews will need one or two fewer frames for each of the five shafts – reducing the total amount of beam needed by about 500 feet.

That should save as much as \$8,000 in material, Pearia says. And it will also save about \$10,000 in labor, because each frame will now require fewer man days per frame.

The first of the 15 H-Piles were installed in September, and the project should be finished in 2012.

“For years, that 14-inch H-pile section was the biggest

thing you could get, so it’s nice to have another size,” Pearia says. “And the guys really like that heavier web. It’s just a sturdier cross-section all around.”

The new sizes should save about \$12,000 in material on a wind tower project in Bayonne, N.J., says Richard Betron, vice president of MG Forge Construction. Normally, the three foundations needed for the wind towers would require W14 x 193 sections. By instead using HP18 x 181 sections, it should reduce the amount of material needed by about 11 tons.

And near New Orleans, where crews are working at a record pace to build a steel-reinforced concrete floodwall to guard against a 100-year flood or hurricane, Nucor-Yamato Steel Co. has supplied 15,000 tons of the new HP16s so the structure will be more stable and last longer.

Soil conditions from the clay in that part of Louisiana are terrible, and crews can’t drive into bedrock, says Capt. Nicholas Cali of the U.S. Army Corps of Engineers. The HP16s are long enough to create a friction grab, he said, and by oversizing the steel, it also compensates for any corrosion over time.

“It all contributes to the longevity and the stability of the structure,” Cali says. “The HP16s have extended the life of the structure significantly, and we know it could support the 100-year storm event and then some.”

Modernizing the H-Pile Industry

Unlike smaller sizes, the new sections of HP16 and HP18 – produced by Nucor-Yamato Steel Company – can carry more load while also meeting building codes that call for compact sections, according to Ashraf Elsayed of Hall, Blake & Associates - A Division of Geotechnology, Inc., a geotechnical, environmental engineering and materials testing firm. Elsayed helped with the load test of the new H-Piles.

The new, larger sizes also have significantly smaller top settlements at comparable loads, reducing the amount of downward deflection, according to industry observers. And they show significant improvement in end bearing, skin friction and lateral-resistance capacity.




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Photo courtesy of Nucor-Yamato Steel Co.

“When engineers see this, they will instantly see the benefits,” says Reidar Bjorhovde, a 45-year veteran who headed the civil engineering department at the University of Pittsburgh and now runs a consulting firm. “These new sections will be capable of carrying larger loads, whether it’s for a high-rise or an industrial structure. Right now, engineers have

to combine smaller shapes, using more of them and placing them closer together. The fact that you can use fewer piles will reduce cost.”

To learn more about the new sizes of H-Piles available, please visit: <http://www.nucoryamato.com/StaticData/catalog.pdf?currdate=1/31/2011>. ▼




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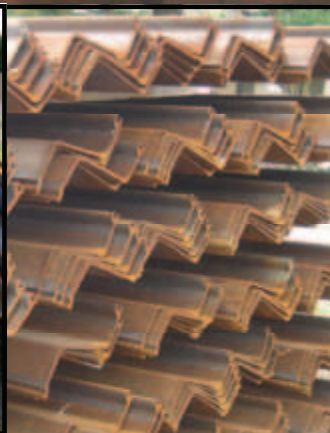


