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The Official Publication of The Pile Driving Contractors Association PDCA | Q3 2010 Vol. 7, No. 3

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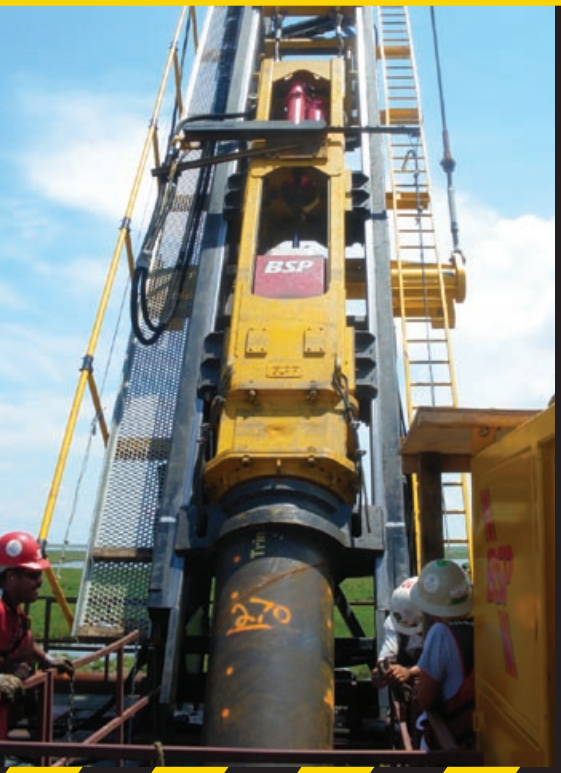

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In PileDriver Q2, Gerald Verbeek was given a byline as co-author of PDCA and AASHTO – A Partnership. This was, in fact, an error as Dale Biggers, Chair, PDCA Technical Committee (Boh Bros. Construction Company, LLC), was the sole writer of this article. We apologize for any misunderstanding this may have caused.

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PDCA Forges Forward Towards Economy & Education

By Don Dolly

As the world anticipates the arrival of an economic renaissance, the pile driving industry is pushing forward stoically. Naturally so, for just as solid character is the foundation of individual greatness, a solid foundation makes possible a great structure, and cannot become obsolete or unnecessary. Regardless of the current measure of our economic recovery, society will move forward with solid foundations. Your PDCA continues, without wavering, to seize opportunities to ensure that driven piles are keystones in the path forward of the world market.

To that end the PDCA through its various committees is interfacing and cultivating relationships with governmental agencies to ensure driven piles are understood and considered during a project's design phase. These efforts include a Technical Committee project redefining "Recommended Design Specifications for Driven Bearing Piles" to help mitigate potential design disadvantage to driven piling. Through our Education Committee, projects are underway to reach out to and partner with DOT's across the United States to hold design seminars as well as installation inspection courses. Through partnerships with state transportation agencies the PDCA is establishing conduits of communication, allowing thorough consideration of driven piles during project design.

Our Communication Committee is striving to make readily accessible current market place information via electronic and traditional means. *PileDriver* magazine has evolved into an essential membership tool that includes project strategy as well as advances in technology throughout the industry. The PDCA website www.piledrivers.org continues to make advances as a true member asset. The Environmental Committee is committed to providing hard facts relative to our industry, including resources relative to vibration and pollution. The Market Development Committee is moving forward with plans for the 2011 Annual Conference to be held in the beautiful venue of Savannah, Georgia. The committee, using years-long experience and input from conference attendees at Coeur d'Alene, has structured next year's conference to maximize the experience of both technological and social aspects.

The Membership Development & Member Retention Committee, chaired by Immediate Past President Mr. John King, has made advancements in new membership as well as maintaining record retention levels when other associations are in decline. The commitment of the committees that serve your interests, the members of PDCA, are unparalleled by other associations. The PDCA Board of Directors makes up the committee chaired by Mr. King and we all welcome

your comments or recommendations with regard to the advancement of the association.

Our association is committed to connecting with the industry using all available opportunities. With that mind set the PDCA has endeavored to create relationships with other industry associations to broaden our sphere of influence. These relationships have resulted in co-sponsored educational seminars on driven pile installation and pile testing. We look forward to long lasting relationships that will help solidify the driven pile market in the years to come. Scheduled for 2011 is another co-sponsored Driven Pile Technical Seminar with DFI.

On another industry note, I would like to mention the current and impending State mandates with regard to our industry in the form of required licensing or licensure. Generally, when I refer to licensing most think of crane operators, which is true as now 18 states require some type of licensure for crane operators. But it is apparent that states will soon require riggers to hold some type of license. In the pile driving business we no longer work with cranes exclusively, as the hydraulic type of fixed and mobile mast rigs that have been popular in Europe for years are not technically considered cranes. However, pile driving work always involves some kind of rigging. As I am sure you are aware, certification classes of all kinds: crane operator, rigger, signal man, and so on are offered by various training firms across the United States.

The trouble with State requirements for certification is not so much the requirement itself, but the standardization of the requirement. In other words, who does the testing and on what subject matter do they test? I have empirical knowledge that moving forward with certifying human resources prior to the finalization of the particular state testing requirements is not advisable. However, keeping abreast of the trend and being ahead of the curve on certification or licensure is wise. Considering that a license is required to operate a motor vehicle, I do not think it unreasonable that a crane operator or the rigger making the connection between lift and machine be required to test to a certain level of proficiency. The PDCA will endeavor to apprise its members of impending licensure requirements, relative to our industry, throughout the United States.

In Charleston, South Carolina on November 4th 2011 is the PDCA Annual Design and Installation of Cost-Efficient Piles Conference or DICEP Conference. Last year's program was held in Walnut Creek, California, so we are going coast to coast to cover the industry. A DICEP conference brochure is available on our website or you may contact the PDCA office in Orange Park, Florida for a hard copy. I hope to see all of you in Charleston in November, but until then, best wishes for good business. ▼

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PDCA Awards Excellence in Industry Conferences

"Just Around the Corner"

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

In this edition of *PileDriver* magazine, you will read about several interesting projects that we are spotlighting. These projects did, in fact, win the PDCA Project of the Year Award. The winning PDCA companies received their award during the PDCA 14th Annual International Conference and Expo 2010, in Coeur d'Alene, Idaho this past May.

The winning projects are:

- **The Brayton Point Closed Loop Cooling Towers**, submitted by GZA Environmental, Inc. and Kiewit Construction Co. in the project category – Land, project value – greater than $2 million
- **The Progress Energy Southport Nuclear Power Plant Diversion Structure Stabilization**, submitted by Taylor Bros Marine Construction, Inc., in the project category – Marine, project value – greater than $2 Million
- **The Leveling of the Centre Hospitalier Cloutier-Du-Rivage**, submitted by Pretech (Canada) in the category – Land, project value - $500,000 - $2 Million
- **Skagway Harbor Surge Control Breakwater**, submitted by PND Engineers, Inc. (Seattle, WA) in the category – Marine, project value 500,000 - $2 Million.

Congratulations to these companies and their winning projects!

The PDCA Project of the Year Award Selection Committee did not have an easy job this year due to the quality and number of projects submitted. It is unfortunate that only one project in each category can be selected, because all of the submitted projects were worthy of an award.

The PDCA feels all the projects are, at the very least, worthy of an "Honorable Mention" in this Message.

Therefore, the PDCA wants to thank the following companies: Underpinning and Foundation (Skanska) for their two submittals, The Great Lakes Construction Company, Cajun Deep Foundations, LLC, Signor Enterprises, L.P., and Foundation Constructors, Inc. for their participation and support of the PDCA Project of the Year Award.

The PDCA plans to have all of the POY submitted projects featured in future issues of *PileDriver* magazine. Look for them in the "*Project Spotlight*" section in upcoming issues.

I want to take the time to acquaint everyone with the upcoming PDCA Design and Installation of Cost-Efficient Piles (DICEP) conference – a little history and what to expect.

The 2010 DICEP will be the PDCA's 11th annual conference. In 2006, the PDCA Board of Directors thought it would be logical and beneficial to have national and local PDCA chapters work collaboratively in the development and implementation of this engineer/contractor focused event.

The PDCA chapters agreed and the plan was put into place. Each year, national PDCA partners with one chapter and holds the conference in a city of that chapter's preference. In 2007, the PDCA held the first national/chapter partnered DICEP conference with the newly formed PDCA of the Mid-Atlantic Chapter at Turf Valley, near Baltimore, Maryland. Over 110 engineers and contractors attended, making it one of the most successful DICEP to date. Next in 2008, the PDCA went to New Orleans and partnered with the PDCA of the Gulf Coast Chapter. This conference attracted more than 120 and was a resounding success. The 2009 PDCA / Pacific Coast Chapter DICEP was no different as its predecessors, only this time the PDCA invited the Structural Engineers Association of Northern California and the San Francisco Branch of the ASCE to be Supporting Organizations – a first for DICEP.

In 2010, PDCA is proud to announce the 11th annual DICEP conference and our chapter partner, the PDCA of South Carolina. This year's joint program will be held in the great town and state of Charleston, South Carolina. The venue will be the Charleston Area Convention Center, with overnight accommodations provided by Embassy Suites Hotel Airport. The PDCA of South Carolina Chapter reps, including Chapter President Sonny Dupre (Cape Romain Contractors), Billy Camp (S&ME) and John King (Pile Drivers, Inc.), were all very instrumental in bringing the program to Charleston.

I also want to thank the Education Committee (Chair, Mohamad Hussein, GRL Engineers, Inc.) for the dedication and hard work they put into this program.

There are a few unique aspects to this conference. One is the outstanding lineup of speakers and presentation topics, including such notables as Prof. Frank Townsend (UF), Prof. George Filz (VA Tech) and Prof. Lutful I. Kahn (Cleveland State University). Elie Homsi (Flatiron) will be back to present on the largest design-build project in North Carolina – the 3-mile long precast concrete bridge using the top-down, span-by-span construction technique with an overhead gantry and rotating lead system; Dennis Knight (Lillio Architects) will discuss the LEED certification program with an emphasis on the relevant aspects of deep foundations and driven pile construction as they relate to the certification process; and Alan Macnab (Condon Johnson) will present on the new Model Geotechnical Constructibility Report. This geotechnical report has been a project of the GeoCoalition (a consortium of Geo-Engineer and Geo-Construction associations, including the PDCA) and is now ready to be discussed and presented to the industry. These and more are the lineup for this year's premier engineer/contractor focused driven pile seminar.

The Geo-Institute of the ASCE, the South Carolina Society of Civil Engineers and the Civil Engineers Club of Charleston are all Supporting Engineers. The PDCA is grateful for their support.

The PDCA will offer six Professional Development Hours (PDH) for Professional Engineers license renewal, including those licensed in Florida.

Finally, don't forget the DICEP conference will have table tops for exhibitors. We only have 22 and, as of this writing, 10 have been reserved. Call the PDCA office at 888-311-PDCA (7322) for exhibitor or registration information. A DICEP Conference brochure is included with this edition of *PileDriver* or it can be downloaded from the PDCA website: **www.piledriver.org**.

April may seem like a long way off, but when it comes to preparing for the PDCA 15th Annual International Conference and Expo 2011, it's just around the corner. In 2011, the PDCA will hold its annual conference in the historic town of Savannah. The specific dates of the conference are not finalized, but the PDCA Market Development Committee (Chair, Mike Elliott, Pile Equipment) is looking at the 3rd week of April 2011. As of this writing, we still have a lot of preliminary work to do, but this conference will be different in many respects to previous annual conferences. It may include an equipment show and exhibitor booths, an opening ceremony with a nationally known keynote speaker, more educational programs without sacrificing the social/networking aspects, another great Companion's Program and plenty of southern hospitality.

I hope you will mark this conference on your calendar and highlight it as a must for your 2011.

Summer is almost over. I hope yours was safe and enjoyable. Our kids are back in school, so tell everyone in the office, especially your drivers, to watch out – you never know which one of these young students will be the next to choose this fantastic career we call "Pile Driving"! ▼

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General Membership Information

We are the premier association for pile-driving contractors

The PDCA was founded in 1995 to promote the use of driven-pile solutions in all cases where they are effective. We strive to build and maintain working relationships among end users, manufacturers, government agencies, educational institutions, engineers and others involved in the design, installation and quality control of the driven pile.

We are dedicated to advancing the driven pile

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

We are a direct link to decision makers

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

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

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

Job referrals

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

Peer-to-peer opportunities

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

Annual membership directory

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

Educational conferences and meetings

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

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

Industry development

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

Publications and reference materials

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

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

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

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

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

Connect worldwide at www.piledrivers.org

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

Leadership opportunities

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

Membership is available to you

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

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

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

PDCA MEMBERSHIP APPLICATION

Step 1: Company Information

Company Name: _____

Contact Name: _____

Address: _____

Phone: _____ Fax: _____

City / State / Zip: _____

Company Home Page: _____ E-mail: _____

Step 2: Select Membership Type

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

- ○ **Contractor Member** – General or Specialty contractor who commonly installs driven piles for foundations and earth retention systems.
  - ○ *Contractor I Member Company* – Annual volume > $ 2 million **($850.00)**
  - ○ *Contractor II Member Company* – Annual volume < $ 2 million **($425.00)**
- ○ **Associate Member** – Firms engaged in the manufacture and/or supply of equipment, materials or services to the pile driving industry.
  - ○ Associate I Member Company – Annual volume > $ 2 million **($850.00)**
  - ○ Associate II Member Company – Annual volume < $ 2 million **($425.00)**
  - ○ *Local Associate Member Company* **($100.00)**
    Small Associate Company desiring membership in a single local chapter, who only serves that local market, and whose interest is to support the local chapter. Membership must be approved by PDCA Executive Committee.
- ○ **Engineering Affiliate** – Any Engineering company, firm, corporation or individual (Structural, Geotechnical, Civil, etc) involved in the design, consulting, testing or other engineering aspect associated with driven piles, deep foundations or earth retention systems.
  - ○ *Engineering Affiliate – 1-5 offices* **($100 per office)**
    Listing up to 5 Individuals per office at no additional charge
  - ○ *Engineering Affiliate – 6-11 offices* **($90.00 per office)**
    Listing up to 5 Individuals per office at no additional charge
  - ○ *Engineering Affiliate – 12+ offices* **($80.00 per office)**
    Listing up to 5 Individuals per office at no additional charge
- ○ **Individual Member** – **($50.00)**
  An individual employed full-time by a university or college and teaching Undergraduate or Graduate courses in engineering; or an individual employed full-time by the government.
- ○ **Retired Industry Member** – **($100.00)**
  Individual who has reached retirement age, left active employment, and wishes to remain a member.
- ○ **Student Member** – **($20.00)**
  Full time students studying towards a bachelor, master or doctorate degree in a regular university program.
- ○ **Affiliate Labor Organization Member** – **($100.00)**
  Concerned with pile driving for the purpose of gathering and sharing information.
- ○ **Organization Member** – Non-voting membership category. Must be approved by the PDCA Executive Committee.

Step 3: Member Information

(complete only the category for which you are applying)

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

- ❒ Bridge Buildings
- ❒ Bulkheads
- ❒ Deep Dynamic Compaction
- ❒ Deep Excavation
- ❒ Docks and Wharfs
- ❒ Earth Retention
- ❒ General Contracting
- ❒ Highway and Heavy Civil
- ❒ Marine
- ❒ Pile Driving
- ❒ Other

B. Associate and Engineering Affiliates Members – check all products and/or services that your company provides:

Accessories

- ❒ Cutter Heads and Drill Bits
- ❒ Dock and Marine Supplies
- ❒ Hammer Cushions
- ❒ Other
- ❒ Hoses and Fittings
- ❒ Lubricants and Grease
- ❒ Pile Cushions
- ❒ Pile Points and Splicers
- ❒ Rigging Supplies
- ❒ Safety Equipment

Materials

- ❒ Aluminum Sheet Piles
- ❒ Coatings and Chemicals
- ❒ Concrete Piles
- ❒ Timber Piles/Treated Lumber
- ❒ Composite Piles
- ❒ H-Piles
- ❒ Steel Pipe Piles
- ❒ Other
- ❒ Steel Sheet Piles
- ❒ Structural Steel
- ❒ Synthetic Material Piles

Equipment

- ❒ Air Compressors and Pumps
- ❒ Cranes
- ❒ Drill Equipment
- ❒ Drive Caps and Inserts
- ❒ Hammers
- ❒ Hydraulic Power Packs
- ❒ Leads and Spotters
- ❒ Marine Equipment
- ❒ Specialized Rigs and Equipment

Services

- ❒ Consulting
- ❒ Design
- ❒ Freight Brokerage
- ❒ Analysis
- ❒ Pile Driving Monitoring
- ❒ Geotechnical
- ❒ Marine Drayage
- ❒ Surveying
- ❒ Civil and Design
- ❒ Other
- ❒ Testing
- ❒ Trucking
- ❒ Vibration Monitoring
- ❒ Materials Testing

General

- ❒ Rental
- ❒ Sales

Step 4: Geographic Areas Where Services and Products Are Available

(All applicants check all that apply)

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

Step 5: Method of Payment

I am providing payment in the amount of: _____

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

Card Number: _____ Expiration Date: _____

Name on Card: _____ CVV Code: _____

Statement Billing Address: _____

_____

Signature: _____

Please complete this application and mail to:
PDCA – 1857 Wells Road - Suite 214 Orange Park, Florida 32073 or Fax to: 904-215-2977

Chapter Updates

PDCA of the Mid-Atlantic Chapter:

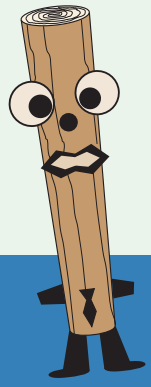
PDCA of the Mid-Atlantic chapter held its 2nd quarter meeting on April 22, 2010 at Hell's Point in Annapolis, MD. Xavier McGeady was the guest speaker and he presented on Corman Marine's project about the Annapolis City Dock - Bulkhead and Boardwalk Improvement Project. Our meeting happened to be overlooking the project which made this talk even more interesting!

Congratulations to the new leadership of the chapter. Bill Bonneau (Cianbro Corporation) is the President, Marty Corcoran (Corman Marine) is the new Vice-President and Jill Kennedy (Drive-Con/ICE Capital) is the new secretary/treasurer.

