Sheet pile: A driving innovation in building foundations

page 23

PDCA member profile: Key Constructors, Inc.

page 40

Understanding the nature of risk management

page 74

PILEDRIVER

THE OFFICIAL PUBLICATION OF THE PILE DRIVING CONTRACTORS ASSOCIATION | Q4 2007 VOL. 4, NO. 4

Project Spotlight:
Naval Weapons Station Earle welcomes two improved piers

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Contents

On the Cover:
Naval Weapons Station Earle welcomes two improved piers.

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The PDCA: a valuable resource

By Mark Weisz, P.E.

Recently while surfing the Web, I Googled the acronym PDCA and I found it interesting that our acronym referenced as many as 20 other associations ranging from the Painting and Decorating Contractors of America to the Pug Dog Club of America. I never took the time to find out what a Pug looked liked, but it doesn't sound like an animal that I'd want to own. I'll leave the dog research to you the next time you're out surfing the Web. But the point to my story is that there is a lot of information out there and that the really useful information can be difficult to find when you need it the most.

I like to think the Pile Driving Contractors Association is one of those "tools" that provides its members useful information to help them succeed. The PDCA and its local chapters have proven that it's one of the contractor's strongest resources available in solving the challenges facing this industry. Whether it's being informed of the latest trends in foundation design/installation to learning of the newest technologies, the PDCA is always looking to improve on what it can provide its members. Many contractors have taken advantage of the benefits of being active with the PDCA and those members have benefited from their efforts. If you haven't yet had the chance to participate, it's not too late to become involved and make a difference.

The PDCA is still a rather young trade organization. The accomplishments made over the past 11 years are significant and continue to allow your current board to build upon those past successes. The exciting news is that our work is far from over. The PDCA will need to evolve to meet the needs of its members and adapt to the market to remain successful. Our commitment to improving and evolving the PDCA includes an upcoming strategic planning meeting; our last strategic planning meeting was four years ago in Houston. Many of those long-term objectives have been met, but now we need to look into the future again. This upcoming planning session will provide an outline for the PDCA to become more successful.

Previously, I mentioned that my main goal as president was to increase the contractor membership by 20 percent. I'm happy to report that as of late August, we were within five contractor members from reaching that goal. I'm confident in saying that by the time you read this issue of *Piledriver* that we will have beaten this goal. It hasn't been an easy one to reach, but many of your board members have worked very hard to grow the PDCA. This co-operation between members proves that when people work together good things happen.

Finally, mark your calendar for the upcoming 2008 Annual Conference. The program will be held Feb. 20 to 23, 2008 in Phoenix, Arizona, and its format has been revamped to meet the needs of the members while in a relaxing resort-style environment. Please consider attending the 2008 Annual Conference if you haven't been to one of these programs before. We expect the next conference to be the best ever!

A Driven Pile is a Tested Pile. ▼

The PDCA keeps growing

By Stevan A. Hall

By the time you receive this edition of *Piledriver* magazine, it will be early November and the winter and holiday seasons will be approaching with surprising stealth and quickness. It is about this time of year when we all start asking ourselves that old familiar question, "Where has this year gone?" I don't know about you, but for me each year seems to go by just a little faster than the one before. This issue of *Piledriver* magazine represents the fourth quarter and last edition of the magazine for 2007. The PDCA hopes you have enjoyed your 2007 subscription and found the articles to have been not only interesting, but also informative and educational. The PDCA looks forward to 2008 and another successful year of *Piledriver*.

I want to thank Van Hogan with the Augustine, Florida-based company Ed Waters & Sons Contracting Co. and the chair of the PDCA Communications Committee for his tremendous dedication and commitment to this publication. Van and his committee members work tirelessly on each edition by researching potential stories, securing authors, reviewing drafts, and meeting editorial deadlines in an effort to produce a magazine that reflects the profession and industry we proudly call pile driving.

With the New Year approaching, I want to inform everyone about the PDCA's 12th Annual International Conference and Exposition scheduled for Feb. 20 to 23, 2007, in Phoenix, Arizona.

The site for the conference is the Pointe South Mountain Resort, a Four-Diamond all-suites luxury resort located in a desert oasis at the base of the South Mountain Preserve. The largest all-suites resort in Phoenix, Pointe South Mountain Resort was selected for its appeal not only as a quality resort with all the lavish amenities possible, but also for its quality conference facilities and staff. The resort also boasts an athletic club and spa, a water park, a unique dining experience at six restaurants, and an 18-hole championship golf course.

The 2008 conference will be one you won't want to miss. The PDCA Education Committee and Market Development Committee are busy planning all the various activities, which are sure to impress those in attendance. The 12th Annual International Conference and Exposition will feature contractor-focused presentations, exhibit hall, an industry roundtable, committee meetings, the companion's program, Phoenix tours, receptions, a themed dinner, breaks, golf and tennis tournaments, plenty of social and networking time, and a whole lot more! So mark you calendar for this exclusive PDCA Driven Pile event, and we will see all of you in Phoenix next February.

Finally, I want to let you know about a significant accomplishment made by the PDCA in 2007. During the Board of Directors meeting in Nashville, Tennessee this past March, President Mark Weisz set a goal of having 125 contractor members belong to the PDCA by the end of the year. Well, it's November, and I am proud to say the PDCA is standing on the threshold of that goal. This objective has required the hard work and effort of a lot of people, such as John King (Pile Drivers, Inc., Charleston, South Carolina), chair of the Membership Development and Member Retention Committee who has made it his personal quest to motivate his committee to meet the president's goal. It has also come at the commitment of our members, such as associate member Pileco who paid the membership dues for every contractor company that purchased a hammer from them in 2007 that was not an existing PDCA member.

What is the real significance of 125 contractor members? It is an indication that the PDCA is growing! It is also an indication that the PDCA offers tangible value in its membership and provides an important service to its members and the pile driving industry.

In 2008, the PDCA wants to continue to grow and to become an even greater force in the deep foundation and earth retention industry. Accomplishing

this will require a continued and concerted effort on the part of the board of directors, committees and PDCA staff; I assure you that commitment is intact. It will also require a commitment on your part, the PDCA member. Advancing the membership, as PDCA has done in 2007, is sustainable only if all our members renew their dues in 2008. PDCA had over 90 percent membership retention in 2007; we want 100 percent in 2008. When you receive your 2008 dues invoice from the PDCA, please respond positively and promptly. Doing so will ensure the continued success of the PDCA and our ability to serve the pile driving industry.

Thanks to all our members in 2007 for your support. Your participation is responsible for our success, and you should be proud of the commitment you have made to your association, industry, and business. I look forward to working with each of you in 2008. ▼

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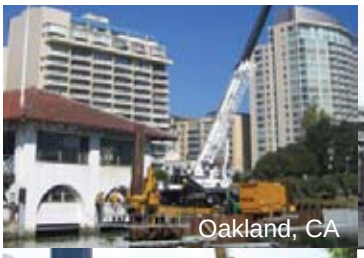
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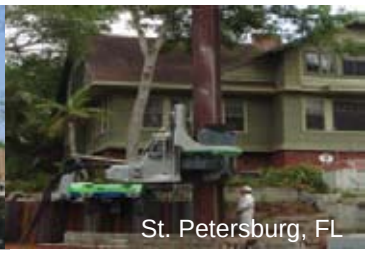
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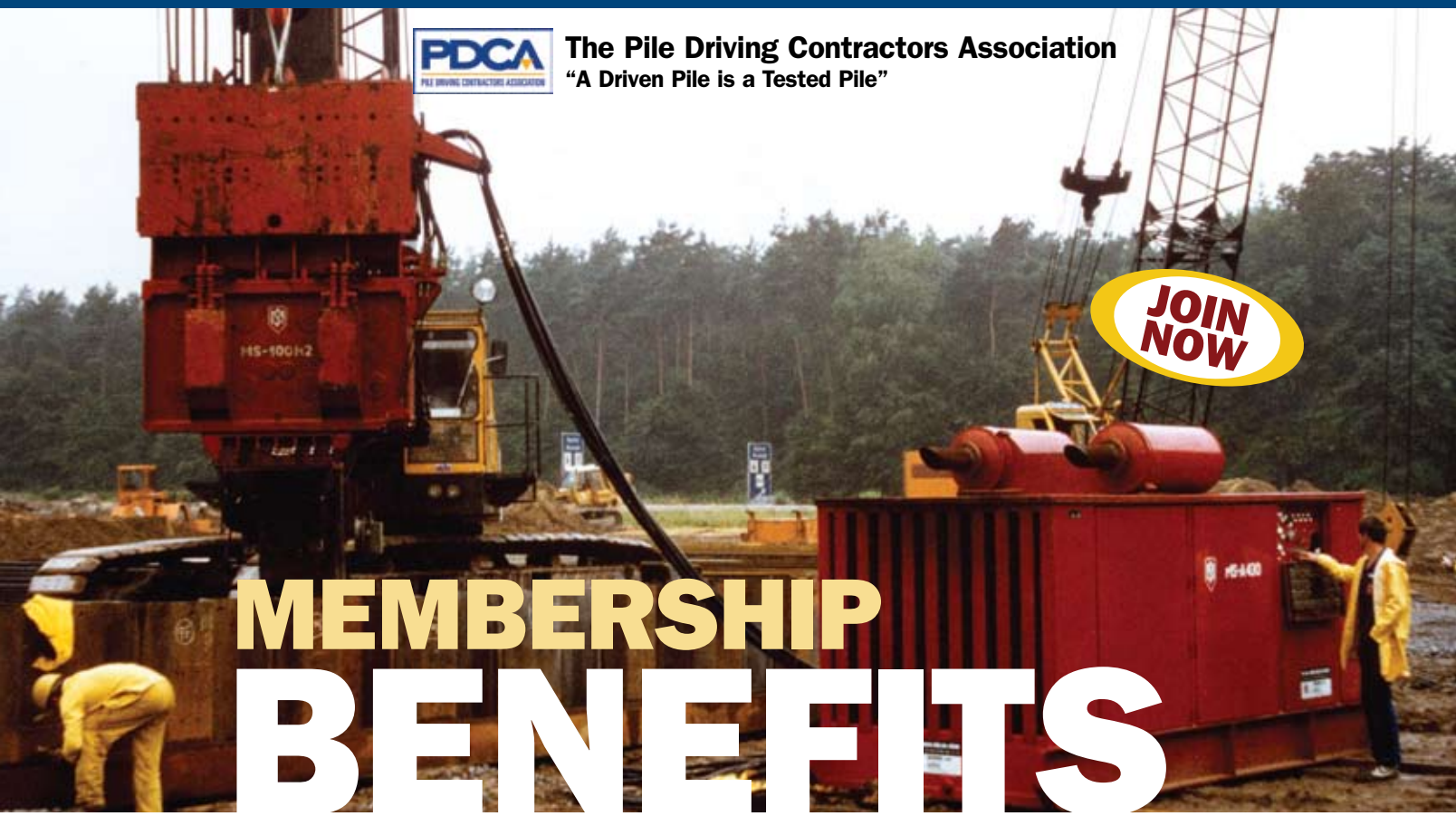

The Pile Driving Contractors Association
"A Driven Pile is a Tested Pile"

MEMBERSHIP BENEFITS

General Membership Information

We are the premier association for pile-driving contractors

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

We are dedicated to advancing the driven pile

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

We are a direct link to decision makers

Major manufacturers take an active role supporting the PDCA. At our conferences, we bring together the world's leading design manufacturers and technical application experts to assist you in advancing the driven pile as a superior product.