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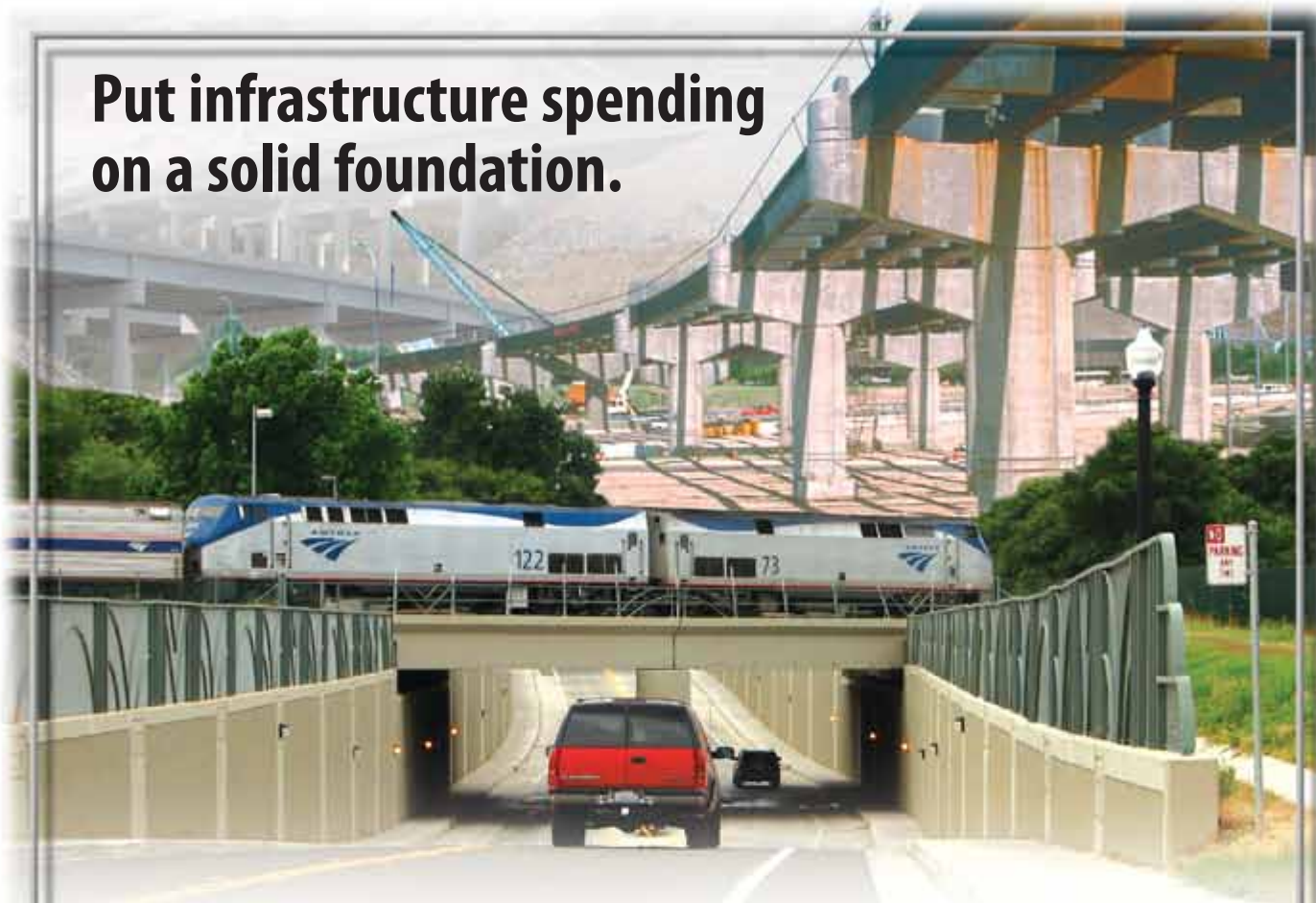
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Changed Site Conditions Claims:

A Roadmap for Successⁱ

By Jeffrey R. Blease, Ed Baxa, Jr., and C. Ryan Maloney Foley & Lardner LLP

Estimating subsurface conditions is a combination of art and science. While investigative techniques have improved greatly in the last decade, the exact conditions to be encountered below grade are still unknown. Inevitably, pile driving contractors will at some point encounter a situation where the conditions encountered are not what was assumed at bid time. Harder rock, different rock profiles, fractured rock and other unanticipated soil conditions can greatly affect production and the cost of the job. What should the contractor do when an unanticipated condition affects the job? As production costs rise, the contractor may be faced with an unprofitable job at a minimum and financial ruin in the worst case scenario. Differing site conditions claims (changed conditions) are therefore high stakes claims that must be properly developed to be successful. While the outcome of any specific changed conditions claims is highly dependent on the specific facts and circumstances and specific contract provisions at play,ⁱⁱ this article is designed to provide a brief roadmap to help contractors avoid some of the key pitfalls that can often arise in connection with changed conditions claims.

Changed Site Conditions Contract Clauses and Type I and Type II Claims

Almost all construction contracts now contain what are commonly known as changed or differing site conditions clauses.ⁱⁱⁱ The purpose of these contractual clauses is to benefit the owner and the contractor by taking some of the risk of changed site conditions out of bidding for both parties. As one court described it^{iv}:

The purpose of the changed conditions clause is thus to take at least some of the gamble on subsurface conditions out of bidding. Bidders ... need not consider how large a contingency should be added to the bid to cover the risk. They will have no windfalls and no disasters. The Government benefits from more accurate bidding, without inflation for risks which may not eventuate. It pays for difficult subsurface work only when it is encountered and was not indicated in the logs.”

Modern changed site conditions clause generally divide changed conditions claims into two types. Type I claims involve “subsurface or latent physical conditions at the site differing materially from those indicated in the contract documents.”^v Courts have generally found that in order to prevail on a Type I claim, the contractor must be able to prove:^{vi} (1) the conditions indicated in the contract documents differ materially from the actual conditions encountered; (2) the actual conditions must have been reasonably unforeseeable based on all the information available to the contractor at the time of bidding; (3) the contractor reasonably relied on its interpretation of the contract documents; and (4) the contractor was damaged as a result of the material variance between the expected and encountered conditions.^{vii}