PDCA of Florida Chapter:

The Florida Chapter held its 2nd Quarter meeting in Orlando, Florida on June 3. Our speaker was Mr. Bob Burleson, President of the Florida Transportation Builders Association. Bob shared his insight on the recent Florida legislative session and its potential impact on funding for transportation projects in the State of Florida. Of particular interest were his comments regarding the proposed use of the Florida Transportation Trust Fund to balance the State's Education budget and his thoughts on a high-speed rail project between Tampa and Orlando that is now in a preliminary design phase.

The chapter will next meet Thursday, September 2 at the Crowne Plaza Westshore Hotel in Tampa. ▼



Did You Know?

The Department of Labor, Occupational Safety and Health Administration (OSHA) issued a "Letter of Interpretation" regarding the OSHA standard addressing the repair of mobile cranes, which states that repairs to structural members on cranes can be made as long as the Original Equipment Manufacturers (OEM) or a Registered Professional Engineer (PE) approves the work. The Letter of Interpretation can be found at the following link:

http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=21677

Provided by WHECO Worldwide Services.

PDCA 14th Annual International Conference and Expo 2010

That's a Wrap!

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

The PDCA 14th Annual International Conference and Expo 2010 has come and gone. The event kicked off with the traditional Opening Reception on Thursday night in the exhibit hall, sponsored by L.B. Foster Company. On Friday, May 7, the conference resumed with committee meetings, educational programs, and the PDCA 3rd Annual Golf Tournament, concluding with an evening cruise on Lake Coeur d'Alene. Saturday followed with the remaining committee meetings, educational programs, the Business and Awards Luncheon and the evening's annual dinner dance.

The PDCA is grateful to all of the PDCA members and guests who supported the conference, including the exhibitors, registered attendees, the ladies who participated in the Companion's Program, and the generous sponsors. Your support and participation made the conference a very enjoyable event.

The PDCA wants to congratulate the following individuals who were recognized during the conference's Business and Awards Luncheon.

Harry Robbins (Palmetto Pile Driving, Charleston, SC) received the Presidential Award for Distinguished Service. Harry's support and involvement in the PDCA makes him a very deserving recipient of this prestigious award. Harry has served the PDCA in many capacities, including Past President. However, he is probably most noted for his vision, perseverance and commitment to establishing PDCA chapters across the US, starting with the first and very successful chapter, the PDCA of South Carolina. With six PDCA chapters currently supporting the driven pile industry in their respective areas, Harry can be proud of the positive influence he has had on the PDCA and the pile driving industry.

William M. "Billy" Camp III (S&ME, Charleston, SC) was presented the PDCA Professional Engineer's Service Award. This award recognizes Billy's outstanding contributions to the PDCA and the driven pile industry. Billy has been a champion of the driven pile industry for many years. He has been instrumental in supporting the PDCA, lending his engineering expertise to the PDCA at every request. As a member of the PDCA Technical Committee, Billy was instrumental in helping rewrite the AASHTO Design and Installation Specifications. He continues to add an engineer's perspective to technical content in *PileDriver* magazine, and has assisted the Education Committee in securing nationally renowned speakers for conferences and seminars and is steadfast in his support of local and national PDCA chapters.

Pollyanna Cunningham (ICE, Matthews, North Carolina) was presented with the Committee Chair of the Year Award. Pollyanna received the award for her outstanding dedication and commitment to the Pile Driving industry and the exemplary leadership she displayed as Chair of the Communications Committee. In 2008, PDCA visited Pollyanna at the ICE facility in Matthews, North Carolina, where she accepted the Chair of the Communications Committee for 2009, returning to that seat in 2010. Since then, she has facilitated the development of a new website, helped organize a website page for PDCA chapters, acquired two new domain names for PDCA international segment, improved and increased magazine content, supported all forms of PDCA communications to our members and guests and played a key role educating users on the PDCA website. Pollyanna's commitment outside of her committee duties has also been extraordinary. In 2009/2010, Pollyanna helped the PDCA review and acquire new server technology, allowing the PDCA staff to be more efficient and productive in our daily operations and she has accomplished all of this with a "What can I do for you and when do you need it!" attitude.

PDCA owes a great deal of gratitude to these outstanding PDCA recipients for their exemplary leadership and dedication to the PDCA.

PDCA would also like to acknowledge our Corporate Sponsors and Exhibitors for Conference and Expo 2010. Following is a list of those companies whose commitment to the PDCA through their generous financial support or as a participating exhibitor made a tremendous difference to the overall success and enjoyment of the conference.

Enjoy the pictures!

PILE DRIVING CONTRACTORS ASSOCIATION

14TH INTERNATIONAL CONFERENCE AND EXPO 2010

CORPORATE SPONSORS AND EXHIBITORS

The Pile Driving Contractors Association would like to acknowledge the Corporate Sponsors and Exhibitors who helped make the PDCA 14th Annual International Conference and Expo 2010 such a great success.

CORPORATE SPONSORS

Platinum

American Piledriving Equipment
Foundation Constructors, Inc.
Herbert F. Darling, Inc.
ICE – International Construction Equipment
Pile Equipment, Inc.

Companion's Program

Robishaw Engineering, Inc.

AM and PM Breaks

Ed Waters & Sons Contracting Co, Inc.

Reception and Annual Dinner

Jinnings Equipment, LLC

Opening Reception

L. B. Foster Company

Business and Awards Luncheon

Piling, Inc.

Continental Breakfast

Lester Publications

Golf Hole

Balfour Beatty Infrastructure
Bauer-Pileco
Bermingham Foundation Solutions
Ford Pile Foundations
GRL Engineers, Inc.
Marine Contracting
MG Forge Construction, LLC
Pile Drivers, Inc.
Piling Products
Skyline Steel Company

CONFERENCE EXHIBITORS

AB Chance / Hubbell Power Systems
American Piledriving Equipment
Atlantic Wood Industries
Atlas Tube
Bayshore Systems, Inc.
Bermingham Foundation Solutions
Challenger Pipe and Steel
Corpac Steel
Cox Industries
Dominion Pipe and Piling
Emeca/SPE USA Canadian Piledriving Equip.
Foundation Testing and Consulting, LLC
ICE – International Construction Equipment
Instantel
Interpipe
JD Fields
Jinnings Equipment
L.B. Foster Company
Lester Publications
Liebherr Nenzing Crane
Link Belt Construction
Mill Man Steel
Monotube Pile
PACO
Pile Dynamics, Inc.
Pile Equipment, Inc.
Pile Hammer Equipment
Skyline Steel Company
Steel Piling Network
Sun Pile Driving Equipment
Timber Piling Council

Ladies get reacquainted through the Companion's Program.

The Companion's Program ladies get pampered in the spa.

First Lady, Debbie King, hosts the Companion's Program in President's Suite.

Ingred Dolly prepares lunch at the Culinary Cooking with the Chefs activity.

John King presents Billy Camp (S&ME) the PDCA's Professional Engineer's Service Award.

Ladies prepare gourmet lunches at Beverly's Restaurant, Cover d'Alene Resort.

Pollanna Cunningham dresses for the evening cruise on Lake Cover d'Alene.

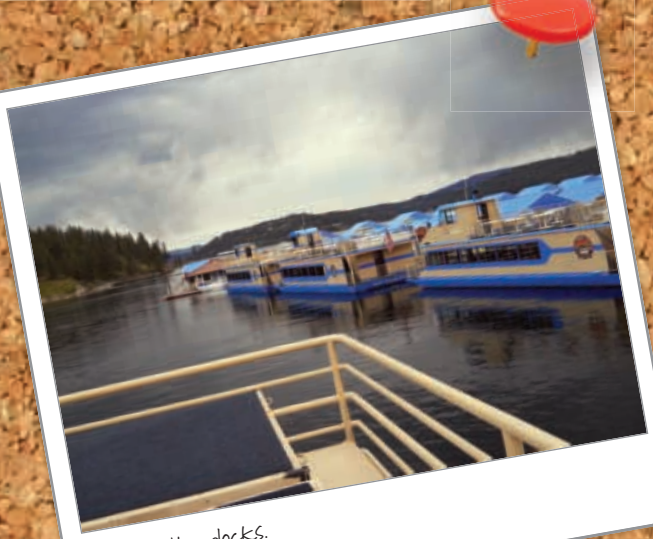
John King presents Harry Robbins (Palmetto Pile Driving) the PDCA's Presidential Award for Distinguished Service.

The chef working with the Companion's Program at Beverly's Restaurant.

PDCA members socialize in Exhibit Hall.

Steve Hall prepares to greet PDCA members boarding for the evening cruise.

John Lanigan, PDCA Safety Committee Chair, presents on "World Class Safety Program."



Leaving the docks.

PM Break in Exhibit Hall offers networking time for everyone.

Members gather for evening reception.

John and Meg Parker at the reception.

PDCA members on the upper deck enjoying the scenery.

John King presents Pollyanna Cunningham (ICE) with the PDCA's Committee Chair of the Year Award.

Conference general session.

Exhibitors at the Annual Conference.

Exhibitors reception.

Abigail King enjoys her manicure with the Companion's Program.

14th Annual International Conference And Expo in Coeur d'Alene

All photos supplied by the PDCA and Lester Publications, LLC

Sun Group of Businesses

Bringing the Future of Pile Driving to You

"If it weren't for my Junttan PM 16, I might not have stayed in business in this economy."

John King
Past PDCA President
Pile Drivers, Inc.
Charleston, SC.

Sun Piledriving Equipment, LLC
35322 Bayard Road
Frankford, DE 19945
Tel. 302.539.7187
Fax. 302.539.4443
www.spe-usa.net

Deep Earth Technology, LLC
35322 Bayard Road
Frankford, DE 19945
Tel. 917.678.7299
Fax. 302.539.4443
www.deepearthtechnology.com

Emeca/SPE USA, LLC
35322 Bayard Road
Frankford, DE 19945
Tel. 302.875.0760
Fax. 302.875.0761
www.emeca-speusa.com

Sun Marine Maintenance, Inc
35322 Bayard Road
Frankford, DE 19945
Tel. 302.539.6756
Fax. 302.539.6076
www.sunmarineinc.com

2010 New PDCA Members

The following is a list of all members who have joined the PDCA in 2010. The association would like to welcome everyone on the list!

Contractor Members

Blue Iron, LLC
Michael Carter
467 Lake Howell Road #104
Maitland, FL 32751
Tel: 407-427-7051
Fax: 407-436-4423
www.blueironllc.com
mcarter@blueironllc.com

Coastal Bridge Company
Devon Overall
4825 Jamestown Avenue
Baton Rouge, LA 70808
Tel: 225-766-0244
Fax: 225-766-0423
www.coastalbridge.com
overall@coastalbridge.com

F. Miller Construction, LLC
Mark Korkowski
825 Ryan Street
Lake Charles, LA 70616
Tel: 337-721-7517
Fax: 337-433-2678
www.fmillerconstruction.com
mkorkowski@fmillerconstruction.com

Falco Construction Corp.
K.K. Ramamurthy
2300 East 69 Street
Brooklyn, NY 11234
Tel: 718-241-2100
Fax: 718-968-1919
Kay@falcoconstruction.com

HC MATCON, Inc.
Martin Halliwell
4-122 Earl Thompson Road
AYR, Ontario N0B 1E0
Canada
Tel: 519-623-6454
Fax: 519-623-6061
www.hcgroup.ca
martinh@hcgroup.ca

Healy Tibbits Builders
Emilo Placencia
99-944 Iwaena Street
Suite A
Aiea, HI 96701
Tel: 808-487-3664
Fax: 808-487-3660

L&A Contracting Company
Lee Sims
PO Box 16749
Hattiesburg, MS 39404-6749
Tel: 601-264-2100
Fax: 601-264-3007
www.landacontracting.com
lsims@landacontracting.com

Macro Enterprises, LTD.
Scott Morris
25 East Chestnut Street
P.O. Box 398
Massapequa, NY 11758
Tel: 516-799-3434
Fax: 516-799-3845
www.macroenterprisesltd.com
smorris@optonline.net

Marine Contracting
Trey Ford
PO Box 5525, Bayside Station
Virginia Beach, VA 23471-5525
Tel: 757-460-4666
Fax: 757-363-9647
fordpile@earthlink.com

Mason Construction
David Hudson
PO Box 20057
6285 Walden Road
Beaumont, TX 77720-0057
Tel: 409-842-4455
Fax: 409-842-4586
www.masonconstruction.net
dhudson@masonconstruction.com

North American Cassion, Ltd.
Jeff Grieder
11405 – 163 Street
Edmonton, Alberta T5M 3Y3
Canada
Tel: 780-969-5519
Fax: 780-969-5519
www.gacg.ca
jgrieder@nacg.ca

Pacific Pile and Marine
Carrie Hansel
582 S. Riverside Drive
Seattle, WA 98108
Tel: 206-331-3873
Fax: 206-774-5958
www.pacificpile.com
carrieh@pacificpile.com

RHTC, Inc.
Jeff Hairston
309 Smith Street
West Monroe, LA 71292
Tel: 318-330-9000
Fax: 318-330-9014
www.rhtcinc.com
jeffh@rhtcinc.com

Superior Construction Company
Maggie Laneri
7072 Business Park Blvd.
Jacksonville, FL 32256
Tel: 904-292-4240
Fax: 904-292-2682
www.superiorfla.com
estimating@superiorfla.com

Walter Toebe Construction Company
Jeff Stover
29001 Wall Street
PO Box 930129
Wixom, MI 48393
Tel: 248-349-7500
Fax: 248-349-4870
www.toebe-construction.com
jstover@toebe-construction.com

Associate Members

Bear Steel Products
Joshua Spoelstra
2972 W. Swain Road
Suite 208
Stockton, CA 95219
Tel: 831-600-5446
Fax: 831-621-1152
Josh@bear-steel.com

Ferguson Enterprises, Inc. Specialty Pipe and Tube
Bill Austin
12500 Jefferson Avenue
Newport News, VA 23602
Tel: 757-874-7795
Fax: 757-989-2501
www.ferguson.com
sales@specialtypipe.com

Foundation Technologies, Inc.
KC Queen
PO Box 491718
Lawrenceville, GA 30049
Tel: 678-407-4640
Fax: 678-407-4645
www.foundationtechnologies.com
info@foundationtechnologies.com

GeoEngineers, Inc.
David P. Sauls, P.E.
11955 Lakeland Park Blvd., Suite 100
Baton Rouge, LA 70809
Tel: 225-293-2460
Fax: 225-293-2463
www.geoengineers.com
dsauls@geoengineers.com

Helical Anchors, Inc.
Tom Ronnkvist
5101 Boone Avenue North
Minneapolis, MN 55428
Tel: 763-536-9132
763-536-9102
www.helicalanchorsinc.com
tom@helicalanchorsinc.com

iCON Foundation Equipment, BV, A Subsidiary of ICE USA, Inc.
Sander Jorissen
Lissenveld 69, 4941 VL
Raamsdonksveer, The Netherlands
Netherlands
Tel: 31-162-58-23-24
www.iceicon.nl
sales@iceicon.nl

Kie-Con
Allen Kung
3551 Wilbur Avenue
Anticoh, CA 94509
kTel: 925-754-9494
Fax: 925-754-0624
www.kiecon.com
akung@kiecon.com

Mill Man Steel
R. D. Schieman
11307 E. Montgomery Drive
Spokane, WA 99206
Tel: 509-535-5700
Fax: 509-535-6843
www.millmansteel.com
rdschierman@millmansteel.com

Pile Insulation Consultants
Henry Whitty
19-1 Chamale Cove East
Slidell, LA 70460
Tel: 504-214-8199
Fax: 985-649-7955
pichenrywhitty@yahoo.com

REV Drill
Jack Mitchell
5811 Grove Lane
Fredrick, MD 21704
Tel: 301-662-6552
Fax: 301-662-6553
www.revdrill.com
jack.mitchell@revdrill.com

Steel Piling Network
Mark Lenzi
PO Box 29502, #41258
Las Vegas, NV 89126-9502
Tel: 888-600-6098
Fax: 888-6006098
www.steelpilingnetwork.com
mark.lenzi@steelpilingnetwork.com

Engineering Affiliate Members

Aquaterra Engineering
Tom Vrenick
2822 O'Neal Lane
Baton Rouge, LA 70816
Tel: 225-344-6052
Fax: 225-344-6346
www.aquaterraeng.com
tvrenick@aquaterraeng.com

Aver Technologies, Inc.
Swamy Avasarala, M.E., P.E.
13104 Queensdale Drive
Woodbridge, VA 22193
Tel: 703-580-8907
Fax: 480-247-4839
www.avertechnologies.com
swamy@avertechnologies.com

Badeaux Engineers, Incorporated
Michael Badeaux
115 E. 6th Street
Thibodaux, LA 70301
Tel: 985-447-2317
Fax: 985-447-2319
michael@badeauxengineers.com

ECS Mid-Atlantic
Karl Higgins
14026 Thunderbolt Place
Suite 100
Chantilly, VA 20151
Tel: 703-471-8400
Fax: 703-471-5292
www.ecslimited.com
mcurtis@ecslimited.com

Foundation and Geotechnical Engineering, LLC
Lawrence Spears
608 Hitchcock Street
Plant City, FL 33563
Tel: 813-759-2426

Geo-Technology Associates
Chris Reith
18 Boulden Circle
Suite 36
New Castle, DE 19720
Tel: 302-326-2100
Fax: 302-326-2399
creith@mragta.com

JL Arnold Engineering
Jeff Arnold
PO Box 179
St. Petersburg, FL 33731-0179
Tel: 727-823-4200
Fax: 727-823-4224
jeff.arnold@jlarnoldengr.com

Lloyd Acoustics, LTD.
Nigel Dillon
Laurelvale House
36 Lurganville Road
Moira, County Armagh
BT67 OPL
Northern Ireland
Tel: +44 (0) 28-9261-0525
Fax: +44 (0) 28-9261-0524
www.lloydacoustics.com
nigel.dillon@lloydacoustics.co.uk