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

We offer timely, valuable services

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

Job Referrals

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

Peer-to-Peer Opportunities

With more than 100 contractor members, the PDCA offers many networking opportunities. Whether at our Winter Roundtable, 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 complementary basis.

Educational Conferences and Meetings

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

- The Annual Conference, held in early Spring since 1997, is a nationally recognized conference that brings together leading technical experts, suppliers to the piling industry and contractors. This conference focuses on the key issues faced by pile-driving contractors and features discussions and presentations as well as an extensive exhibit area.

- The Design and Installation of Cost-Efficient Driven Piles Conference (DICEP), held each September since 2000, is a nationally recognized two-day conference that brings together geotechnical and design engineers, college professors and contractors to discuss the latest trends in understanding, analyzing and controlling piling costs.

Industry Development

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

Publications and Reference Materials

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

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

D.R. Jordan, President and CEO, Jordan Pile Driving, Inc.

All PDCA members receive a complimentary copy of the PDCA's codebook, *Recommended Design Specifications for Driven Bearing Piles*, now in its third edition. This book covers all required guidelines for driven piles and includes a suggested bid and payment schedule.

PDCA also offers the *Installation Specifications for Driven Pile-PDCA Specification 102-07* as a CD to all new members at no charge.

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

Connect Worldwide at www.piledrivers.org

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

Leadership Opportunities

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

Membership is available to you

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

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

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


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MEMBERSHIP APPLICATION

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

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

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

❑ **Associate ($725/year)**

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

❑ **Technical Affiliate ($95/year)**

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

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

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

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

Step 2: Demographic Information

Company Name _____ Phone _____

Your Name _____ Fax _____

Address _____ e-mail _____

City/State/Zip _____ home page _____

Step 3. Method of Payment

Attached is my payment of $_____ for annual dues.

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

I am making payment in full by

❑ Check # _____

❑ Credit Card: ❑ MasterCard ❑ Visa ❑ American Express

Card Number: _____ Expiration Date:_____

Name as it appears on card: _____ Signature: _____

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

Applications Systems

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

Equipment

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

Services

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

General

❑ Rental ❑ Sales ❑ Other _____ ❑ Other _____

C. Technical Affiliate Only (check all that apply)

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

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

(All applicants check all that apply)

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

Step 5. Sponsorship: Who told you about PDCA?

Member Name_____

PDCA
PILE DRIVING CONTRACTORS ASSOCIATION

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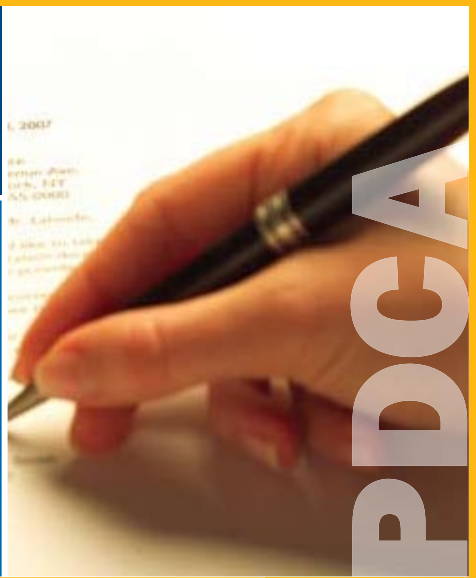

Committee Corner

Committee corner is a new department in *Piledriver* in which we profile the chairs of various PDCA committees. In this issue, we highlight the work of John King who is the chairman of the PDCA Membership Development Committee.

I joined Pile Drivers, Inc. in August 1990, and we drive foundation piles for residential, industrial, and commercial projects of all sizes.

I got involved in the PDCA on May 29, 2002 while at an organizational meeting to form a local chapter. I am embarrassed to admit I had to be nominated by one of the owners of Pile Drivers, Inc. to serve on the steering committee, but once I got involved that first year I fell in love with promoting the driven pile to everyone. Almost a year later, we held our first meeting on May 6, 2003, and we have been going full steam ahead ever since. I am currently finishing up the second year of a two-year term as president of the South Carolina Chapter, and while it is a lot of work, I would do it again without hesitation.

My first national PDCA event was the eighth Annual Conference held in Orlando, Florida, and the first two people I met were Rory Kelly with Skyline Steel (the first Chair of the Membership Committee) and Woody Ford who said to me, "You're part of that Charleston Crowd." They both made me feel like I belonged there, and I was nominated to the board and started serving in February 2005.

It has truly been so much fun and a huge honor to serve with Wayne Waters, Randy Dietel, Harry Robbins, and now Mark Weisz, and I look forward to Van Hogan's service as our leader with Steve Hall. To all of you reading this, I say, "Call me at 843-763-7736, and let me tell you how the PDCA can help you help yourself!" ▼

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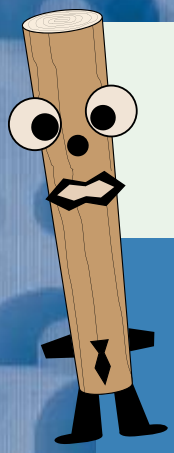

Did You Know?

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

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Standard beam and lagging temporary shoring

A driven solution

Sheet pile: A driving innovation in building foundations

By Dean Abbondanza

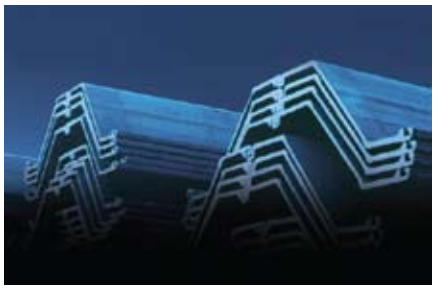
All below-grade foundations require excavation. Unless the site footprint is large enough to do a slope cut, an excavation needs to be supported. Put simply — dig a hole, support the sides and build from the bottom up! The objective is to provide a safe and dry pit to construct the foundations. Traditional "open-pit" construction methods have remained virtually unchanged for the past 50 years.

Conventional support of excavation

Soldier beam and lagging (SOE) is the most common temporary support of excavation, although soil nailing is rapidly gaining acceptance. In deeper excavations and where water is present, slurry walls, soil mixing columns, secant piles and sheet piles are better suited. With less prime real estate available and the drive for mixed-use developments, deeper excavations are becoming more common in today's construction market.

Construction economics

Foundation costs are made up of multiple time and material components, which include temporary shoring, bracing, excavation, dewatering, waterproofing and backfilling; all which need to take place prior to any permanent wall construction. Soil conditions, water table, foundation design and support of excavation (SOE) methods all have a direct impact on these costs. As you can see, the conventional foundation process involves numerous phases that lengthen the critical path of the project. The benefits of subterranean structures are overshadowed by these variables and make owners cringe at the cost of below-grade parking and basement foundations.



Innovative steel solutions

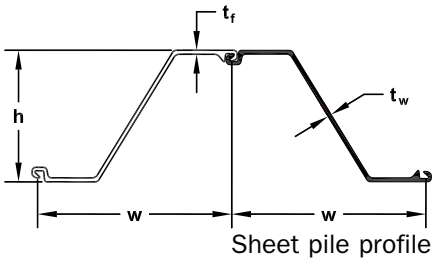
Try to imagine a versatile building material with the strength to serve as the support of excavation and permanent wall element in one. The concept is radical compared to conventional methodology, but not without merit. The material and schedule savings that would be realized could impact the project critical path like nothing ever before. The results could revolutionize foundation construction; and they are doing just that!

Consider underground parking and basement structures; in principle, they are no different than a cofferdam. The base, intermediate, and top level slabs mirror the cross bracing members that would resist lateral earth and water pressures in a traditional cofferdam. These fundamental similarities are what drove

European piling manufacturers to explore new market opportunities for sheet piles in permanent building foundations.

Permanent sheet pile application

For more than 30 years, European and Asian building consultants have embraced the concept of designing below-grade structures with steel sheet piles. So why haven't domestic designers done the same? It has to do with "product perception." European sheet pile producers have been proactive with consultants to reshape the misperceptions that sheet piles are only for temporary shoring and marine structures. By recognizing this product as the versatile structural element it is, their minds opened to this pile innovation, which revealed significant savings that were being buried with conventional foundation methods.



Sheet pile profile

Design considerations:

Loading

Sheet piles began more than a century ago as tension members with no bending capacity. Flat in shape, their strength lied only in the interlock tension. Over time, they evolved into bending elements for retaining applications, but many are still unaware of their vertical load capacity. Structurally, sheet piles are a system of beams that continuously interlock to form a wall with significant axial cross-sectional area. The sheets are providing the bending resistance for the lateral earth and water pressures, but a reserve for axial loading remains to be tapped.

Based on the perimeter building loads and the soils, the structural and geotech may have the option to design the sheet piles for axial loading.

Perimeter grade beam

The tops of the piles are cast into a grade beam to distribute the vertical loads evenly across the wall. The axial load transfer may not only reduce perimeter columns, but will remove the perimeter footings that would be needed to support a conventional structural wall. Sheet pile walls derive strength through soil mechanics, independent of footings. This is just another example of how this efficient structural element does the job of many conventional materials.

Installation

Analysis drives the structural property requirements of a retaining wall material, but there are additional design issues that help determine the sheet pile section. "Drivability" is equally important. Most times, the bending moment and deflection can be achieved by one section, but a heavier section is specified to assure precise installation of the piles without damage.

This is a permanent wall that demands a proactive plan for a proper install. A thorough understanding of the soils is critical for any SOE.

Conventional vibratory and impact hammers will do just fine in a wide range of cohesive and non-cohesive conditions. Piledriving has had some

issues regarding noise and vibrations in urban environments. New technologies in variable frequency hammers, site monitoring programs and hydraulic press equipment are addressing those negatives. Furthermore, pre-drilling, auger and water jetting attachments are enabling piledrivers to penetrate very dense soils that would not be considered in the past.

For a market with urban development sites surrounded by neighboring structures, the piledriving industry is responding to owners and consultants with pro-environmental options and reduced liability.

Durability

Service life code requirements for foundation structures are also to be considered. Fortunately, this application is a non-aggressive environment. The presence of free oxygen on the backside of the wall is virtually non-existent. Therefore, corrosion or mill loss of the steel is minimal. The exposed side of the wall is temperature controlled, ventilated and protected from the elements. With wall thickness ranging from 0.375" to 0.750", the sheet pile section provides a design life minimum of 150 years. This is far beyond what conventional foundations can claim. Durability software is used to validate the design or increase service life to 300 years and beyond.

Fireproofing

European codes do not enforce fire ratings for structures. The fire resistance is engineered into the foundation in the structural design. The United States building code requires a construction material to be fire rated first, then the structural consultant may implement that product into the design. Because this application is new to the domestic market, there are no UL/UBC fire safety codes to refer to for sheet pile as a permanent foundation wall. Fire ratings and code interpretation vary by local jurisdiction throughout the country. Wall vicinity, adjacent property, ventilation, and vertical loading all play a role in the code interpretation.

The AZ sheet pile sections have been independently fire tested to ASTM E-119 standards. The results showed these sections achieved a four-hour rating under axial load. The fire engineering is inherent to the bare steel sections and no additional fireproofing measures are required for the application.