Type II claims are those based on “unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inhering in the work of the character provided for in the contract.”^{viii} Type II claims are therefore not based on the contract documents, but arise when the conditions encountered differ materially from those normally encountered.^{ix} To recover on a Type II claim, a contractor must be able to prove: (1) it did not know about the actual physical condition; (2) it could not have reasonably anticipated the condition from inspection or general experience; and (3) the actual condition varied from that normally expected in similar construction work.^x

Site Investigation Duties

Prevailing on either a Type I or Type II claim requires the contractor to be able to prove the changed site condition could not have been reasonably anticipated by the contractor, and most contracts also contain a site inspection clause. A contractor has a duty to perform a reasonable inspection of the site to determine the existing conditions, and a contractor that fails to make a reasonable site investigation will not be allowed to claim for conditions that would have been observed by a reasonable inspection.^{xi}

Generally, unless the contract contains specific site investigation requirements, the contractor’s duty is based on the standard of a reasonable and prudent contractor in the same field of work, and the contractor is not held to the standard of an expert or obliged to conduct its own invasive exploration of subsurface or other concealed conditions.^{xii} This general duty usually does not require the contractor to independently verify the validity and accuracy of the information provided by the owner.^{xiii}

However, if the contract identifies specific issues that a reasonably prudent contractor should investigate through further inspection, the contractor may not be able to assert a changed conditions claim if the contractor fails to avail itself of the opportunity. For example, in *T.L. James & Co., v. Taylor Bros. Inc.*, a pile driving contractor that was delayed in its work for the Port of New Orleans due to subsurface obstructions had its changed conditions claim denied where the contract advised of “unknown infrastructures” and referred the contractor to a maps and archives room of the Port for detailed maps to review, but the subcontractor failed to investigate the site or review such information.^{xiv} Claims have also been denied where the contractor did not adequately account for potential subsurface anomalies or make reasonable bid assumptions in light of the owner information provided.^{xv}

Prudent contractors should whenever possible make a thorough visual inspection of the site and conduct a careful review of the plans and specifications prior to bidding. Not only will this help to ensure the accuracy of the bid, but it will also help bolster the strength of a later changed site conditions claim.

Notice Requirements

Changed conditions clauses also generally require the contractor to give the owner prompt notice of the changed condition before the changed condition is disturbed. The purpose of the typical notice provision is to provide the owner with the ability to verify the condition before it is disturbed, to perform its own independent investigation, to track the extent and cost of dealing with the changed condition and to negotiate any time extension or change order cost.^{xvi} Although strict compliance with notice requirements may sometimes be excused, particularly where the contractor can establish the owner was not prejudiced,^{xvii} the failure to provide timely notice has resulted in claims for changed site conditions being denied, an extraordinarily harsh result.^{xviii} Therefore, contractors should pay close attention and use their best efforts to comply with contractual notice requirements and otherwise keep the owner informed of unexpected site conditions as they arise to attempt to avoid this potential pit fall.^{xix} The best practice is to involve counsel when a claim is first suspected to review and analyze the contract to make certain the notice provided is timely and effective.^{xx}

Claim Documentation

One of the requirements of all changed conditions claims is for contractor to prove the damages it suffered that were caused by the changed site condition. Claims have been denied where the contractor is unable to prove through reasonable documentation and evidence the actual damages it suffered due to the changed condition.

For example, in *Connolly-Pacific Co. v. U.S.*, the Court found that it was “clear from the record that plaintiffs were delayed in the construction ... by reason of the directives issues by the Navy in connection with the driving of piles,” due to subsurface obstructions.^{xxi} However, the Court nevertheless

approved the trial commissioner’s ruling that the plaintiff could not claim delay damages because an “examination of plaintiffs’ job record[s] ... do not indicate that plaintiffs were damaged in any way, or suffered increased costs because of the delays in driving piles.”^{xxii}

As this case demonstrates, even where there is delay due to a changed condition, the claim may be denied or limited where the contractor’s documentation of damages is insufficient to prove the actual damages caused by the changed condition. For this reason, contractors should endeavor as soon as possible after determining that there might be a claim to document as accurately and thoroughly as possible the delay and additional costs incurred due to the changed condition. The best practice is to properly document the information provided by the owner at bid time and the assumptions that were used to develop production estimates at bid time. When faced with a changed condition during the job, the best practice is to set up and track the extra work under separate cost codes and provide all required notices.