Sany America, Inc.
Larry Washington
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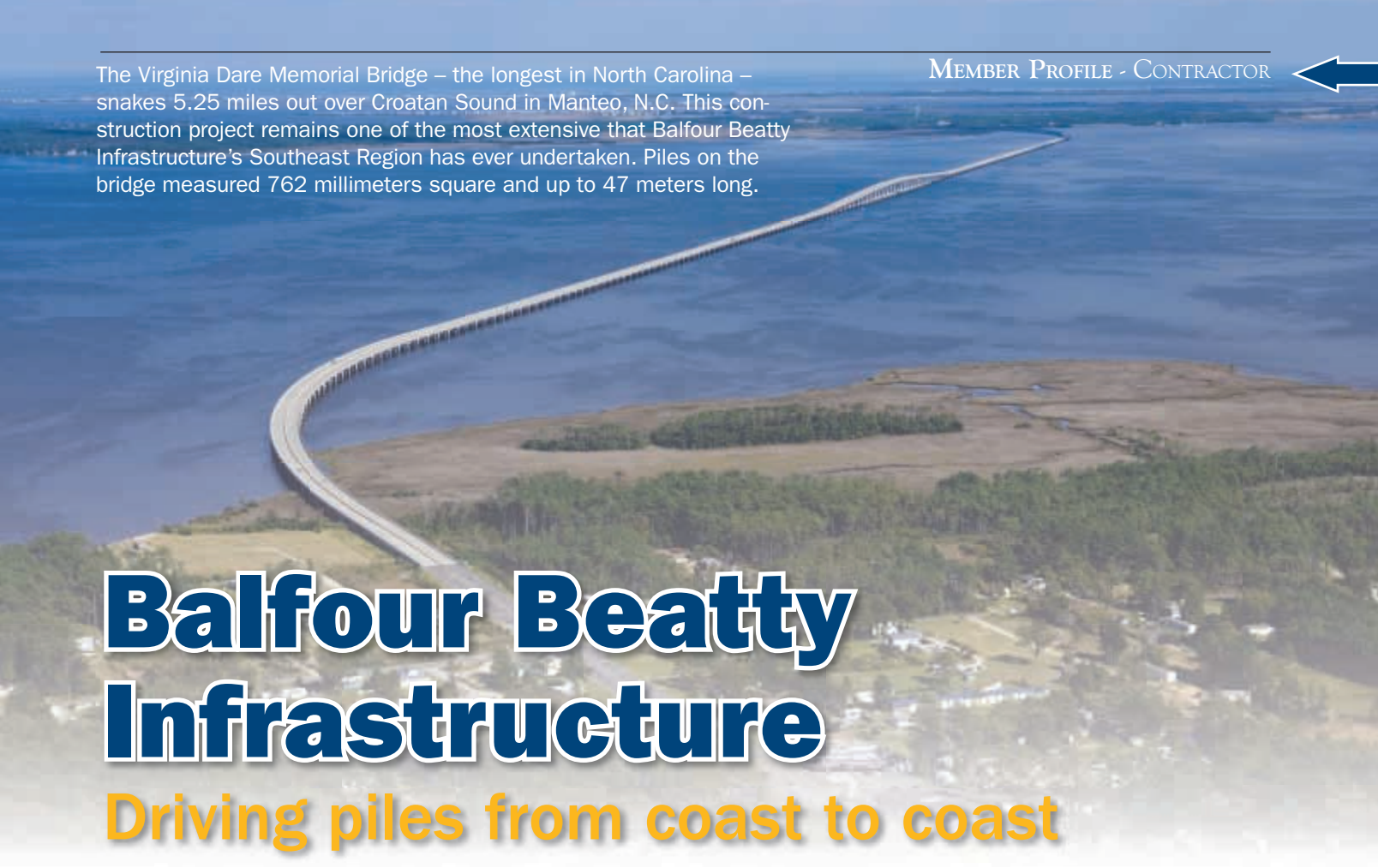


The Virginia Dare Memorial Bridge – the longest in North Carolina – snakes 5.25 miles out over Croatan Sound in Manteo, N.C. This construction project remains one of the most extensive that Balfour Beatty Infrastructure's Southeast Region has ever undertaken. Piles on the bridge measured 762 millimeters square and up to 47 meters long.

Balfour Beatty Infrastructure

Driving piles from coast to coast

By Steve Jones, Marketing Communications Specialist, Balfour Beatty Infrastructure, Inc.

While many heavy construction companies subcontract piledriving on large projects, teams with Balfour Beatty Infrastructure, Inc. are accustomed to doing the work themselves. The company has distinguished itself for piledriving expertise during the last 20 years on some massive projects around the United States. And there's plenty more ahead.

Balfour Beatty Infrastructure was established in the United States in 1990. It provides services mostly to municipal, county, state and federal agencies, particularly state Departments of Transportation and expressway authorities. The company is part of a global giant in heavy civil engineering that's existed for a hundred years: Balfour Beatty, plc. Its headquarters are in London with member companies spread out over the globe.

In the last 20 years, Balfour Beatty Infrastructure has driven pile from coast to coast, acquiring a wide breadth of piledriving experience. The company constructs highways, bridges over land and water, tunnels, potable water treatment plants and wastewater treatment plants.

Company structure

Balfour Beatty Infrastructure is organized by geographic region. The Southeast Region, with headquarters in Wilmington, North Carolina, takes on complex bridge and highway projects – many with a high level of environmental sensitivity – throughout Florida, Georgia, the Carolinas, Pennsylvania and Ohio.

The Western Region serves California, Oregon and Washington. Like the Southeast Region, its work involves highways and bridges, but it also performs water and wastewater projects, as well as tunnels and rail systems. Many of these require some type of driven pile, both for permanent and temporary applications.

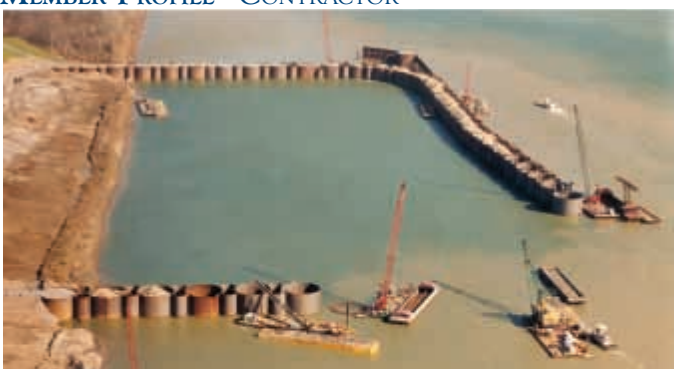
The Southwest Region operates in Texas and focuses mainly on highways, including many large-scale toll road projects.

Piledriving capabilities

Balfour Beatty Infrastructure has worked with a wide range of materials: steel and vinyl sheet pile, steel H-pile, steel/concrete/fiberglass cylinder pile, precast pile, combiwall and wood pile. Recently, the company has begun using steel-reinforced plastic pile.

The equipment the teams use to drive pile includes vibratory and impact pile hammers powered by air, hydraulics and diesel. "The technology of the pile driving equipment we use has not changed much the last few decades," said Crandall Bates, region manager for northern California. "It's really quite simple: Basically the hammer transfers energy into the driven pile."

But that doesn't make piledriving an elementary enterprise. "The hard part is determining the correct type and quantity of energy, considering the multiple pile products, applications and varying ground conditions," Bates said. "All the while, you've got to meet and adhere to the specified final design criteria, permit and contract specifications, as well as all other the owner and client needs."



This cofferdam is part of the Omsted Lock and Dam project. While replacing locks and dams on the Ohio River, the team drove and installed more than 21,000 tons of sheetpile.

Balfour Beatty Infrastructure, Inc. workers drove 2,400 number 762-millimeter square piles weighing up to 60 and 70 tons each as part of the Virginia Dare Memorial Bridge project over Croatan Sound in Manteo, North Carolina. Shown here is a completed high-rise section in the bridge center, supported by up to 60 piles in each bridge footing.

Ambitious beginnings

Strangely enough, the Western Region started with its first piledriving job east of the Mississippi River. That project was the Omsted Lock and Dam, Phase 1, on the Ohio River. The Olmsted, Illinois, location is considered the hub of the Ohio, Mississippi, Tennessee, and Cumberland River waterway system. More tonnage passes this point than any other place in the inland navigation system.

The project ran from 1993 to 1995 and called for the replacement of aging locks, along with two dams. The new facility consists of twin 110-foot by 1,200-foot lock chambers. The project allows unobstructed water access and commerce to more than 100 million tons of goods through this stretch of the Ohio River.

The scope of the job's piledriving component was daunting. Balfour Beatty drove and installed more than 21,000 tons of sheetpile produced by Bethlehem Steel on the project's first phase. The sheets formed circular cells that were all interconnected and filled with sand. The resulting cofferdam gave workers a dry area to construct the locks.

Challenging projects

The San Mateo-Hayward Bridge project, which won the 2003 PDCA Project of the Year Award, was another good test of the Western Region's piledriving mettle. The San Francisco Bay area project called for new construction of 4.7 miles of concrete bridge, three lanes wide, with shoulders. The bridge was made up of precast bent caps that were supported by driven pre-stressed, precast concrete piles, 42 inches in diameter and more than 110 feet long.

"This project had a number of challenges associated with it, especially our goal of completing 270 feet of bridge

The White Oak River Bridge called for steel pipe pile, concrete pile with steel pile stingers in a highly sensitive wetlands area near Stella, North Carolina. Pictured here are low-water footings supported by 24-inch OD metalized pipe pile.

every week," said Mark Johnnie, the project manager and now vice president of the Southeast Region. "The work was highly repetitive. Even so, we were never really able to just breeze along. Getting all the processes to work in harmony as we moved through the process required a lot of intense planning."

One of the Southeast Region's most extensive projects was construction of the Virginia Dare Memorial Bridge over Croatan Sound in Manteo, North Carolina. The five-mile, four-lane bridge called for 2,400 piles, weighing up to 60 and 70 tons each. The team used exceptionally large piles on this four-year project, which began in 1998. They measured 762 millimeters square and up to 47 meters long.

Many projects have involved piledriving in extremely environmentally sensitive areas. For example, the White Oak River Bridge, a project that ran from 2004 to 2006, required 240 concrete piles and 270 steel piles in pristine wetlands near Stella, North Carolina.

Recent work

Among the recently completed projects is the Freeport Regional Water Intake Facilities on the Sacramento River in California, a three-year job that began in March 2007. The expansive facility contains a pumping plant designed to move 185 million gallons per day. The Balfour Beatty Infrastructure team used a combiwall system supplied by LB Foster to support that structure.

"The combiwall isn't used a lot in the United States. But it definitely has its useful applications, as was the case for the Freeport job," said Bates. "The final wall, with the added section modulus, provides a lot of added strength to the overall wall."

Projects currently underway include the new Red Bluff fish screen and pumping plant in Red Bluff, California, on the Sacramento River. This pumping plant on the project will feed the Tehama Colusa Canal, which provides agricultural water for more than 1,500 family farmers in the Sacramento Valley.

More than 3,200 tons of driven z-pile will serve as a cofferdam to support the fish screen and pumping plant. When complete, this unique project will allow spawning fish to run farther up the Sacramento River, unobstructed by dams and associated gates. "In this instance, all parties are in a win-win situation," Bates said. "The environmentalists, farmers and Mother Nature all get to accomplish their goals."

Safety

The dangers inherent in major construction – piledriving in particular – obviously require high-level safety precautions. Balfour Beatty Infrastructure has several standards in place to prevent accidents in such a high-risk environment.

"The company puts a great deal of thought into the overall process," said Johnnie. "We focus on the hoisting process, as well as the mechanisms that hold the pile in the vertical position once hoisted – either through the fixed piledriving leads or an engineered template. Long and the short is that the company spends a lot of time planning the piledriving process for our projects. Every project is unique."

In addition to the process, the team is meticulous in outfitting employees with the proper safety equipment and pro-

The Balfour Beatty Infrastructure team lofts a trestle pile on the San Mateo-Hayward Bridge. This project in the San Francisco Bay area won the 2003 PDCA Project of the Year Award. The 4.7-mile stretch of new construction required piles 42 inches in diameter and more than 110 feet long.

viding ongoing safety training. "Working from heights can be involved, so we provide fall protection provisions," Johnnie said. "Oftentimes, piledriving occurs over or around water, so lifejackets tend to be standard apparel for piledrivers. That said, piledriving is about repeatedly hoisting heavy and awkward loads. Moving a pile from the horizontal position to a vertical position is a routine piledriving process, but it is also one of the highest risk steps in the overall process. As you can imagine, overhead loads are a constant safety concern."

Johnnie said the company is strict about making sure all employees wear the right personal protective equipment and use hearing protection. It also means hand-picking employees who are committed to safety. "We spend a lot of time selecting and training the right employees to execute the process," he said.

The parent company launched a new safety initiative in 2008 to have "Zero Harm" across all businesses by 2012. The Zero Harm effort is aimed at eliminating the risk of serious injury and the ruin of lives because of the company's work. Across all its global operating companies, Balfour Beatty is working to cut out the risk from the company's activities, so no realistic risk of a serious accident or environmental harm exists.

"Our company performs quality work, with as much expertise and efficiency as anyone else in the field," said Jim Moynihan, the company's president and CEO. "But none of that matters much if we're not protecting people and the environment. That will always be our primary concern when we handle these jobs. We make sure employees come home to their families at night in the same condition as when they left that morning." ▼

Photos courtesy of Balfour Beatty Infrastructure

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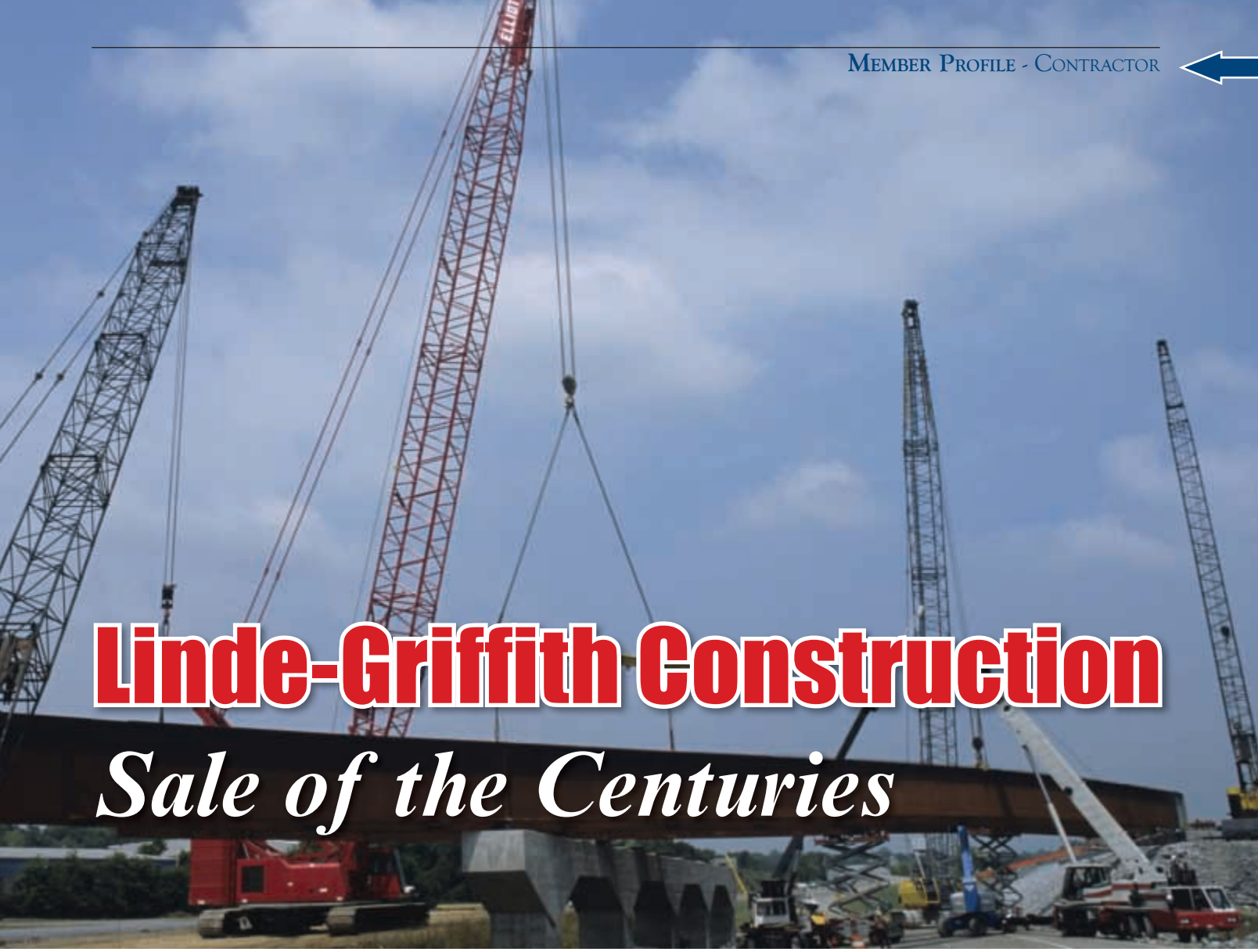

Linde-Griffith Construction

Sale of the Centuries

By Kevin Shannon, Linde-Griffith Construction Company

History

Linde-Griffith Construction Company's origins date back to 1865, with the founding of The A. E. Sanford Company. In 1909, August Linde and George Griffith, then superintendents for The A. E. Sanford Company, purchased its assets – the legend has it for the grand total of one dollar! Mr. Griffith provided the technical know-how and Mr. Linde handled the marketing expertise. As the years progressed, the business flourished.

In 1921, the founders hired Raymond A. Finley, Sr., P.E. Prior to his joining Linde-Griffith Construction Co., Finley worked on the construction of the Panama Canal. Shortly thereafter, Charles E. Ryan was also hired. The firm's accomplishments during the first 30 years were many and diverse, and the workload increased rapidly.

Accordingly, the Linde-Griffith Construction Co. cadre hired Peter H. Shannon Sr., P.E. in 1941 to strengthen the firm's administration, management and supervision capacities. The deaths of Griffith in 1939 and Ryan in 1942 and the increase in national defense work associated with America's deepening involvement in the Second World War resulted in the hiring of Charles Stillman, P.E. in 1943.

Linde-Griffith Construction Co. did not rest on these accomplishments. In 1946, shortly after World War II ended, another engineer, Raymond A. Finley, Jr., P.E., fresh out of the United States Navy, signed on and began working with Linde-Griffith Co. William Richtmyre, P.E., another United States Navy veteran, joined the firm in 1948. The company continued to flourish. After Linde's death in 1960, the young triumvirate of Peter H. Shannon, Sr., Charles Stillman and Raymond A. Finley, Jr. assumed more management control, with Raymond A. Finley, Sr. remaining as chief executive officer until his death in 1965.