Waterproofing

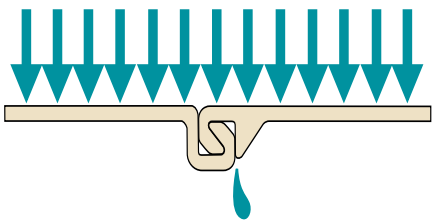
In below-grade parking or basement structures there are two aspects of water intrusion. One pathway is from the base slab/wall interface. This is referred to as waterstop. Whether you have a conventional concrete wall or sheet pile wall, the waterstop measures are no different. A membrane or barrier system is required for the bottom of slab. A hydrophilic stripping about the perimeter walls will address the floor/

Conventional hammer installation for permanent sheet pile wall

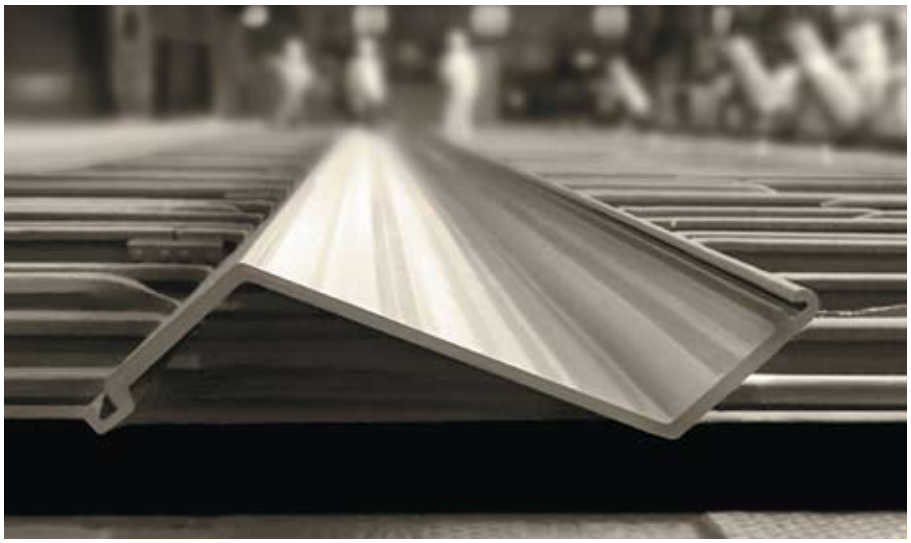
wall interface connection.

When ground water is present, the geotech and structural will increase the mass of the base slab and or incorporate tension piles to resist hydrostatic uplift forces. Unlike cast-in-place walls, sheet piles penetrate about 10 feet or more below the base slab, providing a natural cut-off. This will reduce the base slab material and construction costs compared to concrete walls.

The other aspect of waterproofing refers to the horizontal pathway directly through the wall. With concrete construction, a membrane system is applied to the backside in between the shoring system and basement wall. Steel piling is impermeable to vapor and liquid. The only pathway is through the connection, which accounts for less than one percent of the total wall area. AZ sheets are produced with a Larrsen interlock and have the lowest rate of conductivity among sections produced. Not only is the potential penetration identified, it is minimized. A non- structural seal weld is applied to every exposed interlock to assure a watertight seal for the life of the structure.



Permeability of sheet pile wall



Features and benefits

Foundation footprint

Steel sheet piles initially serve as the temporary shoring. After excavation, they are cleaned, prepped for welding, painted, and left in place as the permanent wall structure. This simple but versatile use of material eliminates the conventional offset area and permanent wall construction costs. With section

Floor / wall interface connection

profiles of 12 to 20 inches in depth, it is easy to see how sheet piles simplify the foundation system and maximize the basement area.

Method of excavation

Permanent sheet pile foundations offer something that conventional systems do not: options. In addition to open pit excavation, sheet piles walls can be used with top-down excavation methods. Unlike most conventional foundations, sheet piles are precast sections that are ready for immediate loading.

Top-down excavation is the only method of excavation that allows the superstructure to be built during the subgrade work. This removes the foundation from the critical path at the earliest point in the schedule. This method employs the slab construction during excavation, so anchors or bracing are not required. Yet again, offering more time and material benefits.

Material and schedule

Open pit excavation with permanent sheet piles is the quickest form of foundation construction. No other SOE system can get a foundation out of the ground and off the critical path faster. In comparison, this offers some material costs savings, but more importantly, dramatically reduces the foundation schedule by up to 50 percent.

Top-down excavation is the fastest method for total project completion. In addition to the material savings, the months of construction removed from the project schedule result in loan interest and liability insurance savings for the owner. Lastly, the facility is in operation generating revenues months ahead of conventional schedules for a better return on investment.

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PDCA Chapters Update

PDCA of South Carolina Chapter

Tuesday, Dec. 4, 2007, Quarterly Dinner Meeting, Town & Country Inn, Highway 17 South, Charleston, South Carolina, begins at 6:30 p.m. Chapter elections will be held during the meeting. Contact John King, Chapter President at 843-763-7736 to register or for more information.

PDCA of South Carolina has proposed a driven pile demonstration to the Civil Engineering Program at the University of South Carolina (USC), Columbia, South Carolina in November 2007. Sarah Gassman, professor of CE at USC is a past participant in the PDCA Professors' Driven Pile Institute.

For more information on the PDCA of South Carolina Chapter, contact Chapter President, John King with Pile Drivers, Inc. at 843-763-7736.

PDCA of Mid-Atlantic Chapter

The PDCA of Mid-Atlantic Chapter recently held its quarterly dinner meeting in Riva, Maryland. The chapter worked in conjunction with PDCA national on the Design and Installation of Cost-Efficient Piles conference that was held on Sept. 27, 2007, at the Turf Valley Resort, Ellicott City, Maryland. More information on the conference can be found at the PDCA Web site at www.piledrivers.org

For more information on the PDCA of Mid-Atlantic Chapter, contact Mike Jahnigen with Sun Piledriving Equipment at 302-539-6756.

PDCA of the Gulf Coast Chapter

Thursday, Sept. 20, 2007, the PDCA of the Gulf Coast Chapter held its third Quarter Meeting at Smilie's Restaurant, 5725 Jefferson Highway, Harahan, Louisiana. The meeting began with a social and open bar at 6:00 p.m., followed by dinner and a business meeting at 6:45 p.m. The speaker for the night's meeting was Tim Carey with Arch Wood Protection. Carey's presentation was titled Timber Piles — An Overview of the History, Use and the Latest EPA Accepted Preservatives. Sponsors for the evening were T.R. Miller Mill and Arch Wood.

For more information on this meeting or PDCA of the Gulf Coast Chapter, contact Foundation Materials, Inc. at 504-467-5648 or Specialty Piling Systems, Inc. at 888-231-6478.

PDCA of California Chapter

The PDCA of California will hold its annual meeting in early December. Final plans will be announced in future E-Letters.

Information on all PDCA chapters can be found on the PDCA Web site at www.piledrivers.org ▼

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"Mandal Pipe Company Supplies Piling for the John James Audubon Bridge in south central Louisiana"

The John James Audubon Bridge project is a new Mississippi River crossing between Pointe Coupee and West Feliciana parishes in south central Louisiana.

The bridge–proposed to be the longest cable-stayed bridge in North America when complete–will replace an existing ferry between the communities of New Roads and St. Francisville.

The bridge will also serve as the only bridge structure on the Mississippi River between Natchez, Mississippi and Baton Rouge, Louisiana (approximately 90 river miles).

Over 6000 Tons of Large Diameter Steel Spiral-weld pipe ranging in size from 48" to 96" O.D. and in wall thicknesses from .500 to 1.000 inches was supplied by Mandal Pipe Company for both the Pier foundations and the temporary work trestle. Specially designed trailers were constructed to facilitate the transportation of the massive 30 Ton pieces of 96" x 1.000" steel caissons manufactured in 60' lengths.

The project is being constructed by Audubon Bridge Constructors and is expected to be completed by the summer of 2010.

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Building bridges

At Key Constructors, Inc. it's more than a line of work — it's a philosophy

By Judy Penz Sheluk

Key Constructors, Inc. started in Madison, Mississippi in 1975, the vision of Charles Webster, a man who had been in the construction business for more than 15 years before deciding to start his own general contracting company that specialized in pile driving and concrete construction.

Webster was smart enough to know he couldn't do it alone, and was joined by several former business associates, many hired away from his previous employer, Con-plex, a company heavily involved in the Interstate infrastructure program in the 1960s.

Webster's hand-picked team soon realized it had all the key people to operate a great business and the company name, Key Constructors, was a natural fit. But what started out as a small firm soon developed into a company employing some 100 people, and with the exception of a few administrative personnel, most are involved in the hands-on, day-to-day operations of building bridges, overpasses, dams, culverts, and levies.

Clients of Key Constructors include the Mississippi Department of Transportation, the Natural Resources Conservation Service and the Corps of Engineers. While the majority of projects are in the company's home state of Mississippi, the firm has also completed projects in Louisiana, Texas, Arkansas, Tennessee, Alabama, and Florida. About 98 percent of its business is earned through the competitive bidding process.

Membership in the Pile Driving Contractors Association (PDCA) has been a valuable resource, providing networking opportunities, annual conventions, and most importantly, a united voice in favor of pile driving methods of construction. Currently, Key is working on the largest project in company

Rankin Street Jackson, Mississippi

"I never received preferential treatment, and it's a philosophy I've adopted. In fact, I think that is one of the reasons our company is so successful. We hire the best people for the job, but it doesn't matter what your title is. Whether you're an engineer, a pile driver, or a CEO, if something needs to be done every one of us is willing to get in the trenches and get dirty."

Rick Webster, CEO Key Constructors, Inc.

history, a $33 million, 4,000-foot-long high level bridge over the Yazoo River in Vicksburg, Mississippi.

Turnover in the supervisory ranks at Key Constructors is minimal. Many have worked their way up the corporate ladder, including Chief Financial Officer, Paul McPhail, P.E., who earned his stripes with 21 years in field construction, cost estimating and total cost accounting. Today, McPhail manages all aspects of job procurement, job accounting, and corporate accounting.

President David Trevathan, P.E., PLS also worked his way up, starting in 1979 as a field engineer.

"I traveled from job to job for 20 years, putting 70 to 80,000 miles on my vehicle year after year," said Trevathan. "Thankfully, today, most of my time is spent at the office, and we leave the travel to our younger engineers."

That's not to say that Trevathan regrets the years spent in the trenches.

"My favorite memory is that of a bridge across the Yazoo River in Yazoo City, Mississippi. It was 1986; as a young engineer that bridge was a tremendous challenge, but it's still a functional bridge today," he said.

Even Chief Executive Officer Rick Webster worked his way up the ranks.

"My father, Charles, founded the company when I was 10 years old," said Webster. "Holidays and summer, I'd work in the shop with my older brother, Chuck. We certainly didn't get the glamour jobs and I can remember coming home one day — I might have been 12 or 13 — and telling my mother that I quit. All she said was 'OK, you best tell your father when he comes home.'

Rankin Street Jackson, Mississippi

"I had a high school teacher who used to say, 'Rick, if you don't straighten out, you'll end up digging ditches for a living.' I saw her recently at a charity fundraiser and she asked me what I was up to. 'Digging ditches,' I told her. 'And not only do I love it — I'm making a darn fine living at it.'"

Rick Webster, CEO Key Constructors, Inc.

"That's just what I did. My father worked all kinds of crazy hours, but when he finally came home that night I told him what I'd told my mother, and he said that was fine, didn't even seem to question it. Lo and behold, at 5:30 a.m. the next morning my father came into my room to wake me up for work. Apparently he hadn't understood me, so I explained it to him again — I quit. To which he informed me, 'Son, you quit getting paid; you didn't quit working.' I worked the rest of the summer without a check.

"You would think my brother and I might have learned from that experience, but kids can be slow learners. That fall, a dump truck came to our house and dropped off thousands of slave-made bricks, which had historical significance. Our job was to clean the mortar off those bricks, for which we were paid a penny a piece. We'd clean up a few on Thursday and Friday — just enough to get us some pocket money for the weekend — and by the following summer, when school was out, there was still a considerable pile of them waiting for action.