Conclusion

While the success of a changed site conditions claim often greatly depends on the specific facts and circumstances, by taking the time to do a careful bid review and site inspection up front, being knowledgeable regarding the basic changed conditions concepts in order to be able to timely recognize and evaluate a potential changed conditions claim, providing timely notice to the owner in compliance with the contract, and carefully and thoroughly documenting additional costs due to the changed condition, the contractor will be best positioned to successfully navigate the often challenging circumstances that can brought about due to a changed condition. ▼

i. This article is a follow up to the Changed Conditions Claims on a Driven Pile Project: A Roadmap for Success presentation by the authors at the Pile Drivers Contractors Association’s 15th Annual International Conference and Expo in Savannah, Georgia on April 28, 2011.
 ii. Because of this, specific concerns on any particular matter should be addressed with an attorney.
 iii. For example, the AIA Document A201-1997, § 4.3.4 contains a changed site conditions clause, and most federal construction contracts contain a version found at 48 C.F.R. § 52.236-2.
 iv. Foster Constr. C.A. & Williams Bros. Co. v. U.S., 435 F.2d 873, 887 (Ct.Cl. 1970).
 v. 48 C.F.R. § 52.236-2(a)(1). In other words, Type I claims arise when the actual conditions encountered differ materially from those indicated in the contract documents. H.B. Mac, Inc., v. U.S., 153 F.3d 1338, 1343 (Fed. Cir. 1998).
 vi. The burden is on a contractor to establish a changed site condition of either type by a preponderance of the evidence. See *Stuyvesant Dredging Co. v. U.S.*, 834 F.2d 1576, 1581 (Fed. Cir. 1987).
 vii. See e.g., *Stuyvesant Dredging Co.*, 834 F.2d 1576, 1581; H.B. Mac, Inc., 153 F.3d at 1345.
 viii. 48 C.F.R. § 52.236-2(a)(2).
 ix. H.B. Mac, Inc., 153 F.3d at 1343.
 x. *Martin Paving Co. v. Widnall*, 173 F.3d 433 (Fed. Cir. 1998).
 xi. See e.g., *Connor Bros. Constr. Co., Inc. v. U.S.*, 65 Fed. Cl. 657, 673 (2005); *Randa/Madison Joint Venture III v. Dahlberg*, 239 F.3d 1264, 1270-71 (Fed. Cir. 2001); *Hardwick Bros. Co., II v. United States*, 36 Fed. Cl. 347, 406 (1996).
 xii. Philip L. Bruner and Patrick J. O’Connor, Jr., *Bruner and O’Connor on Construction Law*, § 14.55 (2010 ed.).
 xiii. See e.g., *Kit-San-Azusa, J.V. v. U.S.*, 32 Fed. Cl. 647, 651 (1995) (holding that contractor who experienced great difficulty in driving sheet pile due to the presence of subsurface boulders could rely on boring logs provided by owner which did not reference boulders, particularly where borings were numerous and well spaced).
 xiv. 294 F.3d 743, 747 (5th Cir. 2002).
 xv. H.B. Mac, Inc., 153 F.3d at 1347 (denying contractor’s changed conditions claim for where court found it was not reasonably for contractor to have relied on soil borings 300 yards from site where problematic work was to be conducted).
 xvi. *Schnip Bldg. Co. v. U.S.*, 645 F.2d 950, 959-60 (Ct. Cl. 1981).
 xvii. See e.g., *Brinderson Corp. v. Hampton Road Sanitation Dist.*, 825 F.2d 41, 45 (4th Cir. 1987) (notice provision not enforced and changed conditions claim allowed where owner representatives on site had opportunity to investigate even though formal written notice was late).
 xviii. See e.g., *Schnip Bldg. Co.*, 645 F.2d at 959-60 (claim denied where lack of timely notice was found to have prejudiced the government by precluding timely investigation of the site conditions and possible redesign of the work).
 xix. In the federal contracting environment, notice to the government is also important as a defensive measure to preserve changed site conditions as a defense to government claims, such as claims for liquidated damages for delay. See *M. Maropakos Carpentry, Inc. v. United States*, 609 F.3d 1323, 1327 (Fed. Cir. 2010) (holding that that in order for a contractor to assert a defense to a federal government claim that would require an adjustment of the contract, the contractor must have previously submitted that defense as a formal claim to the federal contracting officer).
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 xxi. 358 F.2d 995, 997 (Ct. Cl. 1966).
 xxii. Id.



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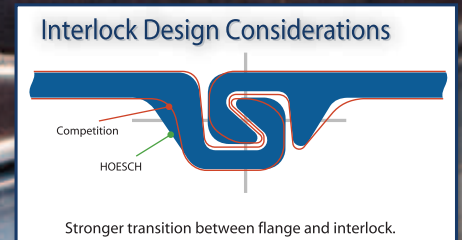
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Route 52 Causeway Bridge Replacement Project



Beam Erection
Piles under
footings



High level bridge
over Beach
thoroughfare at
ocean city end of
the causeway.
Winter 2010.

By Patricia Barnes

Replacing old bridges with more sustainable precast concrete bridges has become almost epidemic across the nation. The Route 52 Causeway bridges at Somers Point and Ocean City, New Jersey are no exception. The original four bridges along the Causeway were 70 years old in 2006. Increased repair and maintenance costs combined with severe deterioration of the bridge decks and chipping and cracking led to the decision to replace the bridges.