In 1966, Peter H. Shannon, Jr. left the accounting firm of Peat, Marwick, Mitchell, joining Linde-Griffith Construction Co. as the operations manager. Four years subsequent, in 1970, another Shannon son, John F., graduated from Lafayette College and was recruited as a civil engineer and project superintendent. Eighteen months later, Linde-Griffith Construction Co. hired its first third generation employee, Raymond A. Finley III, as the office manager.

With Charles Stillman's phasing into retirement in 1971, William C. Richtmyre and Peter H. Shannon, Jr. phased into the company's management. Nine years later,

in 1980, Raymond A. Finley, III and John F. Shannon, P.E. became stockholders. With the retirement of William Richtmyre in 1984, Linde-Griffith Construction Co.'s path of excellence was tended to by five: Peter H. Shannon, Sr., Raymond A. Finley, Jr., Peter H. Shannon, Jr., Raymond A. Finley, III, and John F. Shannon.

Approximately 18 years passed before the third generation of Shannons and another third generation Finley joined Linde-Griffith. Christopher Shannon, John D. Shannon, David Price, James Finley and Kevin Shannon now supervise the field construction and manage the daily operations, as well as being company shareholders and members of the board of directors.

Michael Shannon, a Lafayette College graduate, is the newest Shannon in the company and has assumed the role of site engineer and project superintendent.

Today, more than 100 years from the day when that one dollar exchanged hands, Linde-Griffith Construction Company has continued to be the pre-eminent driving force in the specialty foundation business in the Northeast.

Changing of the Guard

In 1966 a renaissance took place at Linde-Griffith Construction Co. with the hiring of Peter H. Shannon, Jr. In the late 1960's there was a huge chasm between labor and management in the construction industry. Peter Shannon, Jr. promised the Linde-Griffith workforce that if he was successful, they too would be successful. He asked his co-workers to do away with "the honest 8 hours". Peter Shannon, Jr. successfully explained that if Linde-Griffith could drive just one additional pile a day, he could lower the cost of his estimates which in turn would result in more jobs being awarded to Linde-Griffith. That in turn would keep everyone working far more than "the honest 8 hours." Peter Shannon, Jr. earned his co-workers' trust and fulfilled his promise and was the heart of Linde-Griffith until his death in 2003. Today's ownership landscape looks slightly different but the values and traditions Peter put in place still remain the same. Linde-Griffith's eclectic ownership of this millennium offers their clients the unparalleled importance of veteran experience and exuberance of youthful enthusiasm. Linde-Griffith has an owner of the company on every jobsite every day.

To further illustrate the relationship and trust Peter Shannon instilled in his team, the average dockbuilder/operating engineer tenure at Linde-Griffith is close to 15 years. Some ongoing Linde-Griffith careers are much longer. Currently, Linde-Griffith's seasoned foreman, Jackie Warren, just celebrated his 38th year as a "Linde Ranger". Jackie has taught something to everyone at Linde-Griffith and the fire in his belly has not subsided one bit. Jackie will be the first person on the job in the morning and the last to go home in the afternoon. Linde-Griffith Construction Company would not be what it is today without the tireless efforts of Jackie Warren.

Joseph Merse started with Linde-Griffith in 1983 as a dockbuilder journeyman. Joe quickly was promoted to foreman status and since has succeeded in every aspect of the pile driving industry. Currently, Joe is in charge of all the equipment and is at the center of the Linde-Griffith fabrication and equipment hub. Joe Merse's fingerprints are on every job Linde-Griffith completes.

Robert Dammann, operating engineer, started with Linde-Griffith in 1991 and was told by the union hall he would "probably finish the job" with Linde-Griffith. Thankfully for Linde-Griffith Construction Company, the "job" apparently isn't finished. Bobby Dammann is Linde-Griffith's pre-eminent crane operator and has driven more piles than any other Linde-Griffith operator in the company's 101 year history.

Shawn and Tommy Fortenberry have each been with Linde-Griffith for over 20 years, both starting as yard assistants to their dad, Sandy Fortenberry, and then advancing to journeymen and now dockbuilder foreman. Their father Sandy spent his entire career at Linde-Griffith, and his boys learned many of their skills from him. Like his sons, Sandy was a great man.

Pat McDaniel is Linde-Griffith's chief mechanic and has been in that capacity for almost 12 years. There's not an engine Pat can't improve. His no-nonsense approach and southern temperament make him an invaluable asset to his company. Pat's son-in-law, Warren "Opie" Kuhlthau, is also one of Linde-Griffith's top crane/drilling operators.

Dave Steinmetz has taken Linde-Griffith's drilling operations to the next level. With Dave in the seat, the machine is practically on autopilot. Dave's skills are

matched only by his desire and work ethic. If drilling is the subject, Dave Steinmetz' name will undoubtedly be mentioned.

Scott McGinnis, dockbuilder foreman and journeyman, is another "home grown" talent for Linde-Griffith. Scott's grandfather, Richard Pearce, was a dockbuilder foreman for Linde-Griffith in the 1970s and 80s. Scott is the quintessential dockbuilder and has been with Linde-Griffith for almost 10 years.

Jim Fanner, Tim Shannon and Paul Parlacoski, dockbuilder foremen, have collectively represented Linde-Griffith for over 30 years. Their skills, coupled with their expertise, is one of the reasons Linde-Griffith has such a bright future.

Other key contributors to Linde-Griffith's success over the last several years have been Chuck Reisinger, Tony Marques, Matty DiBlasio, Harold Shoemaker, Frank Barnard Jr, John Gruber, Ed Dahl, Richard Ziets, Charlie Calderone, Tommy Galitano, Ray Gregory, among countless others.

As can be seen from the people who make Linde-Griffith what it is today, it is a family business. However, Linde-Griffith is not a family business solely because many of its employees happen to share the same surname; it's a family business because, as in a family, everyone protects and looks out for the other guy and ultimately enjoys the camaraderie of his coworker.

Projects

No single job is too big or too small for Linde-Griffith Construction Company to handle. Linde-Griffith will drive a few piles for a homeowner's addition or will drive thousands of piles for stadiums, parking structures, generating stations, international airports, turnpikes, parkways or warehouses.

One recently completed high-profile job was to drive all the piles for The New Meadowlands Stadium in East Rutherford, New Jersey. The Construction Manager's original thought was to split the contract and award it to three or four pile driving contractors. After a series of presentations and interviews, Linde-Griffith was awarded the entire package and completed the 20 million-plus dollar job months ahead of the original schedule.

Linde-Griffith will be driving piles in the upcoming months on several New Jersey Turnpike projects, multiple schools and a series of airport jobs. A 3,000 pile job for a warehouse in Hudson County will also be commencing in the next few weeks.

In a time when the economy seems to be the main driving force in pile driving and where every dollar matters, none mattered more to the people of the Linde-Griffith Construction Company than that first dollar in 1909! ▼

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Deep Foundation Testing for Varying Types of Projects

By Nemer (Nick) Oweis, P.E., and Michael Krepsik, E.I., Ellis & Associates, Inc., Jacksonville, Florida

Different methods of deep foundation testing are used in the engineering/construction industry. With the advancement of technology in the last 20 years, the conventional static load test is gradually being replaced with more recent testing methods such as high strain dynamic, Statnamic and Osterberg cell testing. The type of testing is dependent on the type of foundation being used and the magnitude of loads applied. For driven displacement piles, high strain dynamic pile testing using the Pile Driving Analyzer (PDA) has recently become the most commonly used method. Standard Static Load testing is still an acceptable method of testing, but with the high cost associated with this type of testing, the use of PDA alone or as a supplement to standard static load testing is steadily becoming more common.

The standard method of Static Load testing remains the industry accepted best method of testing for critical structures, the Quick Load method of Static Load testing is often most cost-effective for smaller or less critical structures, and the use of PDA is most common for bridges and bulkheads – But, there are times when a combination of methods might work best to give the most accurate and reliable data for which to make good, safe and cost-effective judgments for construction type and location.

Keeping Up

Ellis & Associates, Inc. (E&A), an engineering and testing firm based in Jacksonville, Florida, started at the forefront of pile testing technology in the mid 1970s with its purchase of PDI's "blue box" PDA unit, complete with waveform readout and magnetic tape recording capabilities. As equipment has changed and become more modernized, E&A has kept abreast of new technology with continual upgrades in both gauges and main processor units.

The Shipyards

Since the 1990s, E&A has been involved with one of Jacksonville's largest downtown redevelopment projects – **The Shipyards**. The project site resides on the north bank of the St. Johns River. The shores along this stretch of downtown Jacksonville have a long history of shipbuilding activities including construction of Liberty class cargo ships for the Navy during WWII. The area remained a shipbuilding site until the 1980s when portions of the land

West end portion of the completed shipyards.

were purchased by private developers with plans to develop the property into office buildings and high rise condos. The Shipyards is one of the latest planned developments in the area which will offer grand views of the river and successful neighbors.

In 1996, E&A explored the subsurface conditions at the site and provided geotechnical recommendations to develop plans to create a bulkhead between **Berkman Plaza and Metropolitan Park** in downtown Jacksonville. The western portion of the bulkhead was to be constructed in front of the existing bulkhead reclaiming six acres of riverfront property. Phase I of the bulkhead was completed in 2002. As part of the Phase I project, E&A performed a load test program consisting of six static load compressive and tensile tests and ten PDA tests. E&A also performed a design phase pile testing program for the Phase II portion of the project consisting of three 775D Steel HZ Sections and one 24-inch diameter steel pipe pile. Static and dynamic load testing was performed for each of the four piles. The purpose of this test program was to refine unit skin friction and end bearing capacities for the limestone and marl stratums to be used in the design of the proposed complex bulkhead system. In January of 2007, the first test piles were driven for an alternate design at the Phase II site which included a concrete river walk and new sheet pile bulkhead along the previously existing bulkhead. Final test piles were driven in the spring of 2008 with all construction of the bulkhead concluding in late summer. E&A engineers performed 54 instrumented test piles using the PDA on various sizes of concrete piles, steel H-piles, and spiral welded pipe piles during the construction phase.

NASA

In May of 2009, E&A performed dynamic load testing at NASA's Launch Pad 39B. Weary of numerous costly repairs, NASA commissioned the design and construction of three lightning protection towers around the launch pad tower to protect the structure from lightning during Florida's frequent and intense summer storms. E&A used Static Axial Compressive and Tensile Load Testing (Quick Load Method) as well as Pile Driving Analysis at the site. Each tower has three pile caps. Of the three caps, SLT was performed on one, and PDA was performed on another to confirm capacity. Each of the three towers was constructed on 24-inch square pre-cast, pre-stressed driven concrete piles. Both static axial compressive and tensile load tests were performed at each tower location in order to provide an additional degree of certainty of the piles' bearing and uplift capacities.

FDOT/Nocatee

In addition to the projects mentioned above, E&A maintains a strong working relationship with the Florida Department of Transportation (FDOT). In the field of deep foundation testing, E&A has performed verification testing and QA/QC pile driving testing in FDOT's District II for many years and for many projects. E&A also performs temporary trestle pile analysis for contractors and pile testing services on temporary detour bridges when specified in FDOT plan sets. Most recently, E&A provided extensive services at the **Nocatee Development** – a 13,000-acre mega-development – the largest in Northeast Florida.

Installation of test piles, NASA Lightning Protection System at Launch Pad 39B

When completed, the development will encompass 14,200 homes, 11 villages, a 75-acre community park, a waterpark with three pools, a golf course, nine schools and a complete town center that will provide services to its local residents. E&A performed the PDA services required for the construction of four new bridges for Nocatee Parkway Phase II in the development which spans two Florida counties - Duval and St. Johns. While the bridges were part of the private development, plans and specifications were all designed to FDOT standards. Thirty PDA tests were performed and driving criteria issued in an expedient manner which allowed the pile driving crew to continually satisfy project schedule. Since the roadway was to be turned over to FDOT for maintenance, both E&A and the contractor worked closely with inspectors from FDOT, Duval County, St. Johns County, and a CEI firm representing the developer. E&A worked diligently to maintain continuity and expediency with all parties involved.

A Good Practice

At E&A, each and every project is clearly discussed with the client prior to its start in order to gain an understanding of the specific needs and expectations of the client. Project plans and specifications are then carefully reviewed to verify that our field personnel are performing the necessary inspections and testing, and following proper procedures. Each project is staffed with trained personnel who maintain open lines of communication with our clients to keep the project team informed of new developments, provide assistance as needed, and keep all parties abreast of any changes in project scope and requirements. This continual communication with design and construction professionals has been a successful, time-proven tool of success and we believe it's the primary reason that the majority of our clients are repeat customers – an important asset in today's economic times.

Services & History

Founded in Jacksonville in 1970, Ellis & Associates, Inc. is a leading provider of **integrated engineering services** - providing geotechnical, construction materials, and environmental engineering to both the public and private sectors in the Southeast. With offices in Jacksonville, Florida and Brunswick, Georgia, E&A currently has a combined professional staff of 70 engineers, geologists, scientists, technicians, and administrative personnel. E&A supports land

Nocatee Development, Ref. FDOT/Nocatee, pages 46 and 47.

procurement and development from the time a site is first considered for purchase through environmental restoration to engineering design and construction. With 40 years of diverse experience and many repeat clients, E&A remains strong even in our current economy. By keeping a broad base of clientele across the various business sectors, we are poised to accommodate our clients' geotechnical, construction materials and environmental engineering needs both now and in the future. ▼

About the Authors

Nemer "Nick" Oweis, P.E., is a Principal Engineer and the Director of Engineering Services at Ellis & Associates, Inc. Oweis has 26 years of experience (14 years with E&A). Oweis obtained his Master's Degree in Civil Engineering from the University of Texas in 1984, and he is a licensed Professional Engineer in Florida, Georgia and Alabama.

Michael Krepsik, E.I., is a leading Project Manager at Ellis & Associates, Inc. He has 8 years experience (3½ years with E&A). Krepsik is a graduate of Carnegie Mellon University where he obtained his Bachelor's Degree in Civil and Environmental Engineering. Krepsik is currently pursuing his Master's Degree in Civil Engineering from the University of North Florida.

Photos courtesy of Ellis & Associates

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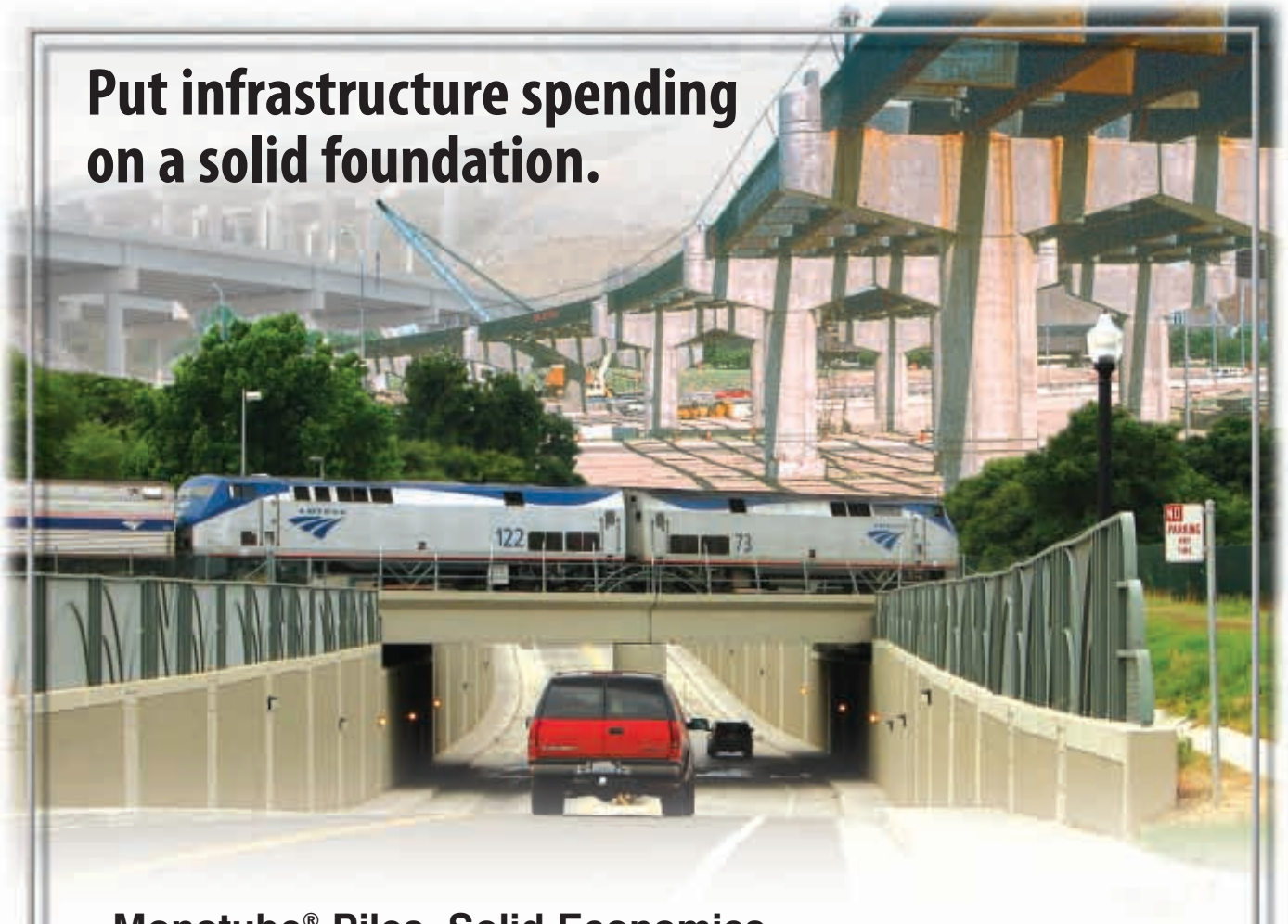

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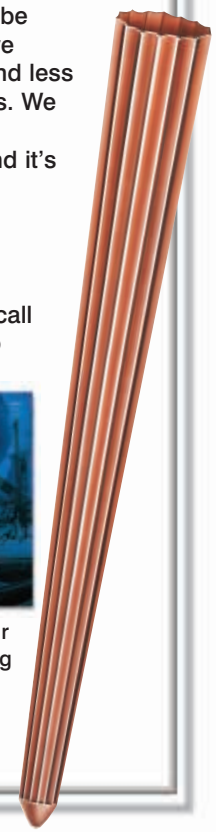

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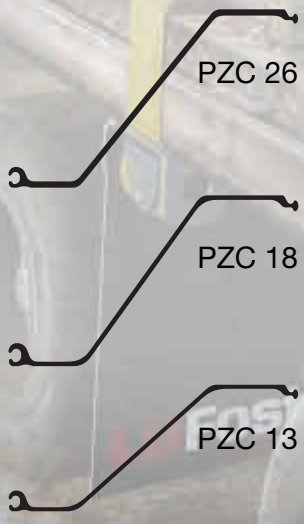

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19,000' of 48" pipe awaits installation at the Port of Houston Expansion

Mandal Pipe

The Road To Success

By Bill Buckland, President and Owner, Mandal Pipe

With my young daughters **Aman**da and **Al**icia as the inspiration, the Mandal name and company was born in the basement of my home in 1983, using a piece of plywood for a desk and a borrowed phone. Ten years earlier, in 1973, while working for a large national steel distributor, my days began by loading trucks with pipe, H-beams, steel sheet piling, and rail. Of all these products, pipe was the most dangerous….it rolled! Here was born a healthy respect for the product. Further work in a coat tar coating plant, managing the yard inventory system, matching heat numbers and mill test reports for transmittal to the contractors, preceded exposure to billing and collection. In a nutshell, learning the grunt work necessary to understand the heavy world of steel distribution. Soon, a sales position opened, taking me to Florida and eight years of constant road travel. In the mid 70's, foreign material was…well, *foreign*; Spiralweld pipe was in its infancy and Florida was booming. Hundreds of thousands of feet of small diameter thin wall pipe was consumed as piling for the condominiums appearing on the beaches. Scarcely a day went by without truckloads of pipe going to a piling job. Raymond step taper piles were dominant and auger cast was unheard of. Finally, after years of extensive travel and sales experience, an opportunity arose that provided the impetus for the birth of a new pipe company.