"That first week of our summer job, Chuck and I cleaned bricks for 10 hours a day and we were eagerly awaiting our first pay check, expecting about $3 to 4 an hour. When we didn't get paid with the others, we asked our father what hap-

Highway 61 Redwood, Mississippi

pened. That's when we learned the cold, hard truth. 'Sons,' he told us, 'You've had all year to clean those bricks. When you're finished with them and ready to do the summer work, then you'll be paid.' And of course, he was right. We'd procrastinated all year long."

As he got into his teens, Webster was sent to work in the field.

"I'd be driving pile, down in the bottom of a footing with the spitting grease and acid, and I swore I'd never do that for a living," said Webster. "After graduation, I joined the National Guard, spending six years in active duty and attending several different schools. But when I completed Special Forces training, I came out with a new perspective. I went back to work for Key as a laborer, and for a while, my father didn't even know; we barely spoke in those days."

Their relationship has strengthened over the years, with Rick proving his worth as he worked his way up from laborer to carpenter to operator, eventually taking over a small crew.

"I never received preferential treatment, and it's a philosophy I've adopted. In fact, I think that is one of the reasons our company is so successful," said Webster. "We hire the best people for the job, but it doesn't matter what your title is. Whether you're an engineer, a pile driver, or a CEO, if something needs to be done every one of us is willing to get in the trenches and get dirty. We also do it safely; we hold weekly, monthly, and quarterly safety meetings, and every supervisor and worker is held accountable and responsible for the safety of their fellow workers."

Although Key Constructors has worked on numerous projects throughout the years, by far the most memorable was the rebuilding of the Popps Ferry Bridge in Biloxi, Mississippi, which was devastated by Hurricane Katrina. The company was awarded the $7.65-million contract from the city of the Biloxi with the stipulation that they complete repairs within 100 days, which was a time frame that was critical to the city's residents. The two-lane bridge is a key artery for accessing the densely populated housing areas north of the Biloxi peninsula, carrying more than 20,000 vehicles a day when operational.

"We've not only built bridges over the years, we've torn down bridges, so I know the force that is required for this type of carnage," said Webster. "We're equally concerned about our aging infrastructure — you can't see inside a bridge, inside concrete — and traffic volumes have multiplied several times since many U.S. bridges were built. After the catastrophic event in Minneapolis, we'd hear comments like, 'That will create awareness,' but sadly, that's not the case. Politicians and people quickly forget — no one really wants to be inconvenienced by road work."

Still, Webster is proud of the company his father started all those years ago, and of his many roles along the way.

"I had a high school teacher who used to say, 'Rick, if you don't straighten out, you'll end up digging ditches for a living,'" said Webster. "I saw her recently at a charity fundraiser and she asked me what I was up to. 'Digging ditches,' I told her. 'And not only do I love it — I'm making a darn fine living at it.'" ▼

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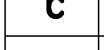
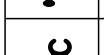
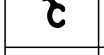
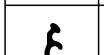
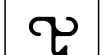
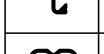
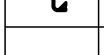
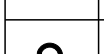
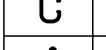
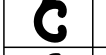
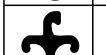
	For PZ and PZC (Ball + Socket)	
	**PZ 90**	Corner (~50° to ~130°)
	**PZ Tee**	Tee Corner (~50° to ~130°)
	**Joker**	Tee Corner (~50° to ~130°)
	**Bullhead**	Tee Corner (~50° to ~130°)
	**CBF**	Tee Corner (~50° to ~130°)
	**Colt**	Corner (~25° to ~65°)
	**Cobra**	Corner (~115° to ~155°)
	**PBS-M** **PBS-F**	PZ / PZC + Peiner Beam
	**BBS-M** **BBS-F**	PZ / PZC + Domestic Beam
	**WOM** **WOF**	PZ / PZC + Pile Pipe Weld-on
	**LBM** **LBF**	Transition Profiles 
	**For all AZ** (U-Pile/Larssen) **Hoesch 1706, 1806, 1856, 1906, 2506, 2606, 2706**	
	**V 20**	Corner (~30° to ~150°)
	**VTS**	Tee Corner (~45° to ~135°) Circular driving
	**VT**	Tee Corner (~45° to ~135°) Omega corner
	**Omega 12**	Omega corner Jagged U-Walls
	**V 22**	Larssen Interlock + Pipe Pile Weld-on
	**PL**	U-Pile + Peiner Beam
	**PLZ I** **PLZ II**	Peiner Beam + Larssen-Z Piles
	**LBM** **LBF**	Transition Profiles

	For Hoesch-Z with a width of 22.64 inches or 575 mm	
	**HZ 90**	Corner (~45° to ~135°)
	**HZT**	Tee Corner (~45° to ~135°)
	**HZ**	Variable weld-on
	**PZL** **PZR**	Hoesch-Z + Peiner Beam
	For Hoesch-Z with a width of 30.15 inches or 675 mm	
	**HZn 90**	Corner (~45° to ~135°)
	**HZTn**	Tee Corner (~45° to ~135°)
	**HZn Knob**	Weld-on
	**HZn**	Variable weld-on
	For PS-Flat Sheet	
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	**SWC 90 B**	90° Tee Pile
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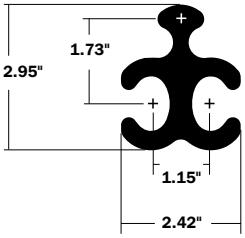
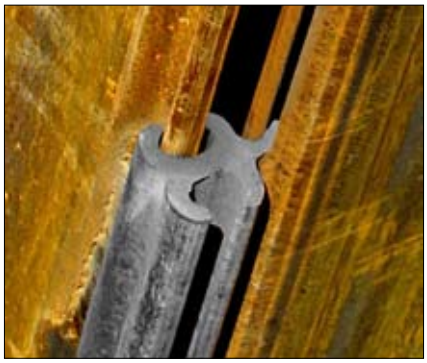
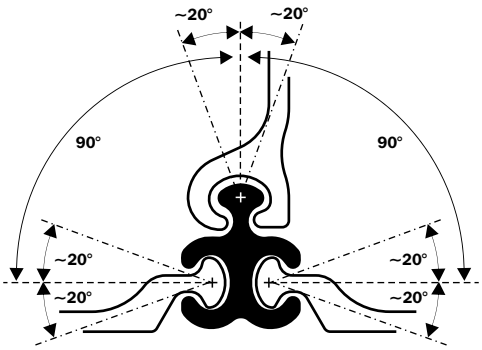


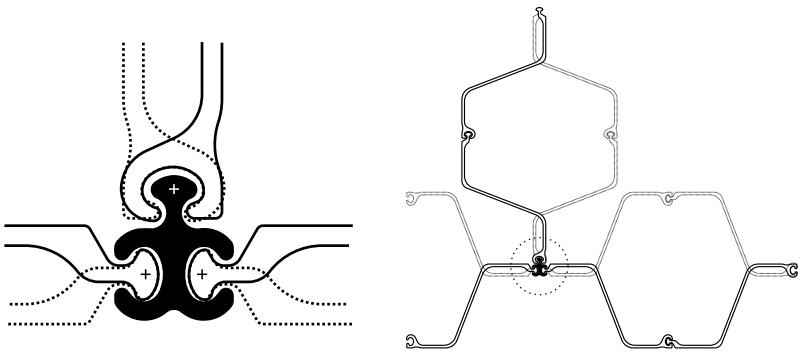




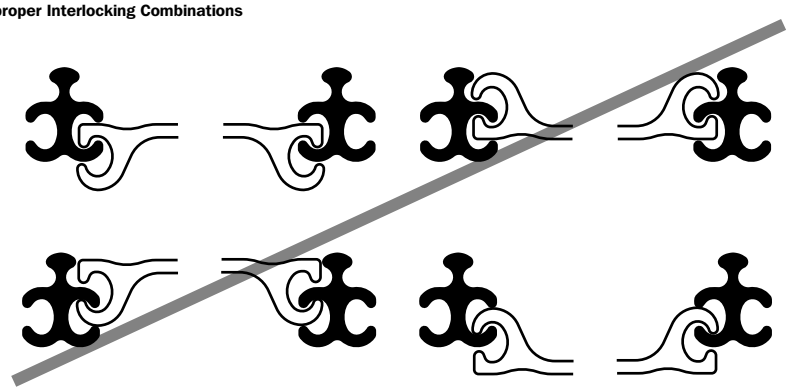
Installation Guidelines

1. General interlocking guidelines call for a ball-to-socket or a socket-to-ball connection. Please review the proper interlocking examples listed.
2. Thread the connector into the interlock while the sheet pile is out of the ground.
3. Adjust the connector to the appropriate position.
4. Tack or spot-weld the connector in place (typically a 10" weld attaching the connector to the sheet pile at the top is sufficient).
5. Drive/extract the sheet (with the connector attached) as you would normally.

Proper Interlocking Examples



Improper Interlocking Combinations



Please note:

1. Swing or rotation stated are typical but can vary by 10° or more due to rolling tolerances found in sheet pile interlocks.
2. PilePro® connectors are protected by patents.

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11.750	.375	45.557	18,500
11.750	.480	57.775	5,600
12.750	.250	33.75	10,200
12.750	.375	49.56	7,500
12.750	.500	65.41	11,250
13.375	.480	66.105	12,400
13.375	.514	70.601	4,400
13.375	.625	85.106	8,800
13.800	.625	87.943	6,600
16.000	.250	42.05	12,300
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A seaside make over

Naval Weapons Station Earle welcomes two improved piers

By Jeanne Fronda and Chris Leykam, P.E.

Naval Weapons Station Earle lies between Raritan Bay and Sandy Hook Bay in Leonardo, New Jersey. The United States Naval base, which was originally constructed in the 1940s, manages, houses, transports, refurbishes and issues ammunition and weapons. The waterfront pier complex gives ships a secure harbor to obtain ammunition and it provides a route to commercial rail facilities with lines approaching from the west, where most of the ammunition cargoes spring. Earle has three piers and its middle branch, which includes Trestle 3 and Pier 3, required replacement to meet modern and future mission demands of the Navy.

Weeks Marine, Inc., headquartered in Cranford, New Jersey, has completed many projects. The company is a family-owned enterprise that was founded in 1919 and was known as Weeks Stevedoring with two cranes operating in New York Harbor. It now has six divisions — construction, dredging, stevedoring, marine transportation, heavy lift and salvage, and equipment charter and rental — and works with over 500 tugs, dredges, barges, cranes, and other pieces of waterborne equipment. The Earle Pier Complex Replacement project was managed by Weeks Marine's construction division in partnership with Weeks Marine's dredging division, which performed the bucket dredging for the project.

Project introduction

As the general contractor, Weeks Marine was commissioned by the Navy to demolish the old trestle and pier and reconstruct and install a whole new pier and trestle, designated Trestle 3A and Pier 3A. The new trestle and pier were built within the footprint of the Trestle 3 and Pier 3 structures. In order to keep the facility operational throughout construction, Weeks Marine was first contracted to improve Pier 2 by installing mooring platforms and upgrading the electrical and mechanical systems for ship service.

Design

The primary structures, Trestle 3A and Pier 3A, were designed by the New York-based company Han Padron Associates, in a separate contract with the U.S. Navy. Compared to the old 1,287 x 136' simple pier, Pier 3A is 945 x 161' with an upper level loading platform and lower level gallery. Trestle 3A was designed to be 1071 x 58', 12 feet wider than the original, to better accommodate vehicle and rail traffic. It extends from a point nestled between two existing trestles, forming a "Y," out to Pier 3A. Han Padron chose large diameter high capacity piles for the design, which allows the pier to withstand considerable ship docking and mooring loads without the use of batter piles.