Well known for its experience and expertise in offering solutions that encompass innovation, sustainability, aesthetics and cost control, Michael Baker Jr. Inc was chosen to design two bridges to replace the four existing ones. Hardesty & Hanover, Baker team's geotechnical design consultant, chose to use concrete piles due to their superior performance in the marine environment. Bayshore Concrete Products (BPC) was the supplier of choice for the square piles for both phases of this project. BCP has been supplying precast prestressed piles for 50 years and is considered a premier producer of concrete piles for the Eastern corridor.

This is one of NJDOT's largest projects and is the emergency evacuation route for Ocean City, a highly populated shore area, making this a complex project with traffic flow having to be maintained during the tourist season. Lane closures were limited to mainly in the off-season and access to businesses had to be maintained. The use of precast prestressed construction reduces installation time by eliminating expensive and time-intensive field form work.

The project includes two four lane, high level, fixed spans over Ship Channel and Beach Thoroughfare (intracoastal waterway), eliminating the need for drawbridges. The project also includes a new visitor's center for Ocean City, four fishing piers off the main structure, and a pedestrian walkway and bike path.

The Route 52 Causeway bridges were designed to be built in two phases. Phase I has been completed and Phase II was started in late 2009. Key to both phases of this project is the use of precast prestressed concrete square piles produced by Bayshore Concrete Products. Phase I construction was completed in 2009 under the direction of George Harms Construction Co., Inc. BCP provided 93.5' Bulb T Girders, 3.5" Deck Slabs, 15" Voided Slabs and 24" and 30" Square Piles for Phase I. Phase II is currently under construction by Route 52 Constructors, a joint venture partnership of G.A. & F.C. Wagman and RE Pierson Construction Co., Inc. For Phase II, BCP is supplying 14", 24", and 30" square piles along with addi-

tional deck slabs, solid slabs, voided slabs and Bulb T Girders. Over 1,600 square piles are being supplied by BCP ranging in length from 50" to 136'. Concrete strength of the 30" square piles are 6,000 psi ultimate compressive strength after 28 days; 4,000 psi at time of transfer. The 24" piles are 5,000 psi ultimate compressive strength after 28 days; 4,000 psi at time of transfer.

Bayshore Concrete Products, a leader in precast, prestressed pile production for the Eastern United States, has expertise in making square piles. The square piles for this project were more challenging due to the design parameters that include using specially coated epoxy strand, installing jet pipes and lofting lugs. Each step in the process required following strict quality control guidelines to ensure the finished piles met the project specifications.

The epoxy coated strand has impregnated grit that necessitated the use of a special hardened steel plate in the parts of BCP's formwork that the strands passed through. Unique about the strand is the special "deep bite" chucks that are required to anchor the strands at the end of the casting bed. The deeper teeth on the jaws of the chucks are required to bite through the epoxy and grip the metal of the strand. The chucks required extra cleaning between uses because the epoxy gums up the teeth. The epoxy coated strand was manufactured in California by Sumiden Wire Products Corporation (SWPC). SWPC has been producing ASTM A882 Epoxy Coated Strand (ECS) since 2000. The product has gained a reputation in the industry for exceptional epoxy-to-steel adhesion and extremely uniform coating thicknesses. It is used in applications where marine splash zones are a concern.

BCP installed four jet pipes in each of the square piles. The jet pipes are prefabricated to a design length using 20' sections of 4" diameter PVC and various PVC and cast metal fittings. The top four cables symmetric about centerline within the pile only receive preload stresses to allow for the installation of the jet pipe. The pipes are then suspended and held in the center of the section by bent rebar tied to the prestressed epoxy cable.

Jet pipes allow for blowing sand through the piling with a hose, then driving the piles.

On the 24" & 30" piles special lofting lugs were installed about 4' from the head end of the pile on two sides opposite of one another. BCP installed rubber disc block-outs with two sleeves of conduit running transverse through the pile resulting in precise rigging locations to aid in lofting each pile. This allowed the contractor to stand each pile and hold it plumb prior to utilizing the jet pipe and driving.

Square Piles in Phase I and II:

- Over 1,600 piles
- Over 145,000 linear feet
- Over 79,750 tons
- Sizes: 14", 24" and 30"
- Lengths: 50 feet to 136 feet
- Over 4,900,000 feet of epoxy coated strand.

Five specialized hammers made by American Pile Driving are being used for this project. The majority of the square piles in the water are being driven using a Manitowoc 4100 Ringer on a 100' x 100' sectional barge.

The Hammer used for the 30" square piles is an APE D160. Piles are driven on land with a Manitowoc 2250 crane. The required minimum tip elevation varies but depth averages approximately 80.0'. The piles are generally jetted to within 20' of minimum tip elevation then driven to capacity with an APE D160 Diesel Hammer.