A good customer bought a spiral weld mill and called me to access my knowledge of the business. Surprisingly, he intended to run the mill only a few days a month for his own consumption. During lunch, he learned that the machine could run every day of the week with the proper representation, whereupon we returned to his office and drafted a "Letter of Agreement" to his secretary (the secretaries knew shorthand back then). One week later, on August 1, 1983, Mandal was born. This quickly drafted agreement lasted for nearly ten years without modification. Many of my friends offered to help and before the week was over, crucial mill backing was secured.

We have distributed pipe in the US and abroad from American Steel Pipe in Birmingham, Alabama; Berg Steel Pipe in Panama City, Florida; and Durabond Pipe (formerly Bethlehem Pipe) in Steelton, Pennsylvania for nearly 30 years. Since the beginning, we have benefitted from the

Over 40,000' of 30" diameter heavy wall pipe replaced failing concrete piles during construction of the Bay Bridge near Panama City, Florida.

backing of these powerful Domestic pipe manufacturing companies and have been treated fairly and equitably by them even though we remain one of the smallest companies in the business as measured by employee size. The reasons for this are simple: we are honest and forthright in the conduct of our business, we are knowledgeable of our product line, we are understanding of the needs of our customers and accommodative of the capabilities of our suppliers. And lastly, we pay our bills on time.

In the distribution of ERW pipe from American Steel Pipe in Birmingham, Mandal was instrumental in the development of these initial production runs:

- 24 x 625 wall pipe from a domestic ERW mill
- 24 x 625 wall pipe in 100-foot continuous lengths
- 24 x 750 wall pipe from a domestic ERW mill
- 24 x 750 wall pipe in 60-foot continuous lengths
- 20 x 438, 500, and 625 wall pipe for Offshore Conductor Casing
- API 5L X-80 from a Domestic ERW mill for Offshore Casing

Mandal has sold pipe from this mill to many of the high profile projects in the US and abroad. Some of these projects demand the most difficult physical and chemical requirements in the pipe industry. Among these projects are the Orlando Convention Center, Disney World, the US Navy Trident Submarine base, offshore conductor casing for Shell, Exxon and BHP, The Corps of Engineers, the Department of Defense and numerous DOT entities including Caltrans.

Since 1983, with only a short interruption, Mandal Pipe has been the sole distributor of large diameter piling grade pipe from the Steelton, Pennsylvania pipe facility formerly owned by Bethlehem Steel and currently owned and operated by Durabond Pipe. Pipe sizes 20-inch through 42-inch, when available, are stored at this facility which has the capability to weld and apply coatings. Pipe from this mill has been sold for piling projects as far away as Alaska as well as locally to the Pennsylvania, New Jersey, New York and other Northeast markets.

Mandal Pipe has been a distributor of Berg Steel Pipe in Panama City, Florida since the mill opened for operation in the early 1980s. Large diameter pipe with heavy walls and high tensile and yield are a specialty from this facility. Heavy wall pipe was shipped to the Coronado Bridge in San Diego, California for the retrofit after the earthquakes in 1989 and more recently to the Howland Hook Container loading facility on Staten Island. Over the years, Mandal Pipe has distributed for other quality Domestic pipe and tube mills including Atlas Tube, Paragon Industries, Independence Tube and JSW.

For the past five years, Mandal Pipe has been the primary distributor for large diameter piling grade pipe from American Spiralweld pipe located in Columbia, South Carolina. This facility houses two large diameter spiralweld machines in a parallel installation capable of producing pipe from 30-inch diameter to 144-inch diameter. It possesses fabrication and coating capabilities. It has recently produced the caissons for the Audubon Bridge being constructed over the Mississippi River north of Baton Rouge, Louisiana. When complete, it will be the longest cable stay bridge in North America. The 96-inch diameter heavy wall pipe was delivered over length and over weight on special trailers in order to reduce the welding costs for the contractor.

"Buy American", "Domestic Only", and "Melted and Manufactured in the USA" steel products are a specialty of Mandal Pipe by virtue of its Domestic Supply Stream and we welcome any certification process necessary to qualify us as an approved supplier. Of course, certified original Mill Test Reports affirming grade and specification are available on any shipment as well as the notarized statement of Domestic origin.

Proper stenciling aids traceability of all Mill documents for the Engineers and Contractors.

96" diameter pipe is assembled alongside the Mississippi River for the foundation of the John J Audubon Bridge, which, upon completion, will be the longest Cable Stay Bridge in America.

Even though domestic pipe represents the bulk of our sales, we are also active in the importation of foreign pipe. Over six thousand tons of Japanese pipe were supplied for the Oakland-San Francisco Bay Bridge project and 3000 tons of pipe for the New Carquinez Bridge in California, which was the first suspension bridge built in America in 30 years. We are the only distributor handling large diameter piling grade steel pipe from all four producers in Russia and the mills in the Ukraine and Romania. We regularly stock pipe in Houston, Texas in sizes 26-inch through 48-inch. During the nearly 30 years of operation, Mandal Pipe has remained a trusted and reliable supplier of steel pipe to some of the largest and highest profile jobs in the United States including Launch Pad 39B, the Seven Mile and Lignum Vitae bridges in the Florida Keys, the Sunshine Skyway Bridge and Woodrow Wilson Bridge, Disney World and Universal Studios theme parks, the Trident Nuclear Submarine Base, the Houston Port Authority

and we believe the largest piling job ever in the state of Florida involving nearly 500,000 feet of pipe installed at the Hookers Point Waste Water Treatment facility by the past president of the PDCA, Mr. Wayne Waters of Ed Waters and Sons Contracting.

These important, critical and massive projects prove that Mandal Pipe is an effective and trusted supplier to some of the best, largest and most capable contractors in North America. From humble beginnings in the basement, to today's national and international exposure, we have never lost sight of our true attraction, honesty and integrity. So, if you would like to see why so many contractors have relied upon us to feed their project with the requested product, delivered on the desired date, with the proper submittals, at a fair price, then give us a call. We would love to show you what we can do. ▼

Photos courtesy of Bill Buckland, President and Owner, Mandal Pipe

6,000 tons of 30" diameter heavy wall steel pipe assembled on the dock in Richmond, California destined for the foundation of the New Carquinez Bridge.

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Brayton Point Closed Loop Cooling Towers

PDCA 2010 Project of the Year Award Winner
Category: Land Project Value: Greater than $2 Million

By John E. Regan, P.E. – GZA GeoEnvironmental, Inc. Norwood, MA
& William Bodnar – Kiewit Construction Company Woodcliff Lake, NJ

Executive Summary

Located at the head of Narragansett Bay in Somerset, Massachusetts, the Brayton Point Power Station is the largest fossil-fuel burning power station in New England, generating over 1,500 megawatts of electricity. To dramatically reduce the volume of cooling water used by the "open loop" power station and minimize the thermal impact to Mt. Hope Bay, two (2) natural draft cooling towers are under construction to convert the Brayton Point Power Station into a "closed loop" system. The closed loop system will recycle cooling water and reduce water usage by more than 90%. Upon completion, the iconic cooling towers will extend over 400 feet in diameter and will rise more than 500 feet above existing grade.

Under an Engineer/Procure/Construct (EPC) Best Value contract, Kiewit Construction Company (Kiewit) of Woodcliff Lake, New Jersey is responsible for designing and constructing the foundation systems to support the cooling towers. After performing rigorous cost and schedule analyses of several deep foundation options including Slurry Wall Load Bearing Elements (LBE's), various drilled shaft configurations with and without tie-down anchors, ground improvement methods and driven pile options, Kiewit selected a prestressed concrete driven pile foundation option to support the large loads imposed on the iconic cooling towers and demonstrated that driven piles provided the most cost effective solution for support of these signature structures.

Despite conventional wisdom that driven piles could not effectively resist critical loading conditions imposed by these massive structures, Kiewit and GZA GeoEnvironmental, Inc. (GZA) of Norwood, Massachusetts performed an extensive and comprehensive Pile Load Test Program which demonstrated that driven 20-inch square prestressed concrete piles could provide sufficient resistance to support the controlling loading conditions.

Foundation Design Considerations

Since new natural draft "closed loop" cooling towers have not been constructed in the US in nearly 20 years, Kiewit relied on state-of-the-art design guidelines from the German VGB Design Code for seismic loading in develop-

ing a suitable foundation design system. Design loading conditions based on the German VGB Design Code and the Massachusetts State Building Code demonstrated that uplift (i.e. tension) and lateral load conditions under wind loads and the design seismic event represented the critical loading conditions.

The site of the proposed cooling towers is located over the previous cooling waterway and is underlain by approximately 30 feet of coal ash fill and organics, overlying silty sand. Numerous obstructions including spray tower foundations were known to exist within the coal ash fill and organics under the tower footprints. Dense glacial deposits and bedrock underlay the upper deposits and historic coal ash fill and represent suitable bearing for driven pile foundations.

The subsurface conditions at the site require deep foundation support to resist unique loading conditions. In addition to the 150-ton pile capacity requirement for the 500-foot tall structures, the design seismic loading conditions specified by the German VGB Building Code and wind loading combinations required by the Massachusetts State Building Code (MSBC) established that the resistance to lateral and uplift (i.e. tension) loads became the controlling criteria for foundation support.

Two of the options (LBE's and Drilled Shafts) required the excavation, handling and proper disposal of coal ash fill. Driven piles minimized soil handling and disposal and provided cost and worker health and safety benefits.

20-Inch Square Pre-Cast Concrete Piles – Production

Large displacement pile sections typically employed in the New England region include 14-inch prestressed concrete and 12.75 to 16-inch closed end pipe piles. These pile types, although readily available, could not resist the large moments and lateral loading conditions imposed by the cooling towers. Kiewit purchased additional pile beds suitable for casting minimum 20-inch square concrete pile sections which were not readily available in the local supply market.

All piles were cast by PDCA member Vynorius Pile Driving Pre-Cast Concrete Division in Salisbury, Massachusetts. Due to the corrosive nature of the soil

at the site, piles were cast with 2-inch minimum concrete cover over steel reinforcing and DCI Corrosion Inhibitor was used during the batching process. The robust 20-inch pile design, consisting of heavy seismic reinforcing to resist critical loads, also improved material handling (i.e. offloading, stockpiling, lofting) and minimized breakage of the 70-ft long concrete piles.

With a minimum allowable concrete compressive strength of 6,500 psi specified, actual production pile testing confirmed that substantially higher strengths (avg. of 10,000 psi) were routinely achieved within 4 days of casting. This higher strength concrete improved delivery time and minimized pile breakage during transport, lofting and driving.

Comprehensive Pile Load Test Program

To confirm that driven prestressed concrete piles could provide sufficient resistance to support the controlling loading conditions, a comprehensive Pile Load Test Program was undertaken by Kiewit and GZA. This multi-phase Test Program included the following:

1. **Pre-Driving Wave Equation Analyses of Piles (WEAP)** to establish/size appropriate hammer systems suitable for safe and efficient pile installation while being capable of delivering sufficient energy to develop the required pile capacity (150 ton design).
2. **Dynamic Pile Testing** - Twelve (12) indicator piles were driven and monitored by GZA using the Pile Driving Analyzer (PDA) to measure driving stresses, hammer performance, and to estimate the static pile capacity. The preliminary driving criteria was developed based on pre-driving WEAP using the GRLWEAP Software to size the hammer system with the 20-inch prestressed concrete pile type and known soil conditions. Prior to installation, test pile locations were pre-augered approximately 30 feet through existing fill material with a 16-inch auger to clear obstructions and improve energy transfer to the pile tip. The indicator piles were driven using a Delmag D46-32 (ram weight 10,140 lbs.) open-end diesel impact hammer. Dynamic pile testing was performed on all indicator piles in accordance with ASTM D4945-89 - Standard Test Method for High-Strain Dynamic Testing of Piles using a Model PAK Pile Driving Analyzer (PDA). The PDA was used to make real-time dynamic force and acceleration measurements of the indicator piles during impact driving. These measurements were evaluated in the field to estimate pile capacity, monitor pile stresses and hammer performance, and were used to perform CAPWAP analyses to verify that the required ultimate pile capacity of 300 tons (600 kips) was achieved.
3. **Compression Load Testing** – GZA performed one (1) compression load test on a 20-inch square precast concrete pile in accordance the Massachusetts State Building Code (MCBC) and ASTM Method D1143 "Standard Test Method for Piles Under Static Axial Compressive Load" to confirm the pile design compression load. Prior to casting, GZA installed three (3) pairs of Geokon Model 4200 Embedment Strain gages to the test pile reinforcing with each strain gage pair installed diametrical in three (3) locations positioned at 0.5 feet, 5.5 feet, and 15 feet above the pile tip. The strain gages provided microstrain measurements during the compression load test which were used to calculate load transfer from the pile butt to the gage location for each load increment of the compression load test to confirm load transfer to the bearing stratum in accordance with the MSBC.
The loading sequence was taken to a maximum test load of 750 kips to satisfy the load transfer criteria of 100% of the design load (150 tons) in the bearing stratum. The maximum gross displacement of the pile butt measured 0.2 inches, substantially less than the specified failure criteria (Davisson Criteria) of 0.59 inches, thereby satisfying the MSBC requirements for a 150 ton (300 kip) pile.
4. **Tension Load Testing** – GZA performed five (5) tension load tests on selected test piles. Each test pile was prepared for tension testing by removing the top three to four feet of each pile above the subgrade and exposing the embedded strain gage signal wires and prestress strands. Eight of the exposed prestress strands were secured to a load transfer plate. This plate was used to transfer tension load from the hydraulic jack to each test pile shown below.
Tension pile load testing was performed in accordance with ASTM Method D3689-90, "Standard

Test Method for Individual Piles under Static Axial Tensile Load". Using a limiting load-displacement criteria of 0.5 inches of upward movement at the pile head, the maximum measured tensile resistance ranged from 184 kips to 280 kips, thus satisfying the design tension (uplift) capacity of 40 tons (80 kips) at both tower locations.

5. **Lateral Load Testing** – GZA performed three (3) lateral load tests on the selected indicator piles in accordance with ASTM Method D3966-07, "Standard Test Methods for Deep Foundations Under Lateral Load" and the Massachusetts State Building Code. Using a limiting load-displacement criteria of 0.5 inches of movement at the pile head, the maximum measured lateral resistance ranged from 25 kips to 60 kips, thereby satisfying the design lateral capacity of the test piles is 21 kips (10.5 tons) at all three lateral test locations.

Results of the Pile Test Program confirmed that 20-inch prestressed concrete piles could be driven to the required capacity using the Delmag D62-22 without overstressing the pile section. As a result of the test program, higher pile capacities were substantiated. These design values were utilized in place of conservative design assumptions, resulting in a revised pile layout that eliminated 176 piles for a total cost saving of approximately 9% (~$1M US).

Production Piling Installation

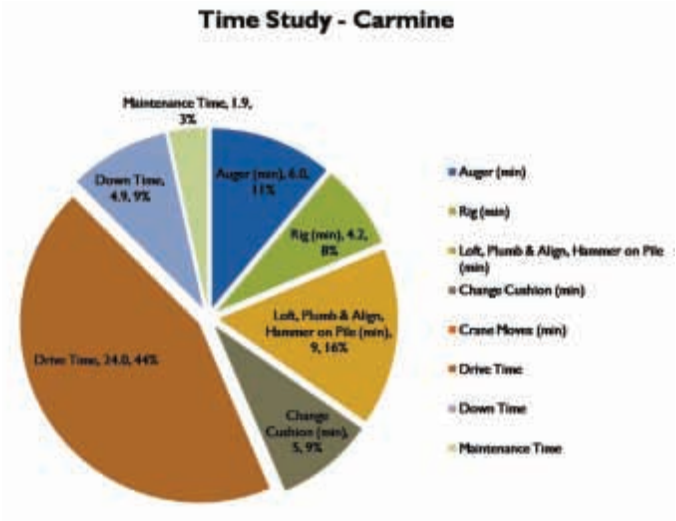
Kiewit's three (3) pile driving crews employed two (2) Manitowoc 4100 Series 2 with 130 feet of 37-inch open faced fixed leads and one (1) Liebherr 885 Crawler Crane (shown below) with 120 feet of 33-inch open faced fixed leads. All three came equipped with a Delmag D-62-22 Open-End Diesel Impact hammer, a 20/40 HPSI spotter and 16-inch continuous flight augers.