Environmental issues

Sandy Hook Bay, which is an arm of Raritan Bay, is on the coast of northern New Jersey and home to diverse creatures. During the project permitting process, the presence of sea turtles was identified as a major concern of the U.S. Fish and Wildlife Service. In response, Weeks Marine hired a qualified inspector to monitor the area as pile driving progressed through the sea turtle migratory season in the Bay. If turtles were observed within 125 feet of pile driving operations, work ceased until the turtles left the area.

Weather conditions were also a concern, as the pier complex extends 2.5 miles from shore. Certain storms and weather patterns caused some problems. During the winter, snow and ice quickly built up on equipment and surfaces. Conditions were most difficult during Northwest winds that, when aligned with the long 7-mile fetch across the Raritan Bay, created waves and chop higher than 5 feet. Last August, tropical storm Ernesto brought high winds and large tides. During the storm, one of the material barges broke free and floated overtop the new piles. As the tide dropped, the barge came to rest on top of the piles. The situation was quickly resolved the following day when the Weeks #533 derrick with its 500-ton Clyde 52 crane on a 90 x 300' ABS Class hull, the largest barge mounted whirley crane on the East Coast, was dispatched to the site. The stranded barge was rigged by Weeks Heavy Lift personnel in a two-point basket with soft slings to a large spreader frame. The Weeks #533 then simply picked up the 300-ton barge with its main 24-part block and set it back down in the water. Weeks Marine project manager Dave Vosseller said workers had to deal with the weather and wind conditions, minimize their exposure, and be prepared. There were no injuries.

Construction obstacles

Submerged 4kV and 15kV power lines traversed the footprint of the new trestle and pier and the location of a new mooring platform, which was part of the Pier 2 upgrade. The submerged cables were electronically located with divers, and positions were surveyed into the project grid; from the survey, areas in conflict were identified. Divers then exposed the cable in these spots and relocated them.

The distance between pile bents at Trestle 3A, Pier 3A, and Pier 2 Walkways was also an obstacle. At Pier 2, the size and quantity of piles was small making a conventional stand alone template time and cost consuming to use. The solution was a small cantilevered frame fixed to the stern of the Weeks #751 Jackup Derrick Barge. As for Trestle 3A and Pier 3A, a single tier pile-driving template was used to set and drive up to ten 42" diameter piles per location. It consisted of a base

The Weeks #532 Derrick drives 42" x 3/4" w.t x 158-foot test pile "K25" with the Pileco D-125 diesel impact hammer.

frame supported by four 36" diameter spud piles, and a checkerboard ladder frame with guide rollers and hydraulic gates at each pile location. Despite its size it was easily moved in two picks with the Weeks #532 Derrick Barge, and its 350-ton tub mounted crane.

Due to the overall length of the pier and distance from adjacent structures, a Trimble RTK GPS system was set up with a base station at the "Y" for survey control of the pile driving template and pile as-builts following driving. The position of the template was monitored in real time on display screens in the crane operator's cab and the field engineer's control room on deck.

The pile test program at Pier 3A needed to begin as soon as possible to confirm pile driveability and finalize pile order lengths, before the demolition of the old pier. Each of the 15 test piles was driven through cutouts in the existing pier deck. Later, the pier was carefully removed at each of these locations to prevent damage to the pile coating.

Pile driving

Two unusual construction solutions involving the driven piles were employed by Weeks Marine on this project. Seamless fiberglass concrete-filled jackets were required to protect the top 10 to 15 feet of each pile. The jackets used a unique self-sealing soft-fit ring that permitted the jacket to be placed and concrete filled from the top without the use of divers. In addition, the static load test on certain indicator piles required a 1,900-ton reaction load. Weeks Marine lifted two 40 x 120' deck barges and set them on either side of the test pile on the pier deck. A reaction frame was installed across the top of the barges and the pile jacks and affixed to the barges with DYWIDAG Systems high-strength rods. The barges were then filled with water to increase the total load to 1,900 tons, and the complete system was jacked up in a barbell-like fashion to test the pile.

"No other foundation type was as practical for such an offshore pier structure. The speed of driving with vibratory hammers to within a few meters of final tip elevation made driven piles more beneficial to use for this project than other foundation type," said Weeks Marine, Inc. engineer Chris Leykam, P.E.

Logistical problems

Obtaining the piles and the delivery of precast concrete were two logistical issues encountered by Weeks Marine. The 42" steel pipe piles were rolled in Greece and shipped in 60-foot sections to Kingston, Rhode Island. They were then offloaded by South East New England Shipbuilding Co (SENESCO), spliced in lengths to 175 feet, coated, re-loaded to Weeks barges, and towed to the job site by tugboat. The new Earle structures are comprised of over 1,800 pieces of precast and prestressed concrete delivered by truck, including a series of pile caps up to 90 TN each. Besides being overweight, at 16' wide x 17' high, many of these caps were also over height and over width. This required the use of specialized high-capacity trailers with very low ground clearance and added axels to handle "superloads." The pieces were then transloaded to barges on site by Weeks and towed out to the new pier by the 1400 HP tugboat, Weeks Virginia.

Materials and machinery used

Materials used to construct the Pier 3A and Trestle 3A included the open-

end steel pipe piles themselves, 42" in diameter and between 140 and 190 feet long, installed in 365 locations. In addition, temporary 36" piles were driven by vibratory hammer to support pile driving templates at Trestle 3A in the areas closest to the "Y" where space limitations prevented the use of Weeks Marine's primary template. Precast concrete components included 1175 each pre-stressed and 625 each precast components, totaling over 33,000 tons, while 13,600 CY of 5000 psi cast-in-place concrete were required with 2,200 tons of ASTM A934 "purple" coated rebar.

At Pier 2, Weeks Marine used 24" diameter and 36" diameter open-end pipe piles in the design of temporary structures to support pile driving loads and mass cast-in-place concrete loads at the Pier 2 mooring platforms. These temporary piles supported a precast concrete pile template deck, which aligned the batter piles and later acted as a soffit form for casting in place the mooring platform cap. Weeks Marine also installed 130 timber pile plumb posts and 16 timber pile concrete jackets as part of the Pier 2 repairs.

The Weeks #532 Derrick lifts the 70-ton pile driving template platform base complete with temporary support piles.

There were several open-end driven piles used, which included 42" dia. x 3/4" w.t. coated steel pipe piles at Trestle 3A and Pier 3A; 18" dia. x 1/2" w.t. coated steel pipe piles at Pier 2 Mooring Platforms and Walkways; 42" dia. x 3/4" w.t. steel pipe piles for Pier 2 Lightning Masts; and 24" diameter x 1/2" w.t. and 36" dia. x 5/8" w.t. temporary steel pipe piles that acted as template piles. During the demolition of Pier 3, over 10,000 timber piles were extracted with an ICE 416 vibratory driver/extractor and timber clamp.

(Background) The East half of the old Pier 3 deck has been removed, and the Weeks #500 bucket dredge and Weeks #668 Crawler crane are extracting the old timber piles and caps. (Center) 1390-ton Static Load test being performed on a 42" pile for the new Pier 3A. The 1900-ton reaction weight consist of (2) 30'x90' deck barges filled with water and load transfer beams across a set of (4) Dudgeon hydraulic jacks.

Equipment used on the project included the Weeks #751 Jackup Derrick Barge, which has a100-ton Dravo Model 28 revolver crane on a 130 x 58' barge with four Delong jacks. The Weeks #751 drove the 18" mooring platform piles to 154 ton ultimate compression capacity, in lengths of 122 to 136 feet. This was accomplished with an ICE 44-50 vibratory hammer in 120-foot leads with guide rollers; a Vulcan 010 air impact hammer with 60-foot leads and 1300 cfm compressor; and a Delmag D36-32 diesel impact hammer with 60-foot offshore leads.

For installation of the large 42" diameter piles, the Weeks #532 Derrick Barge was deployed to the site. The Weeks #532 is a 350 ton American M-40 revolver crane on a 90 x 300' ABS class barge with 9-point mooring system. It began work with the two 115' long Lightning Mast foundation

The first static load test setup on a new 42" diameter pile for Trestle 3A driven though the deck of old Trestle 3 prior to its demolition, adjacent to the Pier "Y" area. The 1900-ton reaction weight consist of (2) 30'x90' deck barges filled with water and load transfer beams across a set of (4) Dudgeon hydraulic jacks.

piles that were driven through cutouts in the Pier 2 deck. Operations then relocated west and the Weeks #532 began driving the 42" pipe piles, which support Trestle 3A and Pier 3A in 54 bents. These new piles were driven to 1380 ton ultimate compression capacity in lengths of 140 to 190.' Each pile was advanced first with an ICE V125 vibratory hammer to within 15' of final tip elevation. The piles were then driven home with either a Pileco D125-32 (primary) or a Delmag D100-13 (backup) diesel impact hammer.

No other foundation type was as practical for such an offshore pier structure. The speed of driving with vibratory hammers to within a few meters of tip elevation made driven piles more beneficial to use for this project than other foundation type." Weeks Marine, Inc. engineer Chris Leykam, P.E.

Execution and completion

The project has a value of $133 million and construction began in August 2004. The structure itself is complete, but internal workings such as mechanical and electrical concerns must be finished to complete the entire project, which has a projected completion date of May 18, 2008.

"A large part of Weeks Marine's success is due to the extensive amount of equipment customization that is engineered and fabricated in-house to meet specific project needs and to enter new markets. This includes pile rigging, large pile supported and floating work platforms, custom leads, and large diameter driving helmets," said Leykam.

"This project highlights Weeks Marine's equipment and talent. In order for the project to be completed on schedule, there was a need to create an assembly line-type of construction. This was obtained by the company's ability to furnish unique equipment and its commitment to dedicating resourc-

es and financing to achieve satisfactory results. Included in this is the commitment of the Navy and Weeks Marine's subcontractors to work through difficult situations as they arise," said Vosseller.

The project was also completed with contributions from vendors and contractors, which included Pileco that supplied the D-125 hammer; ICE that supplied the V125 vibratory driver/extractor; ZS Technologies who custom manufactured the seamless fiberglass pile jackets; and Jersey Precast Inc. for casting and shipping over 1,800 precast and prestressed concrete units on schedule, including the many "superloads." In addition, William F. Loftus Associates and GZA GeoEnvironmental Inc. performed pile driving inspection and dynamic analysis; both companies worked with Weeks Marine and the Navy's engineer, Han Padron Associates, during the pile test program and monitoring of production piles to ensure target capacities were achieved.

Weeks Marine's expertise allowed for the company to achieve its goal of improving Naval Weapons Station Earle's trestle and pier.

"This size of the job was a challenge put forward, and we were able to meet our schedule and budget," said Vosseller. "As far as the basic foundation and structure, we were able to overcome some of the situations with the weather and logistics and complete the pier on time." ▼

(Right) Weeks #532 Derrick sets 175ft long 42" dia x ¾" w.t. pipe pile in template platform frame
(Left) Weeks #720 jackup barge sets a 30-ton precast pile cap on jacketed piles.

Trestle 3A test pile program: The Weeks #532 Derrick drives a 42" dia. x 3/4" w.t. open-end pipe pile through a cutout in the old Trestle 3 concrete deck, with an ICE 125 vibratory hammer.