As is usual when working in the marine environment, ecological concerns are important considerations. Fish spawning restrictions for pile driving is April 1st thru June 30th each year. There is also a pile driving restriction within 300 feet of a heron rookery from April 1st to August 15th each year. Plans were in place to work around these restrictions, including getting special permits to drive piles within watertight cofferdams, which allows for the overall job to be completed on time with less net environmental impact.

Among the challenges faced on the Rt 52 project was finding unexpected submerged debris, forcing extra stops during the driving process. In addition there were multiple harsh New Jersey coastal storms that halted installation. The hard work by the Rt. 52 Constructor team and the efficiency of the installation plan has kept the project within the parameters of the job timeline. Rt 52 Constructors was recognized on this project for their impressive safety record of *Zero Incidence Rate* in 2009.

Bayshore Concrete Products was established in 1961 to produce the precast concrete components for the 17 mile Chesapeake Bay Bridge-Tunnel. Over the years Bayshore Concrete has expanded its product line to include precast prestressed concrete for marine facilities, mass transportation, parking structures, offshore structures, piers, and heavy construction in addition to manufacturing girders, segments and piles for bridges. With two plants utilizing over 110 acres of land, BCP is able to fulfill large orders effectively and efficiently. Both plants are located on major waterways with 1,000 plus feet of bulkhead waterfront giving BCP the ability to ship product by barge. BCP's Cape Charles plant is also equipped with its own railways to accommodate shipment by train. Bayshore Concrete is committed to providing sustainable components and protecting the environment for future generations. All Bayshore products are made with materials purchased within the United States utilizing recycled materials whenever feasible. ▼

Photos courtesy of Patricia Barnes

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Age-old Industry

History of sheet piling traces industry's origins

By Heather Hudson

Historians tell us we can't know where we're going unless we know where we've come from. And if you're in the North American piling industry, your roots are in the sheet piling business.

According to Scott Whitaker, who built a 44-year career in sheet piling, understanding the past is not exactly necessary for operating in the here and now, but it certainly helps put the industry into context. And though it isn't a huge segment of piling, it has always had its share of usage.

"The domestic sheet piling market is not large – perhaps in the range of 250,000 to 350,000 tons a year. This compares to a structural shapes market of several million tons a year," says Whitaker.

"Two mini-mills are currently producing sheet piling in the U.S. – Gerdau and NucorYamato – yet there is an adequate supply of domestically produced sheet piling."

Steel titan Bethlehem Steel hired Whitaker in 1967 when he was teaching at Drexel Institute of Technology. He worked with the company as a piling product consultant until September 2001. Since February 2002, he has been a sheet piling consultant with Gerdau Ameristeel.

In the same way we tip our hats to the innovators that came before us, with the help of Whitaker, we're honoring what is a technical marvel in the world of engineering and construction.

What is sheet piling?

Sheet piling is a structural shape with interlocks on its flange tips. Individual sections can be joined together and driven to form a continuous wall, which is earth-tight and water resistant.

One of the earliest forms of piling, it was first recognized by engineers in the U.S. as a safe, efficient and reliable tool in subaqueous construction in the early 1900s. Originally invented to

replace wooden sheeting, its use was quickly extended to many other building constructions.

Carnegie Steel Company was the first in North America to begin rolling sheet piling. Their section had a web with a large circular socket at one end and a "wedge" at the other end – considered quite a feat at the time. The sections interlocked and functioned as a continuous wall, but with little beam strength.

Every producer has its own line of sections, which differs from structural shapes where mills roll sections as listed by the American Institute of Steel Construction (AISC). Traditionally, America is a ball and socket and Z-Piling market while Europe (and the rest of the world) is a Larssen interlock and "U" piling market.

All the different profiles may be broken into two groups based on end use.

Type 1 – The first end use is comprised of the majority of sheet piling profiles; Whitaker estimates up to 90 per cent of the market. It is used for beam strength for straight walls, which would normally be braced or tied-back but could also be cantilevered.

Type 2 – Profiles used for interlock strength (tension) make up the second end use. In this application, the sheet piling is set and driven in circular cells, which are filled with granular material. The fill pushes out against the sheets and places them in tension. The soil's effort to separate the sheets is resisted by the interlocks going into tension. The cells could be individual structures, such as pier protection cells or a series of cells inter-connected with sheet piling arcs. The end use could be structures such as cellular bulkheads and cofferdams.