Kiewit utilized various piling techniques to overcome numerous challenges to successfully complete the work including:

1. **Pile Orientation Controls** - Project specifications and a patented cooling tower foundation design criteria required the implementation and execution of stringent pile orientation controls. Kiewit employed a pile layout template (shown below) to ensure quick and accurate alignment and used Berminghammer leads that rotated independently about the boom tip and spotter connection.
2. **Obstructions** - Subsurface obstructions including spray tower foundations and rip rap slopes were known to exist within the coal ash fill and organics under the tower footprints. Prior to installation, archived site plans were reviewed and compared to proposed pile locations to identify potential conflicts with existing structures. Obstructions were

removed by pre-excavation techniques to depths up to 30 feet below existing grade. Pre-augering to depths of 40 feet was performed in advance of pile installation to clear obstructions. At various locations, auger flights reached refusal on existing reinforced concrete pile caps and were unsuccessful in penetrating the obstructions. To address this issue, reinforced pile points were installed on select piles to strengthen the pile tip. These piles were successfully advanced through the concrete structures and advanced to the bearing stratum.

3. **Quality Control** - Each pile installed was observed by trained technicians (see left) to monitor drive time, penetration resistance, and pile verticality. Driven piles which appeared broken were analyzed using the Pile Integrity Testing (PIT) to ensure that Quality Control was maintained.
4. **Lofting Using a Single Pick** - Lofting (i.e. picking and setting piles in the leads) was initially performed using a 2-point pick technique which required periodic stoppages during installation to remove chockers. This process was refined and ultimately accomplished with a single point pick using braided chokers, thereby eliminated the use of rolling blocks and improving loft time.
5. **Improved Cycle Times** - Numerous time studies were conducted to review cycle times (i.e. bang to bang) culminating in a production shutdown which afforded all 3 pile crews to review production videos, conference with management, superintendents, operators and craft labor, and brainstorm to identify areas of improvement including rigging, lofting, plumbing/alignment, cushion changes and drive time.



Kiewit's pile driving crews worked 12 hour shifts, 6 days a week to successfully install 1592 20-inch prestressed concrete piles (112,000 LF) in 3.5 months with zero accidents, under budget and 10 weeks ahead of schedule. Total pile breakage was approximately 2.5%. ▼

Photos courtesy of John E. Regan, PE.& William Bodnar

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A premier steel foundation supplier serving the US, Canada, Mexico, Central America, Caribbean and South American markets, Skyline Steel is a wholly-owned subsidiary of ArcelorMittal, the world's largest and most respected steel company. Skyline Steel has over twenty sales offices across two continents and a robust infrastructure comprised of manufacturing, coating, and fabrication facilities; dozens of stocking locations; an efficiently-coordinated supply chain; and exclusive engineering support. Collectively, these functions support a dynamic sales team that supplies hundreds of thousands of tons of steel foundation products to the industry every year.

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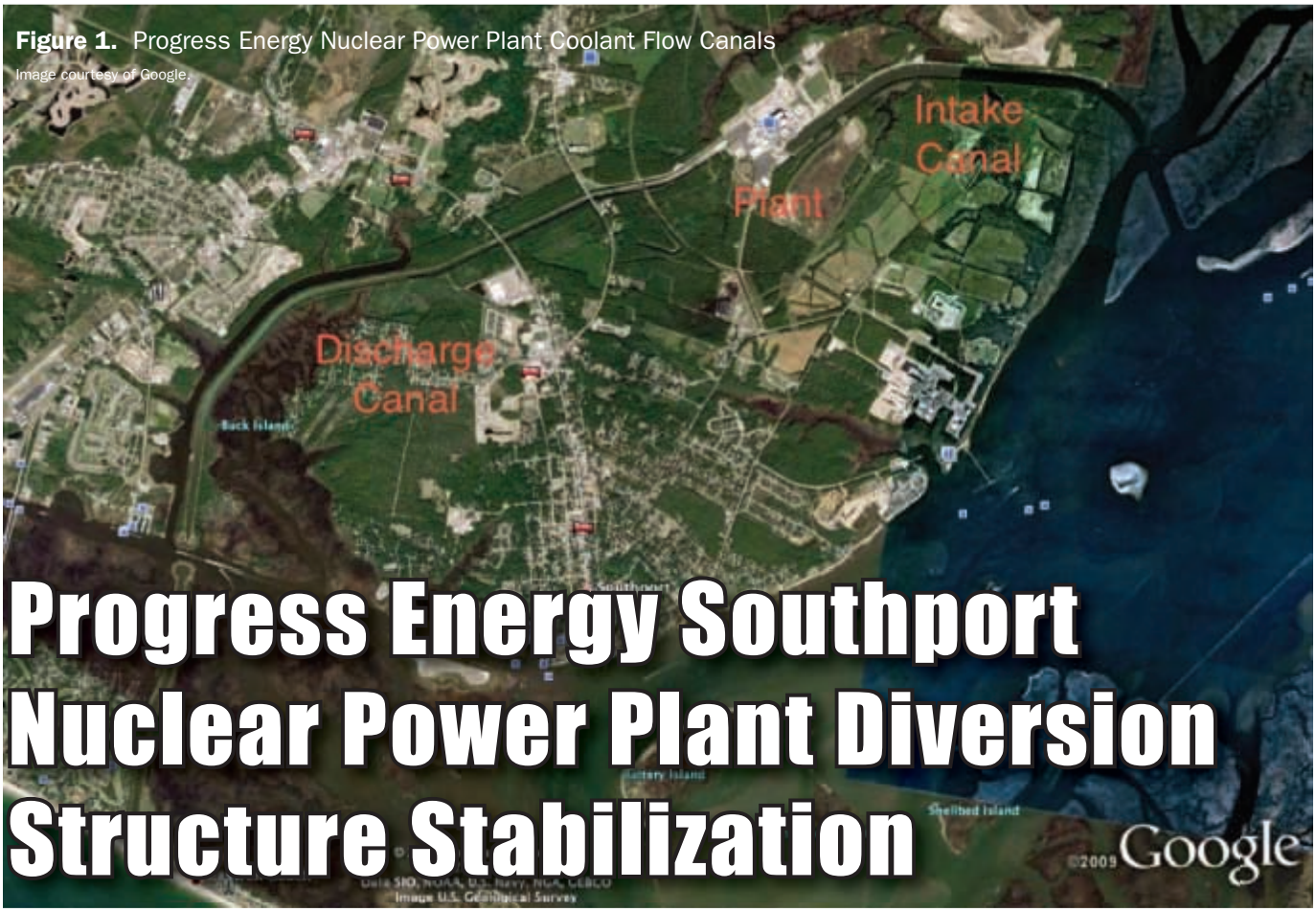

Figure 1. Progress Energy Nuclear Power Plant Coolant Flow Canals
Image courtesy of Google.

Progress Energy Southport Nuclear Power Plant Diversion Structure Stabilization

PDCA 2010 Project of the Year Award Winner
Category: Marine Project Value: Greater than $2 Million

By Julius Taylor, Taylor Bros. Marine Construction, Inc.

The Progress Energy Nuclear Power Plant is located in Southport, North Carolina and consists of two General Electric Boiling Water nuclear reactor generating stations. Due to its unique location near the Cape Fear River and the Atlantic Ocean, the plant draws its cooling water in from the Cape Fear River where it flows approximately two miles down a man-made canal. Once the water is used as coolant for the steam turbine condensers, it is discharged from the plant to the Atlantic Ocean via a 5.5-mile man-made canal, passing through a massive tunnel underneath the Intracoastal Waterway (Figure 1). As seen in this satellite photograph, the plant is massive, and is a significant engineering and construction achievement.

To prevent marine life such as fish and turtles, along with marine sea grass from entering the plant, a large Diversion Structure was built at the inlet of the Intake Canal. This 30-year old structure is V-shaped, with the annex facing the Cape Fear River at the center of the structure (Figure 2).

It consists of 15 bents with a wire mesh turtle and

Figure 2. The Diversion Structure

Figure 3. Diversion Screen and Turtle Excluder

sea grass and turtle excluder between them, which can be raised for cleaning (Figure 3).

With both reactor plants online drawing cooling water, and depending on the tidal level, there can be up to three feet of differential head on each of the 20-foot tall screens. Hurricanes and tropical storms produce unusually high tides, which further increase the DP imposed on the structure. As a result of storms during the last decade, two of the structure bents have moved inward (away from the Cape Fear River) with a maximum deflection of 9-3/4". If left uncorrected, this condition would further worsen, forcing the plant to be shut down pending repairs.

Figure 4. Rail-mounted Cleaning Machine

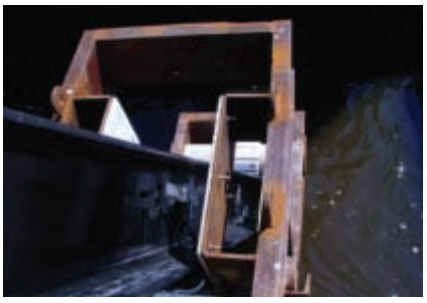

Figure 5. Template Utilizing Connection Studs

Very close coordination between the pile driving crew and the power plant was required. The mesh screens must be cleaned daily (sometimes more often) by the cleaning machines (Figure 4) due to heavy build up of sea grass and river debris. Since all of the driven piles were in close proximity to the structure, and the batter piles actually pass over the structure before driving to grade, very close coordination was required to prevent shutting down the structure.

Once started, a pile had to be set and driven below the grade of the structure rail for the cleaning machines before the machine had to pass by that location. TBM designed and built a template that could be used for the vertical piles, and then rotated for the batter piles. It was bolted to the pile caps using the studs that were installed for the future pile connections to the structure (Figure 5). This enabled TBM to drive a vertical and batter pile at each bent with one template, with minimal setup between piles.

The other known challenge was going to be tough pile driving conditions. The boring report showed a layer of Limestone and Cemented Sands at -45 to -50 feet that was between two and five feet thick. Of note, four borings were performed and were all close to the apex and outside of the structure.

The pile system installed consisted of fifteen 14 X 89# H-Piles battered three to one on the outside of the structure. These piles were connected to each bent by a pre-fabricated stainless steel plate and pin assembly, which transferred the lateral forces of the structure to the pile, which was in tension. Since the outside piles were in tension, tip elevation was critical in developing pile pull out strength, and therefore penetrating the Limestone and Cemented Sands layer was necessary. On the inside of the structure, nine 20-inch diameter, 0.500-inch wall pipe piles were driven vertically adjacent to nine existing pile bents. 16-inch diameter, 0.500-inch wall pipe piles were driven at a three to one batter adjacent to the 20-inch piles and welded to the vertical piles near the top of the structure to form an A-frame type brace (Figure 6).

The A-frames were also tied together by welding in a 10-inch diameter, 0.500-inch wall pipe pile horizontally just below the elevation of the existing structure deck (Figure 7).

Figure 6. A-Frame Assembly

Figure 7. 10-inch Pipe Horizontal Brace

Figure 8. Damaged H-Pile

The inside piles were under a compressive load, and were also required to absorb lateral movement, so they also were required to penetrate the limestone and cemented sands layer.

Once driving criterion was developed, driving commenced from a barge-mounted crane using a single-acting diesel hammer. The first eight outside tension piles were driven easily with the bolt on template. However, the ninth pile did not drive nearly as easily, but finally 'punched' through a three foot layer with no pile damage. The tenth pile was driven to refusal after the tip reached the elevation of the limestone. Pile damage was suspected and it was extracted. The pile showed extensive buckling and was replaced (Figure 8).

After several unsuccessful attempts, it was concluded that the thicker limestone was too dense to penetrate via spudding. It was later determined that the limestone varied in thickness from seven feet to 13 feet throughout the remaining area requiring piles.

When the hard limestone was originally encountered, TBM initiated an exploratory program by driving an H-Pile with a vibratory hammer to determine the location of the limestone. Of note, no soil borings had been performed inside of the structure, presumably due to the difficulty of mobilizing a floating bore driller inside of the structure (Figure 9). There were a total of four outside battered H-Piles remaining and nine inside 20-inch diameter vertical pipe piles coupled with eleven 16-inch diameter battered pipe piles. Unfortunately, the limestone and cemented sand layer was present at ALL remaining pile locations.

After discussion with the engineer and owner, it was decided that drilling through the limestone and cemented sand layers would be the most effective and only viable method

of solving this problem. Three types of drilling were evaluated as feasible for the project. A down the hole hammer drill, core drill, and auger drill were compared. The down the hole hammer would create a significant silt generation and environmental permitting problem. Additionally, since the limestone and cemented sands were a layer and not continuous rock, the possibility of losing a down the hole hammer after it penetrated the layer was significant. Therefore, it was decided to use a conventional drill machine to drill, with both core and auger bits mobilized with it (Figure 10). A 36-inch diameter drill was chosen so that the 20-inch diameter pipe piling would have sufficient clearance in the hole. A 45-foot long, 42-inch diameter, 0.375-inch wall pipe was used as a drill casing to precisely control the hole location and control silt generated from the drilling operation, which also precluded the need for an additional environmental permit (Figure 11). Once drilling commenced, it quickly became apparent that the auger was much faster than the core drill; therefore the bulk of the drilling was done with auger bits.

Drilling a hole for the batter piles was not a trivial task. First, drilling a three to one battered hole into a layer 42 to 43 feet down and then subsequently finding that hole with the job pile was a difficult if not impossible task. Secondly, the range of tide at the structure was approximately 5 feet, which would make drilling the battered hole nearly impossible from a floating barge due to the constantly changing angle of the drill shaft. Mounting the drill machine on the structure was evaluated, but that would prevent operation of the cleaning machines, which was not desired. Therefore, a "slot" method of drilling was adopted by drilling overlapping, vertical holes in the direction of batter. The number of vertical holes (length of slot) was determined by the thickness of the layer at that pile site, which was directly observed by drilling the vertical pile hole first.

Pin together sectional barges were selected and assembled inside of the structure. The drill rig straddled this slot so that the holes for the 20-inch vertical piles and the slots for the

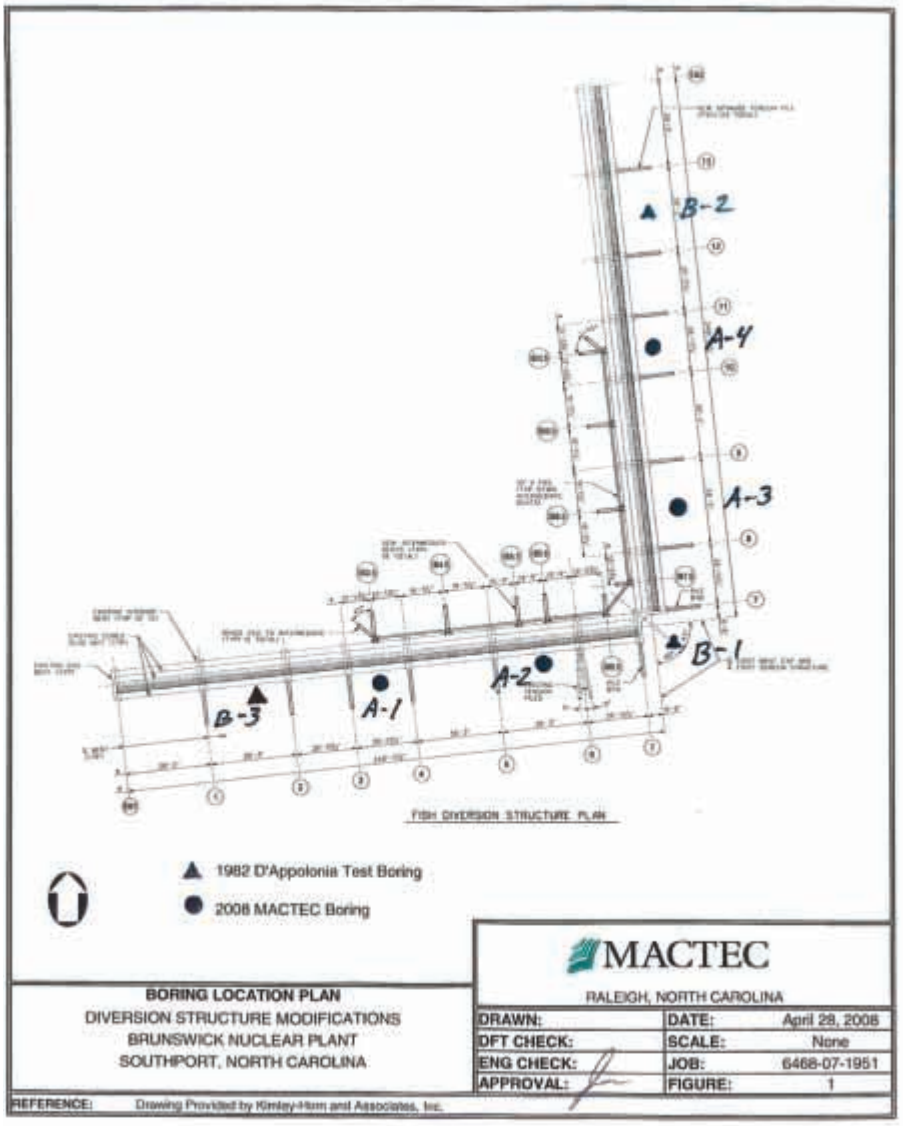

Figure 9. Boring Location Plan

Figure 10. Crane Barge Supporting Drill Rig

Figure 13. Pile Connections to Structure

16-inch batter piles could be drilled without moving the barge (Figure 12).

Once drilling of the holes and slots inside of the structure was complete, the drill rig was off-loaded, driven to the remote loading site, and loaded onto a 30-foot x 80-foot spud barge for drilling outside of the structure.

After all piles were driven, they were fitted and welded to plates bolted to the concrete diversion structure caps using the previously installed studs (Figure 13). Significant time was saved in fitting the batter pile to vertical pile welds by using a pipe fitting software application (Steel Fabrication Software). This software allowed a very precise layout of the complex fit on the pipe prior to cutting and fitting. ▼

Julius Taylor, Taylor Bros. Marine Construction, Inc.