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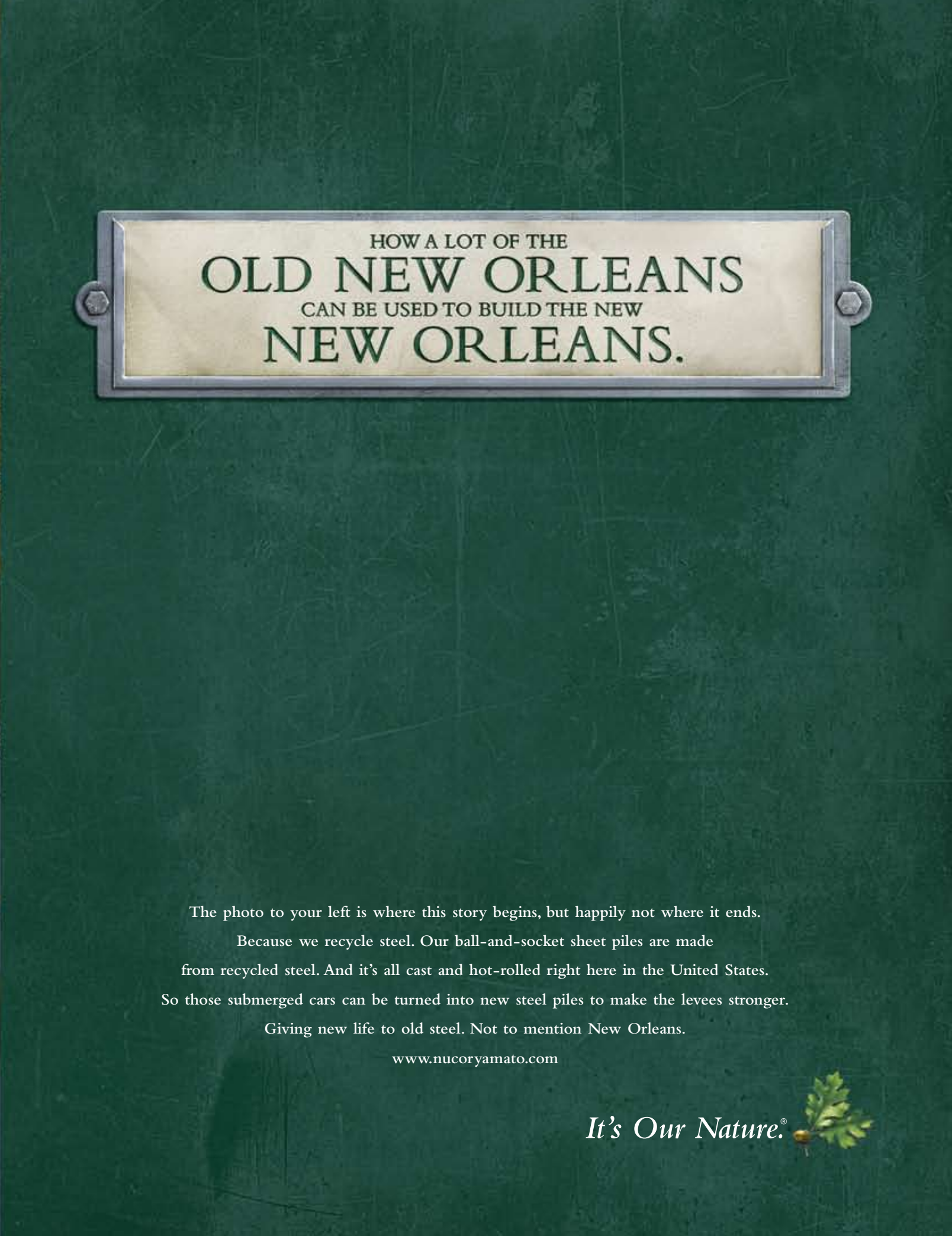
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A full-service contractor

Brayman Construction Corporation provides innovative solutions

By Tom Puzniak Jr.

Brayman Construction Corporation, headquartered in Saxonburg, Pennsylvania, is a full-service general and specialty geotechnical contractor with operations throughout the entire Eastern United States.

Company history and background

Incorporated in 1947 as a bridge specialty contractor, Brayman has grown from a small family business specializing in bridge work and the construction of box culverts to a regionally recognized corporation providing innovative and diverse design/build solutions in multiple market sectors — both public and private.

Over the last 60 years, Brayman has significantly grown in size and has expanded its capabilities to offer an array of services. The synergies developed by Brayman's combination of general and geotechnical contracting experience complement each other and provide the necessary advantage in performing a variety of structural/geotechnical projects. Under the guidance of President and CEO Stephen M. Muck, Brayman has become one of the region's largest private corporations with annual revenues approaching $100 million.

Although Brayman is a large organization, its employees have never lost their sense of values, which are summarized within the company mission statement:

We, the Brayman Team, resolve to become the pre-eminent contractor in our markets through training, innovation, and quality craftsmanship. We will always perform our work with safety, integrity, and pride while earning the respect of our customers, subcontractors, suppliers, community, and one another.

Complementing these values is Brayman's aggregate bonding capacity in excess of $300 million, allowing the organization to maintain its position as a pre-eminent competitor in all the markets it serves. In addition, its substantial inventory and efficient use of general and specialty construction equipment allows the company to support numerous ongoing projects. State-of-the-art shop, maintenance, and fabrication facilities allow Brayman to expertly maintain and service all vehicles and equipment, as well as provide customized fabrication capabilities to quickly satisfy each project's unique requirements. Continuous internal and external training of personnel to enhance existing skills allows Brayman to keep the organization in the forefront of providing innovative approaches and solutions.

Divisions

Brayman Construction Corporation has three distinct divisions: general contracting, foundation, and demolition. The company's General Contracting Division provides comprehensive and innovative design/build services on larger complex civil infrastructure proj-

ects including bridges, elevated concrete structures, dams, cofferdams, and mass transit facilities for various public and private clients, as well as other general contractors throughout the Mid-Atlantic region.

Similarly, Brayman's Foundation Division, which consists of three groups — the Marine & Piling Group, the Caisson (Large Diameter) Group, and the Drilling & Grouting (Small Diameter) Group — provides comprehensive geotechnical construction services for all sizes of construction projects, both civil and commercial for public and private sector clients throughout the Mid-Atlantic region.

Equally innovative as Brayman's two other divisions, the Demolition Division provides economical and cost-effective solutions for a variety of demolition projects.

As a supporting entity to each of their divisions, Brayman Construction also has a dedicated and experienced Steel Erection Group that provides diverse steel erection capabilities, including bridge supports and girders, building erection, conveying systems, and other unique applications.

Although organizationally structured within three distinct divisions, Brayman personnel interact on a daily basis as a cohesive team. This successful team approach allows personnel to learn from each other's expertise and diverse perspectives to jointly derive the optimal solution to each of its unique endeavors. Brayman maintains multiple satellite offices throughout the Mid-Atlantic region that are all staffed with key Brayman supervisory personnel who are experienced in managing complex multi-million dollar projects.

The company also has extensive experience with the use of floating plant operations, as Brayman owns and maintains an extensive amount of support equipment such as cranes (with capacities up to 250 tons), deck barges of various sizes, and an assortment of spud barges. Specific design/build capabilities offered by Brayman's Marine & Piling Group include barge/vessel unloading coffercell construction, concrete-filled pipe piles, retaining walls, shoring systems, cofferdam systems, pile foundation abutments/piers, and tremie seal river piers. Related and supporting marine services also offered by the company include dredging, scour protection, reinforced concrete cell caps, access walkways, and E crane platforms.

Brayman's Marine & Piling Group is gaining recognition for its proven ability to successfully and safely deliver innovative marine and piling solutions on inland waterways systems of the United States, as well as on non-navigable rivers, reservoirs, and lakes. When applicable, Brayman utilizes "value engineering practices" in the development of appropriate solutions, which typically result in significant cost and schedule savings to the customer. Similarly, Brayman also provides innovative driven piling solutions in numerous non-marine applications.

Projects of mention

Brayman recently completed an initiative for American Electric Power's Cardinal Power Station, located on the Ohio River in Brilliant, Ohio. Black & Veatch Corporation contracted Brayman to provide "marine works construction" for the Cardinal Unit 1 and 2 Flue Gas De-sulferization (FGD) project. For this $6 million project Brayman was contracted to construct twelve 20-foot diameter, two 30-foot diameter, and three 40-foot diameter sheet pile cells for the new barge unloading facility. Brayman also performed minor dredging, provided scour protection, constructed access walkways, and reinforced cell caps and E crane platforms.

During the execution of this primarily water-based river project, four floating plants were used simultaneously. These plants were comprised of multiple barge platforms with various lifting capacities. The capacities ranged from 100-ton rigs for support work to two 150-ton rigs for cell fill and installing 83-foot sheet piles, and a 250-ton crane for sticking and driving the 93-foot-long sheet piles.

A particular challenge of the Cardinal project was that all owner-provided pile material was purchased in 60-foot-lengths. Subsequently, all piles had to be spliced to the desired lengths that ranged from 83 to 93 feet. Construction of six cells was successfully accomplished with the placement of pile at 60-foot lengths with additional material spliced in place, resulting in a total pile length of 83 feet. The remaining 11 cells were installed with single sheets of spliced pile that ranged from 83 to 93 feet in length. Brayman successfully met the challenges associated with this project and safely completed its project requirements on schedule and within budget.

Another project of mention is Brayman's ongoing $23 million project at the Sammis Power Plant located in Stratton, Ohio. Brayman is the piling subcontractor for Bechtel Power and First Energy Corporation. This project, which is similar to the Cardinal project, is being constructed to assist First Energy in its attempts to comply with federally mandated clean air regulations of coal-fired power plants.

The Sammis project includes the construction of H-pile foundations for seven different structures throughout the facility, as well as a foundation for a new 990-foot stack that alone contains over 10 miles of driven H-pile. Work on this project is both water and land based and involves two pile crews using 150-ton cranes and fixed leads working on land, and the water-based crews installing over 150 micro-piles along the river. The project will require over 70 miles (approximately 5,000 piles in total) of driven H-piles and 250 micro-piles installed on the river's edge. The project, which started in October 2006, is scheduled to take approximately 18 months to complete.

An ongoing obstacle for this project is the limited amount of a material storage/lay down area on site, as well as the overall tight access throughout the project site. Subsequent to this challenge, all 35 million pounds of pile that have average lengths between 80 and 85 feet are being stored at a remote storage area located 15 miles from the project site. To meet this logistical challenge, an elaborate delivery system was created to deliver/truck materials to the project site on an as-needed basis. In addition, a second hurdle for this project was that the project schedule did not permit a test pile program prior to ordering of materials. As a result, a significant portion of the piles for the project must be spliced in order to obtain the desired driving lengths for the project. Despite these issues, the project remains on schedule.

Although very experienced in providing innovative and diverse marine and piling solutions, Brayman has only recently become a member of the Pile Driving Contractors Association (PDCA). In its brief tenure with PDCA the Brayman Construction Corporation has established multiple new contacts and is gaining further exposure and consideration for future opportunities within this unique market niche.