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History of sheet piling in America

- 1904 – Carnegie Steel Company begins rolling sheet piling.
- 1906 – Lackawanna Steel Company begins sheet piling production in Lackawanna, NY. They invented the “Lackawanna Interlock” (thumb and finger), which remains the interlock of choice by all producers of flat-web sheet piling today.
- 1908 – Lackawanna supplies the piling to build the largest steel sheet piling project on record: a cofferdam (temporary structure) to construct the ship lock at Black Rock Harbor in Buffalo, NY.
- 1922 – Bethlehem Steel buys Lackawanna Steel Company.
- 1926 – Carnegie Steel introduces new sections, their first since 1904.
- 1927 – L.B. Foster Company, founded in 1902, expands its product line by becoming a sheet piling distributor.
- 1928 – Piene (Germany) introduces the Combination Wall, also referred to as a King Pile or HZ system. Interlocking structural shapes and sheet piling together results in walls with large beam strengths.
- 1932 – Domestic producers (Bethlehem, USS, Inland, J&L and Weirton) begin efforts to standardize sheet piling sections.
- 1969 – Bethlehem introduces high strength interlock (28 kips/in.) section SP7b (flat-web section) with a section width of 15¼ inches. This was the first “new” domestic section since 1950.
- 1970 – Inland Steel, J&L and Weirton depart the sheet piling market, leaving USS and Bethlehem as the remaining domestic producers of hot-rolled sheet piling.
- 1971 – USS introduces a 28 kip/in. section (MP103) with a 16½ in. width. The increased width, along with erratic interlock strengths, puts Bethlehem out of the high strength interlock market.
- 1977 – Bethlehem discontinues production of sheet piling in Lackawanna, NY.
- 1980 – Bethlehem resumes production of sheet piling in Bethlehem, PA.
- 1984 – USS discontinues the production of sheet piling.
- 1997 – Bethlehem Steel discontinues the production of sheet piling and structural shapes. There are now no domestic producers of hot-rolled sheet piling.
- 1998 – TXI Chaparral (now Gerdau) begins rolling flat web sections (PS27.5/31) in Midlothian, TX. They expand production to roll the Bethlehem Steel line-up of PZ sections and introduce new and more efficient Z-Piling sections to replace the Bethlehem series.

Whitaker says while the ball and socket interlock remains the same, sheet piling sections and pile driving equipment have evolved dramatically over the years.

“One of main problems in this country with sheet piling is it’s looked upon as a temporary product used to construct something else rather than a permanent structure.”

While that might be the case, with its reliable and innovative design, sheet piling certainly has a rightful place in American industrial history. ▼

Photo courtesy of Scott Whitaker



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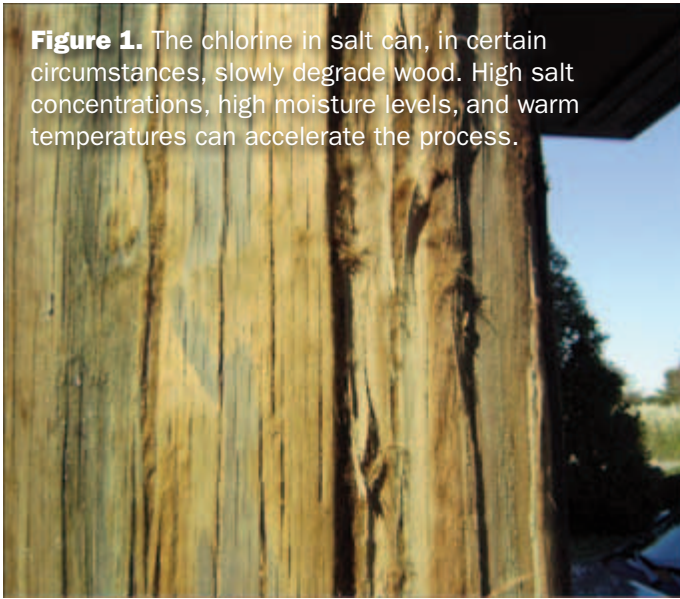
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What Is Salt Killed Wood?

By Dr. P. David Jones, Dr. Rubin Shmulsky, Dr. Shane Kitchens and Dr. H. Michael Barnes

What do cured-meat producers, departments of transportation, Northern homeowners, and Southern marina operators have in common? All use wood for its natural durability and chemical resistance, and all deal with high concentrations of salt. Over time, high salt concentrations can degrade wood under certain conditions. Wood deteriorated by salt is sometimes called “salt killed.”

Wood can be degraded in a variety of ways. These include:

- biological factors, such as decay and insects
- mechanical factors, such as foot traffic, windblown sand, fire, and sunlight
- chemical factors, such as those used in pulp and paper manufacturing

Biological factors cause the greatest financial impact and are the most discussed. These include wood rot, termites, carpenter ants and bees, wood-boring beetles, and marine borers. Preservative treatments and techniques usually target these organisms and try to minimize their harm to wood.

Chemical deterioration is much less common and at times is misdiagnosed. Chemical deterioration generally occurs when high concentrations of chemicals touch wood. Over time, these chemicals can collect on the surface, soak into the wood, and ultimately weaken the wood from the outside in.

An example of controlled chemical degradation is soaking wood chips in strong chemicals that soften and dissolve the lignin (the glue that holds wood together). The result of this process is a mass of delignified wood pulp. This pulp, which is a collection of individual wood cells, can be made into paper.