Figure 11. Casing Located in Barge Slot

Figure 12. Drill Rig on Shugart Barges with Slot

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Skagway Harbor Surge Control Breakwater

PDCA 2010 Project of the Year Award Winner
Category: Marine Project Value: $500,000 - $2 Million

By Todd Nottingham, PND Engineers

Introduction

For the past 20 years, Skagway has been a tourist destination, drawing people from around the world to experience the pristine landscape of southeast Alaska. The harbor at Skagway provides berths for five cruise ships of up to 1000 feet in length. During the cruise season, these ships can disembark nearly 10,000 visitors a day. A popular tourist destination is the city's inner harbor, where small tour boats, fishing charters and local fisherman moor their vessels.

Plans by the Municipality of Skagway to expand the harbor were halted due to the wind and waves that are funneled towards the waterfront by the surrounding fjords. Expansion of the inner basin required construction of a new breakwater to protect the planned facilities from the significant southerly wave surge that enters the Skagway Small Boat Harbor.

Working in Alaska is not for the faint of heart, and Skagway is no exception. Although the summer months boast mild weather with long days of sunlight, these prime months are difficult for construction due to the influx of seasonal tourists. The breakwater construction site is located just south of the entrance to the Small Boat Harbor and adjacent to the Alaska Marine Highway Ferry Terminal float. Boat traffic in the harbor is at its maximum during the summer, with private craft, tour boat cruises, and small passenger ferries entering and exiting the harbor.

The winter months are quite different. With the seasonal departure of the cruise ships near the end of September, traffic in the harbor significantly decreases. Due to its location between the mountains, Skagway acts as a wind tunnel for very cold north winds or strong south winds that cause disruptive waves on the waterfront. The wind and waves, combined with the short winter days, make it a challenging environment for construction.

The early spring was unavailable for the breakwater project due to in-water permit restrictions, so construction was begun in the fall of 2009. Construction crews worked long hours in the harsh Alaskan fall conditions to avoid the even harsher winter conditions. Focused and diligent work by

(continued on page 71)

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Skagway Harbor, Alaska – Project Location

Skagway Small Boat Harbor

PND Engineers, Inc., (PND) and Pacific Pile & Marine, LP, (PP&M) brought construction to a close by late December.

Breakwater Requirements

To protect the Small Boat Harbor from the wave surges, the Municipality of Skagway considered various breakwater concepts to improve the harbor's security without affecting operations. PND's innovative partially penetrating breakwater concept was chosen after it was shown to be viable in water depth outside the harbor.

With an increase in future tourism forecast, the Municipality also required a structure that was aesthetically pleasing and pedestrian accessible. To this end, a timber promenade was created over the top of the breakwater for public access. The new promenade has become a popular attraction, allowing the public to enjoy Skagway's marine environment and stunning overwater views.

Design Features

The partially penetrating breakwater is designed to protect the Small Boat Harbor from waves in waters up to 70 feet deep. The new breakwater is a steel wall composed of 20-inch diameter by half-inch-thick steel pile with flat sheet pile welded to either side. The pile/sheet pile combinations are installed by threading the sheet pile interlocks together to provide a continuous wall. The sheet pile bottom terminates at elevation -11 feet Mean Lower Low Water (MLLW). The 20-inch diameter pile are driven into the ground for support, but the sheet pile is terminated above the mudline. The partial penetrating wave barrier provides effective protection while minimizing the footprint of the structure.

The wall is supported by 24-inch diameter by half-inch-thick bearing piles. Each of the bearing piles is fitted with SPIN FIN® tips. These special tips are composed of several angled steel plates welded to the bottom of the piles, which cause the piles to turn when driven. The modified pile tips increase compression and tension capacity of the piles, which provided substantial cost savings to the client due to shorter pile lengths. The angled plates provide more bearing and pulling area once the piles are locked off by welding to their caps.

The promenade is supported by the curved wall pile cap and bearing pile box caps, with a handrail around its entire perimeter. It is accessed by a 100-foot catwalk mounted onshore.

Challenges of Design and Construction in the Local Environment

Previously, the boat harbor entrance allowed boats to access the harbor directly from the south. Unfortunately, this also allowed the strong southerly wind storm surges to enter the harbor and hammer the existing float system. The

Pedestrian Promenade over the Breakwater

Skagway Harbor Surge Control Breakwater

breakwater not only had to block the waves but also allow access into the harbor. PND proposed a curved breakwater design that shields the harbor entrance from the waves but allows boat access from the east.

The design wave for the breakwater has a significant wave height of 5.0 feet, peak period 4.5 seconds. Water depths at the tip of the new breakwater are about 55 feet below MLLW datum. However, the tide range is large, with the highest observed tide in 2006 equal to +24 feet, MLLW. Therefore, the total water depth at high tide can be 80 feet.

Average daytime temperatures in December range from 22°F to 31°F, but feel much colder in fall and winter because of the near constant wind. Daylight was very limited during construction, with only four hours of daylight during December, plus overcast conditions.

Project construction was based out of two barges. One barge was the designated working crane barge; the other was a materials barge piled high with steel pile and pre-fabricated items. The planned construction sequence required the materials barge to be loaded in the appropriate order. The larger bearing piles were among the last to be loaded on the materials barge since they would be the first to be driven into the ground in Skagway. With the exception of major items, all the steel pile and fabricated items were placed on one barge for the sealift.

Care was taken in both fabrication and design to minimize work in the field due to the tight work window. The bearing pile box caps were shop fabricated in one piece. The wall pile cap beam was fabricated in approximately 30-foot-long sections to minimize field welding; the handrail was fabricated in sections; and the catwalk was completely assembled (except for timber deck) prior to arrival in Skagway.

Cost Savings

To construct the breakwater using the shortest possible pile, the barrier pile were designed with a flat closed end. The two-inch-thick solid end cap allowed the pile to be terminated at a shallower depth than open-ended pile but made the pile installation difficult if hard layers were encountered at shallower than anticipated depths. Achieving the planned pile tip elevations for the barrier piles was critical to ensuring that the flat sheets welded to the pipe sections were all at the same grade to create an even top-of-wall alignment. The installation sequence, generally based on the TESPA sheet pile installation guidelines, required a stepped installation approach to ensure proper alignment and to avoid steel binding; for these reasons, the contractor was reluctant to impact drive the barrier pile if they reached practical refusal with a vibratory hammer prior to achieving the required sheet elevations. PP&M and the field engineer worked closely to create driving criteria that allowed various size holes to be cut in the pile end plate that ensured the required tip/sheet elevations were met just before the pile would reach practical vibratory refusal. Through close coordination, the contractor's pre-bid means and methods did not have to change as a result of variations in the actual subsurface conditions that were encountered, and the engineer did not have to sacrifice the integrity of the design or actual pile capacities achieved.

Loaded Materials Barge

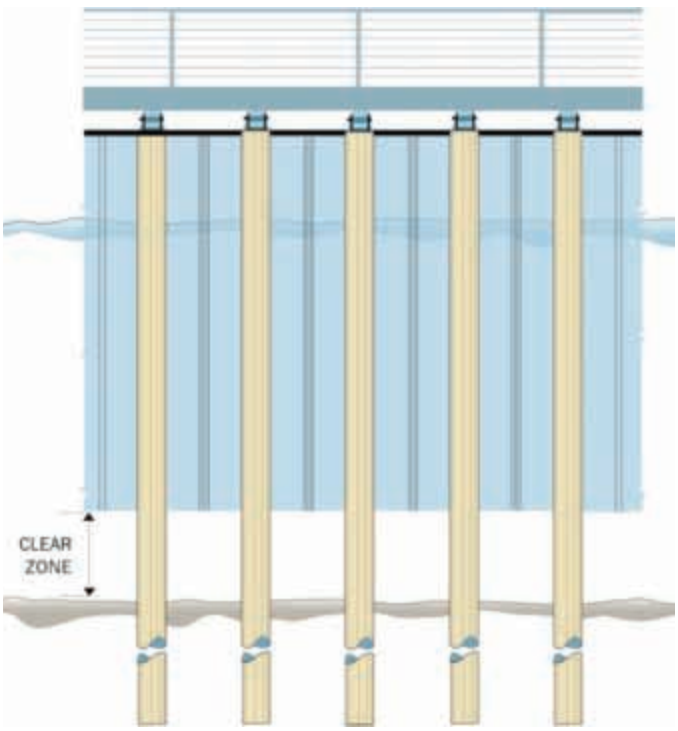
Loading Bearing Pile

Construction Means – Problems and Solutions

During the beautiful summer season in Skagway, boat traffic fills the harbor basin to capacity. To avoid impacts to the harbor users, construction of the breakwater could only occur after the end of the busy cruise ship season, but the end of the season also marks the beginning of the rough winter weather.

In an effort to complete the project in the short window before the onset of full-blown winter weather, the crews worked an average of six 12-hour shifts a week. Rather than scheduling a specific day of the week to take off, the foremen watched the weather forecast and picked the worst weather day. If the weather held, the crews would work more than six consecutive days. If weather was especially bad, they would shut down for the crew's safety. Balancing the need to work long hours and a continued commitment to safety allowed completion of the project without injury.

The pile driving crew was faced with the challenge of driving the 140- to 160-foot-long 24-inch diameter battered bearing piles in high winds, rough seas, and a 25-foot tide range. To minimize pile splices in the unfavorable conditions, most of the pile were driven full length. Even with water depths approaching 70 feet at high tide, over half of the pile extended above the practical template elevation, making them top heavy and unstable in the batter position. To stabilize the pile without extending the template height, the pile was offset from the template by the appropriate amount and vibrated several feet into the soft marine sediments before laying it over to the batter position. After confirming the pile was correctly positioned and at the correct batter, it was vibrated an additional 40 to 60 feet with an ICE 44B vibratory hammer before being impacted to tip with an I-36 diesel impact hammer.



Barrier Piles for a Partially Penetrating Breakwater

Driving the bearing pile in one piece reduced the workers exposure to the elements and decreased their time spent staged on over-water templates. By reducing the need to access the work on icy template beams in windy and dark conditions, the risk of falls and accidents was decreased.

Installation of the interconnected barrier pile was performed without any significant issues, largely due to the pile installation crew's methodical execution, combined with careful design of the barrier pile lengths in relation to the anticipated mud line elevations. In order to properly function as a wave attenuator, the sheet sections of the combination barrier pile had to extend to a certain depth. Often this required that the pipe section of the barrier pile be set into the marine sediments several feet before the sheets could be threaded. Any misalignment by the pile driving crew made threading the sheets impossible or, if threaded, would result in a steel bind. The engineer successfully designed the pile lengths to minimize the length of pipe pile imbedded in the marine sediments prior to threading the attached flat sheets. Had the importance of minimizing pile penetration prior to threading the sheets been unrecognized in the design phase, the contractor would have had a much more difficult time constructing the interlinking barrier pile wall.

Preparing Barrier Piles to be Driven

Conclusion

The new breakwater has been tested by a number of recent storm events with large waves. It worked as intended, successfully blocking waves and greatly improving conditions in the Skagway Small Boat Harbor.

With the protection of the new breakwater, the Municipality of Skagway is now free to expand the harbor to account for increased small boat traffic. Float replacement, with an increase in slip count, is now planned for the entire basin. Standard float configurations can now be used that do not have to withstand the over three-foot waves that had previously entered the harbor. ▼

Photos courtesy of Todd Nottingham, PND Engineers

Cajun Deep Foundations, LLC.

Driving success with skill and experience

By Gloria Taylor

When the Tokyo-based owners of a massive plant expansion in Louisiana wanted a company with enough equipment, experience and expertise to complete a $28-million pile driving contract to create the expansion's foundation, it turned to Cajun Deep Foundations, LLC.

It was a natural choice given that the successful Baton Rouge, Louisiana–based deep foundations specialist had a solid track record of completing some of the top pile driving projects in the country.

Cajun would face a litany of challenges during the Shintech Plaquemine Plant II Piling Project, a chemical plant expansion covering some 200 acres. Houston-based Shintech, a wholly-owned U.S. subsidiary of Shin-Etsu Chemical Company of Japan, owns the plant which produces PVCs used in the manufacturing of plastics and other chemical agents.

Inconsistent soils just south of the town of Plaquemine near the Mississippi River; materials' management, procurement and inventory; a fast-track schedule and language barriers were some of the hurdles Cajun would face and overcome in this showcase award-winning project.

"The expansion was within 1,000 feet of the Mississippi River and the soil in the area varied widely," says Scott Callaway, project manager. "As a result, depending on the design load on the pile, engineering used a combination of over 26 pile types and lengths throughout the project. Depending on the design load and foundation, in some instances engineering designed a 150-foot pile for one structure which may have been only a few feet away from a 70-foot pile designed for a different structure." Over 90 percent of the total 6,052 concrete piles required for the project were two-piece concrete spliced piles with all of the inherent challenges.

Procuring and managing all the materials took special logistical skill given the vast amount of materials needed and the different types of splices needed to pair the pile segments. "Material procurement was a major challenge partly because of the many different pile types and lengths required, the excessive pile lengths and ensuring that all pile driving rigs had the correct pile types in its inventory on any given day of the project," says Callaway.

When fully mobilized, Cajun supplied and operated no fewer than eight pile driving rigs, which Callaway is convinced was instrumental in winning the job for the company.

(continued on page 77)

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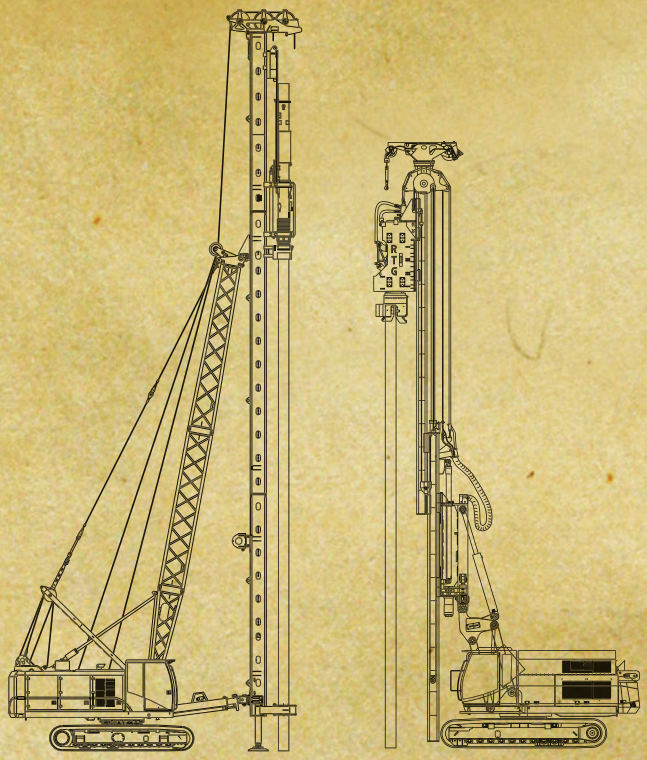

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"Cajun Deep Foundations was selected as the sole pile driving contractor on this major expansion because of our capability to complete the project in the requested time frame by our ability to allocate eight customized pile driving rigs," says Callaway candidly.

Communication was sometimes difficult between Cajun's English-speaking employees and Shintech's Japanese-speaking engineers, but it didn't stop the companies from communicating. "Many conversations were via whiteboard drawings," says Callaway, who feels the challenges ultimately became great learning experiences for the company.

Walking the talk

It's been said that there are no problems only opportunities in business. Cajun exemplified the spirit of that sentiment in December of 2008 when it mobilized on a 200-acre site with limited road access and set out to move ahead as quickly as possible to meet an aggressive eight-month target.

Cajun used two pile fabricators to fabricate different length piles and had stockpiled a cache in preparation for the actual work.

"However, because most of the piles were two-piece, and each fabricator's full length pile was comprised of different length pieces in order to maximize their specific bed space lengths, this decision made managing pile procurement extremely difficult," states Callaway. There were also multiple pile design length revisions throughout the history of the project, because of the varying soils, causing the company to frequently revise its material purchase and procurement strategy mid-stream.

Cajun deployed eight pile driving cranes, four handling cranes, one pile cut-off crane and fully operational support staff and field office when it came time for work to begin.

"Pile driving rigs were made up of 80, 85 and 110-ton hydraulic crawler cranes, outfitted with fixed leads

and D19-42 single acting diesel hammers," according to Callaway. "Handling cranes consisted of 80, 100 and 120-ton hydraulic crawler cranes. The pile cutting rig, depending on pile cut length, was made up of a 40-ton hydraulic crawler crane or PC220-size excavator, with a hydraulic power pack and pile shear specifically purchased for this project."

Cajun was not only able to rise to the challenges but was able to generate multiple engineering savings on the project – saving Shintech an estimated $700,000 by using hundreds of (what would have been) left-over 70-foot piles on one part of the project.

During the planning stages of the project, Cajun developed a successful site specific Safety Award Recognition program to assist in reaching its goal of an accident and injury-free worksite and worked over 90,000 hours without a recordable incident.

Because the Shintech Plaquemine Plant II Piling Project was very different and unique in its own ways, "it ultimately motivated Cajun Deep Foundations to strive for and achieve success on this major piling project," states Callaway.

"The project was one of the most challenging in Cajun's history of large scale piling projects," sums up Callaway. But it also became an award-winning showcase of Cajun's capabilities when it wrapped up in July of 2009.

Industry recognition

Personal satisfaction for a job well done can be gratifying, but recognition by industry peers is even better.

Cajun Deep Foundations was selected as the recipient of a 2009 Excellence in Construction Chapter Award by the Bayou Chapter of the Associated Builders and Contractors (ABC) Inc. in October of 2009 for the Shintech Plaquemine Plant II Piling Project. During the same year, it also received another Award of Excellence from the same organization for another project: the Sector Gate to Boomtown Casino, east of the Harvey Canal Floodwall.

Cajun Deep Foundations was also presented with a 2009 Award of Merit for the same Shintech project by the Pelican Chapter of ABC.