For the most recent information and project listing regarding Brayman Construction Corporation, visit www.braymanconstruction.com ▼

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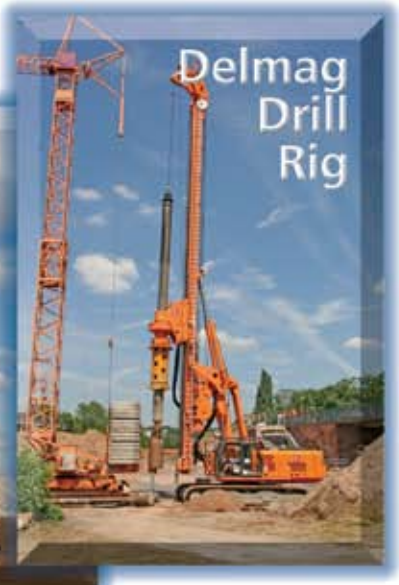

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A new rank

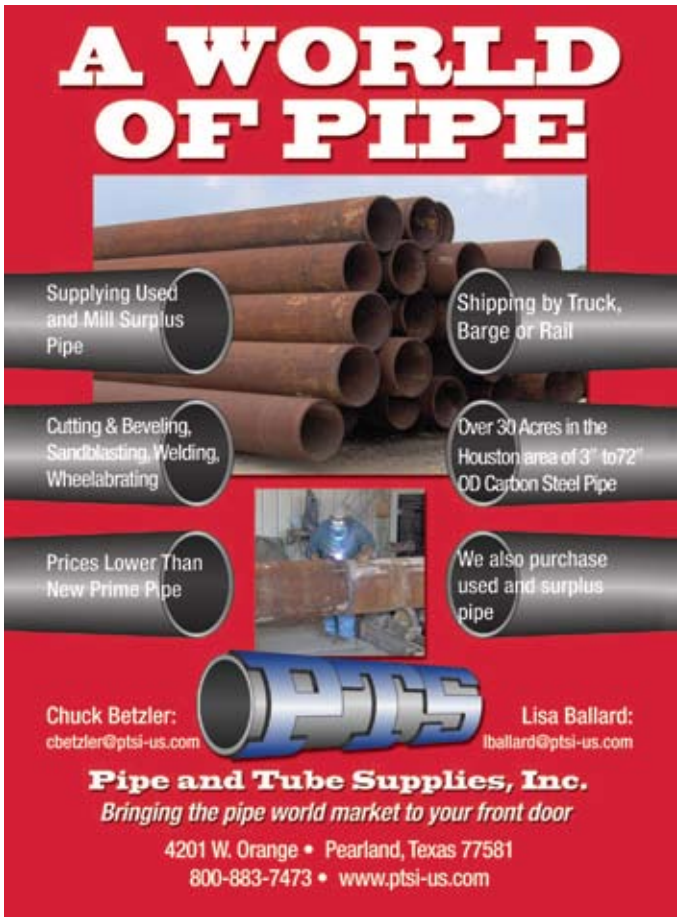
Peter Osborn becomes an FHWA division administrator

Peter W. Osborn was recently named as the FHWA Rhode Island division administrator. Osborn assumed the executive leadership role for the FHWA's RI Division Office in Providence, Rhode Island on August 6, 2007. As the RI Division Administrator, Peter is the principal representative of the Federal Highway Administration (FHWA) and is responsible for administering the total Federal-aid highway program in the state. He is responsible for providing leadership and guidance to state and local officials in identifying surface transportation needs and related priorities that, when implemented, carry out national transportation and safety program goals. He is responsible for establishing division office objectives, priorities, and timetables that will meet the agency's goals and maximize available staff resources and funding.

As the Division Administrator, Osborn has total authority to commit Federal-aid funds for highway programs and to ensure that programs and projects using these funds comply with applicable federal and state laws, regulations, and policies.

Osborn previously served as the FHWA's National Team Leader for the agency's Geotechnical and Hydraulics Technical Services Team. Located in Baltimore, Maryland, Osborn managed a 12-person team of geotechnical and hydraulics experts geographical dispersed in Atlanta, Baltimore, Chicago, and Denver. Osborn has been with the FHWA since 1992 and has held a variety of regional and national geotechnical positions throughout the United States, providing technical assistance and training nationwide and developing policy and guidance documents for the geotechnical engineering community. Before beginning his career with the FHWA, Osborn also worked as a geotechnical engineer for Ground Engineering and Testing in Louisville, Kentucky and as a project engineer with the Whiting-Turner Contracting Company in Shelton, Connecticut.

Osborn received his Bachelor of Science in civil engineering from the University of Rhode Island and his Master of Science in civil engineering from Northwestern University. ▼



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Understanding the Nature of Risk Management

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

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

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

The second element is probability of occurrence. There are two sides to this probability; the likelihood of the event happening and the likelihood of the event not happening. The default interpretation is that the event will happen. Probability of occurrence means anywhere from one percent to 99 percent. If an events probability is zero, it is clearly not an event. If the probability is 100 percent, it becomes a fact, not a risk event.

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

Risk management process

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

The team should not begin to analyze risks until they feel that all potential risks and opportunities have been identified. The quantification phase doesn't begin until the high risks have been identified and so on. Adhering to this principle allows the team to focus on the deliverable for that phase. The deliverable

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

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

Conclusion

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

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Sample Risk Analysis - Pile Installation

Pre-Work

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

Sample Risk Analysis - Pile Installation (cont.)

Driving Operations

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

An Introduction to the **Production and Specification of Steel Pipe**

By Bill Buckland, President, Mandal Pipe Company

To understand the production of steel pipe, we must start at the beginning of basic steel production. Most steel products are downstream, value-added products made from these four basic or primary forms of raw steel: ingots, billets, blooms and slabs. These forms can be produced in great volumes and are easily re-heated, extruded, squeezed or formed into many other configurations so as to make virtually every steel product used today.

Steel pipe is produced from two of these basic forms of steel, the round billet and the slab. A billet is a solid round bar of steel used to produce many other downstream products such as seamless pipe. The other types of steel pipe are produced from slabs, which are solid rectangular blocks of steel. The slabs are reheated and processed into plate and coils.

There are four methods used to produce steel pipe: Fusion Weld, Electric Resistance Weld, Seamless and Double Submerged Arc Weld.

Fusion Weld

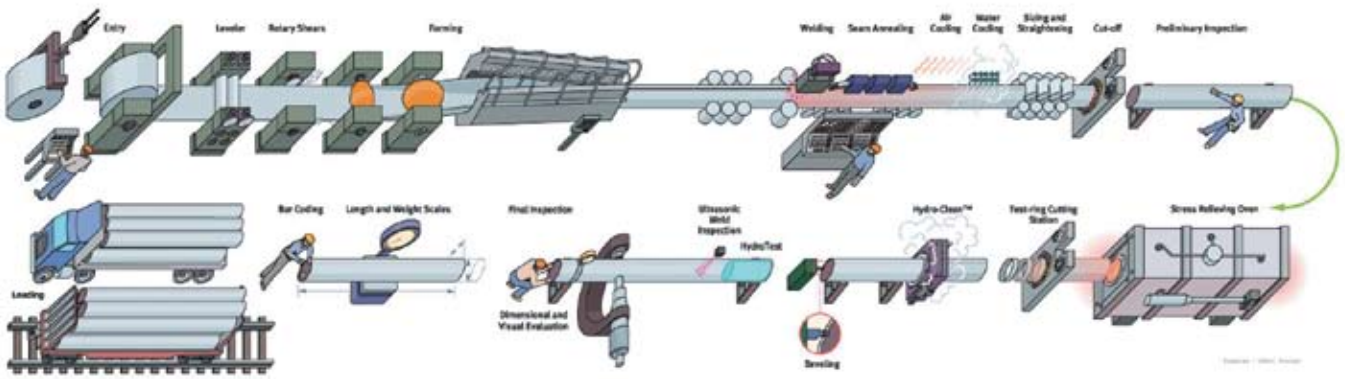
One process for producing pipe is Fusion Weld, sometimes called "Continuous Weld" and is produced in sizes 1/8" to 4-1/2". Fusion Weld pipe begins as coiled steel of the required width and thickness for the size and weight of pipe to be made. Successive coils of steel are welded end to end to form a continuous ribbon of steel. The ribbon of steel is fed into a leveler and then into a gas furnace where it is heated to the required temperature for forming and fusing. The forming rolls at the end of the furnace shape the heated skelp into an oval. The edges of the skelp are then firmly pressed together by rolls to obtain a forged weld. The heat of the skelp, combined with the pressure exerted by the rolls, form the weld. No metal is added into the operation. Final sizing rolls bring the pipe into its required dimensions.

Seamless Pipe (SMLS)

Seamless Pipe is made when steel in a solid, round cylindrical shape, called a "billet" or a "tube round" is heated and then either pushed or pulled (while being rapidly rotated) over a mandrel with a piercing point positioned in the center of the billet. This activity produces a hollow tube or "shell." The tube is then further finished until it becomes the size and wall thickness desired. (Because the pipe is formed in a heated manner the pipe is normalized and should have a consistent steel cellular pattern throughout its circumference). Seamless pipe is made in sizes from 1/8" to 26" and is widely used in construction, oil refining, chemical and petro-chemical industries. It is available in heavy wall thicknesses and exotic chemistries, and is suitable for coiling, flanging and threading. It is, however, expensive, in short supply and unavailable in long lengths.

Electric Resistance Weld

The processing of Electric Resistance Welded (ERW) pipe begins as a coiled plate of steel with appropriate thickness and specific width to form a pipe that conforms to its relevant specification. ERW pipe is cold formed. The ribbon is pulled through a series of rollers that gradually form it into a cylindrical tube. As the edges of the now cylindrical plate come



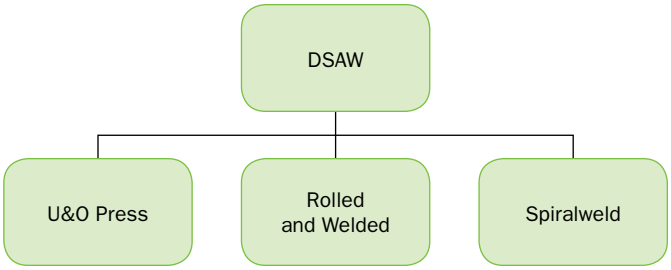
together, an electric charge is applied at the proper points to heat the edges so they can be welded together.

Electric Resistance Welded pipe is a high speed production product that can be made in continuous lengths up to 115'. It produces uniform wall thicknesses and outside dimensions and is made in a wide range of specifications. It does, however, require minimum tonnage to set up on a specific size and sometimes has long lead times.

Double Submerged Arc Weld (DSAW)

Submerged Arc Welded (SAW) pipe derives its name from the process wherein the welding arc is submerged in flux while the welding takes place. The flux protects the steel in the weld area from any impurities in the air when heated to welding temperatures. When both inside welds and outside welds are performed, the welding is accomplished in separate processes and the pipe is considered to be Double Submerged Arc Welded (DSAW).

There are three common types of pipe produced by the DSAW process.



U&O Method

The U&O Method is so called because it first uses a "U" press, then an "O" press to complete cylinder forming from 40' long plates ordered to size and grade. The cylinder is then welded inside and outside by the submerged arc process by using as many as five welding wires. Most U&O is cold expanded either mechanically or hydraulically. When it is cold expanded, DSAW pipe gains in yield strength. This method of pipe production produces exceptional quality with exact dimensional tolerances. The primary use of this type of pipe is gas and oil transmission. It requires large minimum tonnages for size setup and is only produced domestically in 40-foot lengths.