Under certain in-service conditions, salt can degrade wood. Table salt is a combination of chlorine (commonly used in bleach and in water treatment) and sodium. In certain circumstances, the chlorine in salt can slowly degrade wood. High salt concentrations, high moisture levels, and high temperatures can accelerate the process. Exposure to mechanical abrasion (foot traffic on decks), sunlight (south-facing structures), pressure washing, and wave action can accelerate deterioration.

Chlorine is a natural pulping agent of wood. As salt is deposited on or in wood, it often leaves a whitish, powdery residue on the surface. Under certain circumstances, the chlorine can be absorbed into the wood and soften the lignin. The result is a wood surface that looks fuzzy or stringy. This is because the individual cells that make up the wood retain their individual structure, but they are no longer stuck to each other. In addition to a fuzzy or stringy wood surface, a pile of wood dust, or pulp, may result.

This type of deterioration is not related to the preservative treatment process. Preservative treatments primarily protect wood from biological organisms. Some wood-protection chemicals also act as water repellents. This water repellency helps protect wood from both biological and chemical deterioration by limiting how much of a chemical can absorb into the wood.

Differences in the natural permeability (absorbency) of wood can cause differences in salt deposition in the wood. Among other things, permeability is affected by inherent differences among wood samples, species, and processing treatments (such as incising). Permeability also differs between early wood and late wood, heartwood and sapwood, and kiln-dried and air-dried wood.

Occurrence of Salt-Killed Wood

There are a few common instances where salt-killed wood occurs. Salt-killed wood can occur in meat-curing houses, warehouses, and pantries where salt and fertilizers are stored. Saltwater dripping from curing meat or salt leaking from broken containers can cause wood deterioration. Over time, the floor under the pantry, warehouse, or meat hanging racks chemically degrades and needs to be replaced. Careful housekeeping and wood surface coatings can often lengthen the life of wood in this situation.

Salt storage sheds used by highway departments are another instance. Water from snow mixed with salt has been a source of deterioration for some salt storage sheds. This type of deterioration can be minimized by using different salt formulations for road salt and by adding creosote or oil-borne preservative treatments to the wood. These treatments are



Figure 2. Salt killed piers, pilings, seawalls, and other marine structures are common.



Figure 3. Salt kill occurs as intertidal salt from the water is deposited on the wood structures or wicks upward in the wood.

water repellent.

Despite this type of deterioration, wood is generally considered far more chemically resistant than are other structural materials, such as steel and concrete.

Another instance of this type of wood deterioration is on wood decks or walkways that receive periodic icing. Homeowners sometimes spread table salt or water softener salt on wood decks and walkways, which can cause chemical degradation. In more northern climates, safer types of de-icer salts are available.

Another example of chemical deterioration is cleaning with a strong bleach solution. Sometimes diluted household bleach is used to remove mold and mildew from the surface of wood structures. If the solution is too concentrated and not rinsed off well, the chlorine in the bleach can begin to pulp the surface of the wood. This causes fuzziness as the wood cells are loosened. Harsh concrete cleaners can also cause chemical degradation.

Sometimes these types of cleaners are used with pressure washers. The high-pressure water from a pressure washer is

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often enough to cause some of the wood surface fibers to lift up or break off. When pressure washing is combined with diluted bleach or other harsh chemicals, the result is very often a fuzzy or partially pulped surface. Thus, it is usually best not to pressure-wash wood surfaces.

Finally, salt-killed piers, pilings (Figure 1 and 2), seawalls (Figure 3), and other marine structures are common. This phenomenon occurs as intertidal salt from the water is deposited on the wood structures or wicks upward in the wood (similar to water wicking up a paper towel). In untreated wood or wood treated with water-borne preservatives, this chemical change is not uncommon, especially after many years of service.

Generally, only the outer shell of the wood is degraded, as this is the portion with the highest concentration of both salt and sunlight. A more permeable piece of wood will degrade faster than less a permeable piece of wood, even if both pieces are exposed to identical conditions.

Surface coatings are not considered very effective at slowing salt kill for two reasons. First, it is difficult or impossible to get a quality, lasting bond between a surface coating and a partially pulped wood surface. Second, saltwater will continue to wick upward in the wood structure, so the wood will continue to deteriorate underneath the coating.

In some cases, high-temperature kiln drying can help prevent salt kill by closing or aspirating the pits in the wood, leaving it less permeable. However, this process is not very effective.

In any case, during project engineering and material specification, it is important to consider the environment in which the wood product will be used. Additionally, in the case of remedial work, it is important to identify salt killed timber accurately and to know the differences between it and wood that is biologically attacked. ▼

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Publication 2662

Extension Service of Mississippi State University, cooperating with U.S. Department of Agriculture. Published in furtherance of Acts of Congress, May 8 and June 30, 1914. GARY B. JACKSON, Director



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