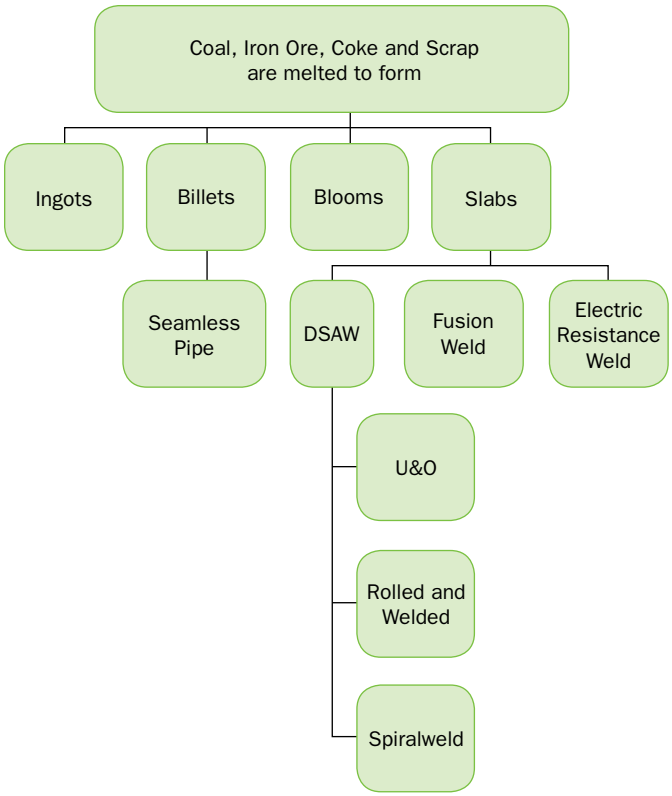
Rolled and Welded

This method of manufacturing is also called the "Pyramid Roll Method" because it uses three rolls arranged in a pyramidal structure. The plate, ordered by grade and thickness, is rolled back and forth between the pyramid rolls until the cylinder is formed. The cylinder is then moved to the welding stations. Most pyramid rolls are 20 feet in length or shorter. Greater lengths are achieved by girth welding the five-foot, 10-foot or 20-foot sections (or cans) together. Berg Steel is the only producer capable of rolling 40-foot plates without a mid-weld and it is the only producer capable of sizing its product. Rolled and welded pipe has the advantage of being rolled in small quantities with short lead times. It can be produced in very large diameters, either ID or OD, and in extremely thick walls. Since the cans are short in length, the production of composite piles or pieces varying in yield and tensile are easily attained. The rate of production of this material is slow and the cost is high due to multiple girth welds.

Spiral Weld

Spiralweld pipe is a steel pipe having a DSAW seam the entire length of the pipe in a spiral form. The outside diameter is determined by the angle of the de-coiled steel against the forming head. The more acute the angle, the greater the diameter. The production of large, hot rolled coils of sufficient width and the development of dependable non-destructive testing methods has enabled this product to be placed in more demanding service. Spiralweld pipe can be rolled in exact lengths up to 115 feet in either ID or OD dimensions up to 144 inches. There is a minimum tonnage required for rolling. Because the manufacturing process is slow, it gives the contractor an advantage of short term changes to the order. This same slow production can also be a disadvantage when large tonnages are needed with a short lead time. Spiralweld pipe is produced to limited specifications.

Now, if this is confusing to you, don't get discouraged. Steel pipe is a complex world to understand. A few charts might help.



The piling industry uses virtually no Fusion Weld pipe as it is produced in small sizes and is used mostly for plumbing, handrails and fencing. DSAW pipe and ERW pipe are used extensively and to a lesser extent seamless pipe. To illustrate the speed with which each method of production is capable, the following chart will be illustrative. We use the 24" diameter pipe because it is the only size common to all the forms of production.

There are hundreds of specifications governing the production and use of steel pipe. The following chart will examine just a few of the common specifications you will normally see in the piling industry.

Pipe Specifications		
Grade	**Domestic Size Range**	**Usage**
ASTM A-53	1/8" through 26"	Domestic and plumbing piping under normal pressures and temperatures
ASTM A-106	1/8" through 26"	Seamless pipe for high temperatures and pressures
ASTM A-139	4" and larger	Industrial piping, mainly water
ASTM A-252	Any size	Pipe piling, drilled shafts and other structural applications
ASTM A-500	Maximum 64" OD	Structural applications for welding, riveting or bolted construction
API 5 L	1/8" through 48"	Oil and natural gas transmission
API 2 B	54" and larger	Rolled and welded for oil and gas offshore platform construction
AWWA C-200	6" and larger	Water and waste water piping

These specifications vary by their production methods.

Methods of Manufacture-Pipe Specifications						
Grade	**FW**	**ERW**	**SMLS**	**U&O**	**SPIRAL**	**R&W**
Domestic size range		2"-24"	1/8"-26"	20"-48"	4"-144"	20"-144"
ASTM A-53	Yes	Yes	Yes	No	No	No
ASTM A-106	No	No	Yes	No	No	No
ASTM A-139	No	No	No	Yes	Yes	Yes
ASTM A-252	No	Yes	Yes	Yes	Yes	Yes
ASTM A-500	No	Yes	Yes	No	No	No
API 5 L	Yes	Yes	Yes	Yes	Yes	Yes
AWWA C200	No	Yes	Yes	Yes	Yes	Yes

Each specification will vary slightly from the other as the only specification designed specifically for piling is ASTM A-252. The other specifications, though intended for different uses, can be used in a structural application. The differences, though subtle, may be great enough to cause problems in substitution and care must be taken to evaluate any change.

Notice that there is a weight tolerance for the ASTM A-252 pipe specification and that this tolerance is one half that of A-53. This means that the same wall thickness ordered for one specification may be thinner than that of the other. For instance, if you ordered 24 x .500 ASTM A-53 and same amount of 24 x .500 ASTM A-252, the minimum wall thickness as addressed in the allowable variations section of the specification would be the same. However, the weight tolerance for A-53 is double that of A-252. In other words, the minimum weight allowable for 24 x .500 A-53, whose theoretical weight is 125.61#/ft, is 113.05#/ft (125.61#/ft - 12.6#/ft). But the minimum weight allowable for the 24 x .500 steel pipe under the A-252 specification is 119.33#/ft (125.61#/ft - 6.28#/ft). Put more simply, the mill is allowed to ship as low a wall thickness as .450 under the A-53 specification, but can only ship as low as .475 under the A-252 specification. But, if you followed the wall thickness tolerance only, the mill would be allowed to ship as low as .438 wall (.500 less 12.5%).

Manufacturing Output Using 24" OD x .500 Wall Per Eight Hour Shift				
ERW	**SMLS**	**U&O Press**	**Spiralweld**	**Rolled & Welded**
1000 Tons or 16000'	350 Tons or 6000'	250 Tons or 4000'	50 Tons or 800'	10 Tons or 160'

For quality control purposes, all the pertinent information about each piece of pipe can be found on the stencil affixed to that pipe. Some mills stencil on the exterior and some on the interior of the tube. Some mills are using the more modern bar codes affixed to the interior of the pipe. Most mills will stencil additional information needed by the purchaser if instructed at the time of order entry.

There are many quality control tests available for pipe as they pertain to various industries. If you have any questions, you should ask a qualified sales representative.

When you are ready to order steel pipe, there are certain parts to the nomenclature that are required. The knowledge of these parts is beneficial to both the seller and purchaser. The more detail that can be imparted to writing, the fewer problems can occur.

Most of these items are self explanatory. The F.O.B. point, however, is probably the most misunderstood. This item delineates the understanding between the buyer and seller as to how the material is to be delivered. The letters SP mean "Shipping Point" and the letters FA mean "Freight Allowed." It is important to understand that the seller will end his li-

Example	
10,000'	24" OD X .500 Wall Bare ERW ASTM A-252 Gr. 3 Steel Pipe, PE, BEV, in 50' Lengths
Price:	$81.50/ft.
Terms:	Net 30 Days
Delivery:	Mid March
F.O.B.:	SP/FA Charleston, SC Via Truck

Digest of Common Specifications				
	A-53	**A-500**	**A-252**	**API 5L**
Type	Type E Type S	Seamless Welded	Seamless ERW, DSAW	Seamless ERW, DSAW
Grades	A B	None	1,2,3	X-42, X-52, X-56, X-60, X-65
Chemistry	% Max C, MN, P, S	% Max of C, P, S	0.05 Max % Phos	C, MN, S, CB, V
Yield	A=30,000 B=35,000	36,000	1=30,000 2=35,000 3=46,000	X-42=42,000 X-52=52,000 X-60=60,000
Tensile	A=48,000 Min PSI B=60,000 Min PSI	58,000	1=50,000 2=60,000 3=66,000	X-42=60,000 X-52=66,000 X-60=75,000
Hydro	Yes	None	None	Yes
Wall Tolerance	Minimum wall not more than 12.5% under nom	+/- 10% of nominal wall thickness	Minimum wall not more than 12.5% under nom	+15%, -12.5%
OD Tolerance	+/- 1% of OD	+/- .75% of OD	+/-1% of OD	+/- .75% of OD
Weight Tolerance	=/- 10% of theoretical weight	None	Not more than 12.5% over or 5% under theoretical weight	Not more than 10% over or 3.5 % under theoretical weight

ability for insurance purposes at the shipping point with the material safely loaded to the truck; and, it is at this point that the title of ownership passes hands from the seller to the buyer. The seller will, however, "allow" the freight to the jobsite in his price. The responsibility for the material from point A to point B is for the insurance of the Truck Line. The responsibility for unloading the material is for the Contractor. If the seller were to quote the material F.O.B.: Delivered, he would then take responsibility for the material until it is unloaded to the ground, and the title would not pass to the buyer until the material is safely unloaded. In the event of an accident, the

Ordering Pipe	
Quantity	Feet, Tons or Pieces
Diameter	OD or ID
Wall Thickness	Standard or Special
Coating	Lacquer or Bare
Method of Manufacture	SMLS, ERW, or DSAW
Specification	ASTM, AWWA, ASME, API
Plain or Threaded	PE, Threaded
End Preparation	Bevel or Square Cut
Length	SRL, DRL, TRL, or Specified
Price	Per Foot or Per Ton
Terms	COD, Net 30, L/C, Discount
Delivery Instructions	Destination, Arrival, FOB

Reading the Mill Stencil

1. Manufacture-5L – API Registration
2. Hydro pressure 3030, E = symbol for welded pipe
3. Weight/piece and length
4. F = Foreign plate then Heat #
5. SR5=Charpy 70ftLBS @ 23 degrees F
6. ß (supplemental requirement)
7. Customer and purchase order #
8. Size and wall thickness
9. Piece number and grade

When you are ready to order steel pipe, there are certain parts to the nomenclature that are required. The knowledge of these parts is beneficial to both the seller and purchaser. The more detail that can be imparted to writing, the fewer problems can occur.

paperwork trail will be very important. Some industries will quote their products "Delivered," such as sod or wall board. Steel pipe, however, is generally quoted at the shipping point, with the freight allowed in the price. Sometimes, the contractor wants the material quoted SP/PPD-ADD. This means that the title will again pass at the shipping point, after safely loading, but the freight will be prepaid and added to the invoice as a separate item. This designation is useful when projects require many truck or rail shipments and the freight cost is a non-taxable item. The pipe will be taxed at the appropriate rate and the freight costs will pass through untaxed. If the contractor wishes to pick up the material on his own trucks or wishes to take responsibility for the shipping, the FOB point will simply state SP (Shipping Point).

The following associations publish their specifications for all to use and it would be prudent to have the proper updated versions of their specifications in your library for reference:

Reference Material

- ASTM (American Society for Testing Material)
- API (American Petroleum Institute)
- ASME (American Society of Mechanical Engineers)
- AWWA (American Water Works Association)
- NAPCA (National Association of Steel Pipe Distributors)
- NACPA (National Association of Pipe Coating Applicators) ▼

Bill Buckland is president of Mandal Pipe Company, located in Atlanta, GA., and has been active in the steel pipe business for more than three decades. He has provided steel pipe for many high profile construction projects throughout the United States. He is currently on the board of directors of the National Association of Steel Pipe Distributors and is chairman of its Education Committee while also a member of the Education Committee for the Pile Driving Contractors Association. Direct your comments to billbuckland@mandalpipe.com

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