Laying the foundation

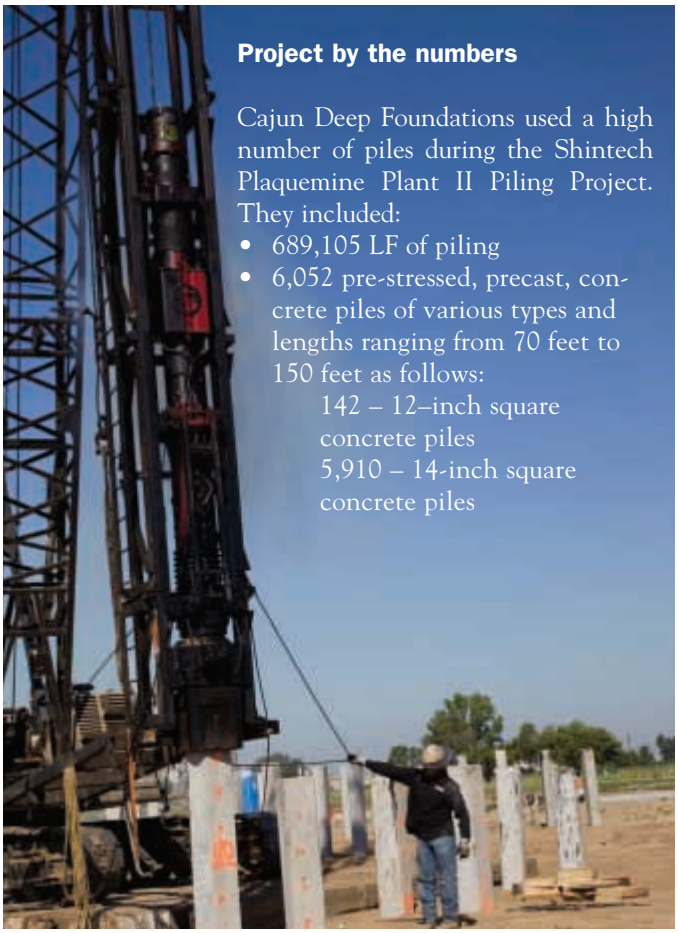
Cajun Deep Foundations, LLC is a subsidiary of Cajun Industries, LLC.

Cajun Industries, LLC is a nationally recognized construction leader providing a broad range of services to various markets. Cajun has come a long way since opening its doors in 1973 as a small, execution based merit shop company. Through years of steady growth in all facets of the construction industry, Cajun's expertise has expanded beyond its core competencies in structural concrete to include deep foundations, marine construction and equipment hauling.

Today, Cajun Industries operates as a holding company of four subsidiaries. This structure allows Cajun to continue providing general and turnkey construction services, while also concentrating on specialized areas important to their customers. Cajun is a leading service provider in various markets including government works, water quality, power, marine, manufacturing and industrial.

Cajun Deep Foundations, LLC, is a specialized company that self performs all disciplines of deep foundations work, including drill shafts, driven piles, auger cast in place piles, earth retention sheet piles and marine piles.

"We have earned the trust and recognition of the most scrupulous oil and gas producers, the Federal Government, demanding industrial customers and insistent coastal stake-



Project by the numbers

Cajun Deep Foundations used a high number of piles during the Shintech Plaquemine Plant II Piling Project. They included:

- 689,105 LF of piling
- 6,052 pre-stressed, precast, concrete piles of various types and lengths ranging from 70 feet to 150 feet as follows:
  - 142 – 12–inch square concrete piles
  - 5,910 – 14-inch square concrete piles

holders. Our proven record of accomplishments proves that Cajun is a total solutions provider, by land or by sea," says Mike Moran, President of Cajun Deep Foundations.

"We utilize a complete range of state-of-the-art equipment that allows us to work quickly, efficiently and, above all, safely. Few, if any companies in the region, can match the experience and expertise of Cajun Deep Foundations and our safety record. This record, along with the quality of work and the professionalism of the Cajun Deep Foundations team, is supported by our long list of satisfied clients," says Kenny Wolf, Business Development Manager for Cajun Deep Foundations.

Cajun is a very diverse company and it's this diversity that makes them special, says Callaway. "Change is constant but so is our dedication to providing the highest level of service to our customers." ▼

Photos courtesy of Gloria Taylor

Minefields in Acquisitions, Mergers and Buy-Sell Agreements

By Gardner Davis, Foley & Lardner LLP

Mergers and acquisitions activity in the pile driving industry is rebounding as the economy recovers from the recession and financial-market crisis of 2008 and 2009. Although business conditions and access to bank financing remain challenging, the stage is set for growth.

M&A activity increased significantly in the first quarter of 2010 as compared to the first quarter of 2009. For "middle-market" transactions, disclosed deal value increased more than 85% and the number of transactions was up 45%, according to data from Raymond James.

Many pile driving contractors are considering either selling their business or expanding through an acquisition. This article reviews the primary issues in negotiating and drafting an agreement for the purchase and sale of the privately held business.

The business owner will want to sign a confidentiality agreement with all potential purchasers before moving forward to share information about the firm and the negotiation process. The confidentiality agreement, frequently referred to as a "CA," may restrict the potential purchaser from hiring the firm's key employees in addition to restricting the disclosure or misuse of confidential business information.

Once the buyer and seller sign a confidentiality agreement, the potential seller will provide so-called "due diligence" materials regarding the company, including financial statements. The seller should be careful to restrict the information provided to a direct competitor, such as specific job pricing information, which could put the company at a disadvantage in future bidding situations.

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THE SHAPE
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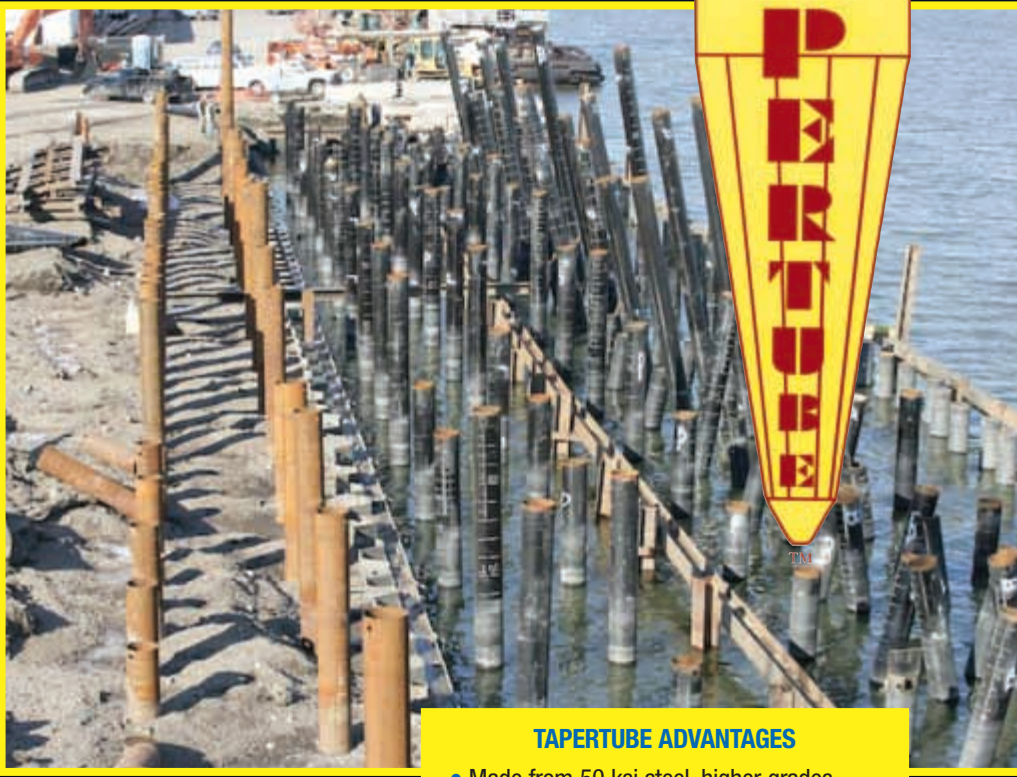

Port of Wilmington Job – Reconstruction of Berth #4 – Kuhn Construction

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This extra thickness eliminates additional steel reinforcements and coatings, and allows piles to be driven harder and faster. The result: more piles driven, higher production, lower costs.

Tapertube piles are available in an array of shapes and sizes to meet your soil and capacity requirements.

TAPERTUBE ADVANTAGES

- Made from 50 ksi steel, higher grades available upon request
- High capacities for shorter driven lengths
- Conventional equipment and installation methods
- Reduces concrete volume requirements
- Factory attached cast steel points
- Tapertube diameters are made to match standard pipe sizes or even non-standard pipe sizes
- Directly driven... no mandrel or butt reinforcement required
- Full-butt welded splices for direct bearing of pipe extension on Tapertube
- Drive-fit DFP S-1800 sleeves may be used instead of welding to extend piles
- Heavier thickness provides greater drivability, eliminates need for coating and reinforcement

DFP Foundation Products, LLC

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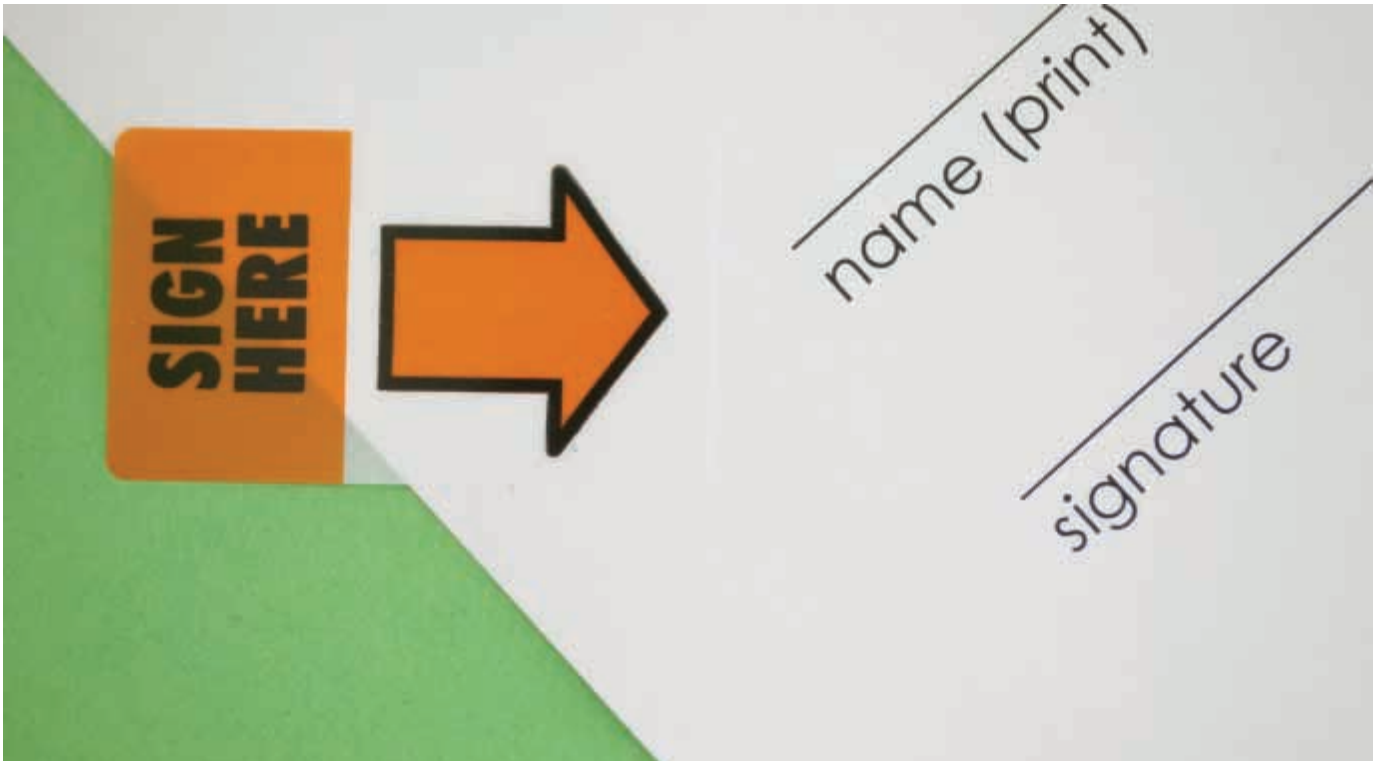


Once a potential buyer and seller reach a preliminary agreement regarding the basic business terms for purchase of the business, they will frequently enter into a letter of intent or "LOI". In the majority of cases, the letter of intent will not be a legally binding contract, but will express the parties' intention to negotiate a definitive purchase contract based on the terms set forth in the letter of intent.

Negotiation of the legally-binding purchase agreement is a substantial undertaking. The purchase agreement sets forth the business terms of the deal, the legal rights and obligations of the parties and the conditions for closing. The purchase agreement also allocates the risk between buyer and seller of potential problems related to the purchased business.

A threshold question is what assets are being acquired and what liabilities are being assumed by the purchaser? In many transactions, the seller will retain cash, accounts receivable and construction contracts which are approaching completion. The seller may also retain responsibility for warranty obligations on completed projects.

Primary advantages of structuring the sale of a business as a sale of stock or a merger are the ability to transfer contracts to the buyer without the need for obtaining the consent of the other contract parties, and the ability to keep licenses and permits in place in a relatively seamless transition.

Disadvantages of a stock sale or merger, as opposed to a sale of assets, are the risk that the buyer will be responsible for unanticipated liabilities of the business, and the failure to obtain a so-called "step up" in tax basis for the purchased assets.

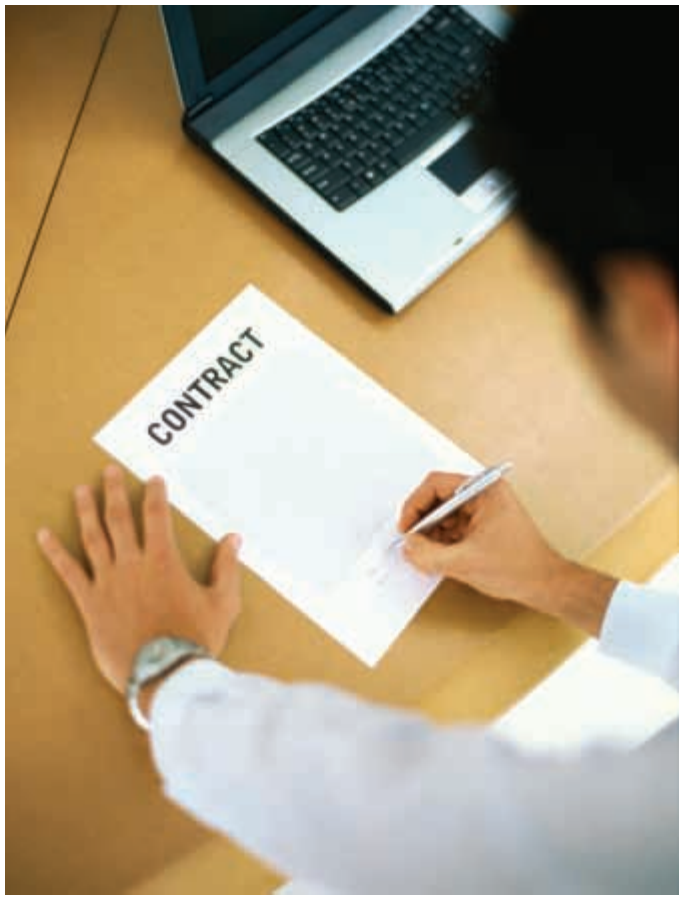
The purchase consideration may be cash, stock (registered or restricted, common or preferred), a promissory note or some combination thereof. The purchase price may be a fixed amount or an amount subject to adjustment based on the value of "net assets" on the closing date.

The purchase price may also have a contingent payment or "earn-out" based on the post-closing earnings of the acquired business. Although an "earn-out" may help bridge the gap between a purchaser's and seller's views of the value of the business, it creates additional negotiating concerns about the calculation formula: Whether the purchaser will change the historical business model of the acquired business, who manages the operation of the business post-closing, and the effect of the sale on the business during the earn-out period. An "earn-out" is one of the most difficult provisions to negotiate in an acquisition agreement.

The buyer will frequently insist that a portion of the purchase price be placed in a segregated escrow account, held by a third party, to secure the seller's indemnification obligations and other covenants in the agreement.

Experienced deal makers understand that the stated amount of the purchase price is not the only factor when determining the best price. For example, the seller may prefer a proposal which has a lower purchase price if the deal contains limited representations and warranties, a generous "basket" and no escrow provision as opposed to a higher amount where the seller anticipates numerous warranty claims against a portion of the purchase price held in escrow.

The simplest and most efficient approach is to close the transaction at the same time that the parties sign the acquisition agreement. However, purchasers frequently do not want to invest the resources to be ready to close until the parties have a signed deal. Moreover, governmental approvals, third party consents and the need to arrange financing may delay the closing.



The deferred closing (i.e., closing after signing the acquisition contract) requires substantial additional provisions in the acquisition agreement to provide for operation of the business during the period between signing and closing, the conditions to the parties' obligations to close and how to treat unforeseen intervening events. Although delayed closings are very common, the simultaneous closing is generally in the seller's best interest because it provides a greater degree of certainty and simplifies the process.

In the case of a delayed closing, the parties will want to agree on an outside "drop dead" date to make sure that they will not be bound by an agreement for an unreasonably long period of time in the event of unforeseen delays or unexpected developments.

Acquisition agreements usually contain representations and warranties regarding the business being sold. Representations are statements of fact as at a given moment in time. Warranties are promises that, if a fact is not true, the promiser will make the promisee whole. Warranties also cover future situations.

The purchaser will usually make representations and warranties in the acquisition agreement to provide the seller assurance that the purchaser has the authority and ability to buy the business and to pay the purchase price. If the purchase consideration includes a promissory note or stock in a private company, the seller will want representations regarding the purchaser's financial condition, contingent liabilities, litigation and similar matters.

The seller's representations and warranties give the purchaser assurance that the seller does in fact own the business and assets and is able to sell them to the purchaser. The seller's representations and warranties provide the purchaser with important information about the business being acquired and often bring out information not discovered during the purchaser's due diligence investigation. In many respects, the customary representations and warranties provide an excellent checklist for the seller to examine various aspects of the business and convey the results to the purchaser in an organized manner.

The shareholders of the company being sold may join in the seller's representations and warranties, particularly where the selling company will have no assets after closing.

One of the most important seller representations concerns the accuracy of the company's financial statements. It is fairly standard to represent that financial statements are "prepared from and in accordance with the books and records of the seller in accordance with generally accepted accounting principles (GAAP) applied on a consistent basis and fairly present the financial condition and results of operations of the seller as of and for the periods indicated." It is important to distinguish between the representation that financial statements are prepared in accordance with GAAP and the representation that financial statements are "true, complete, and correct in all material respects," which is a much higher standard. In addition, GAAP does not require disclosure of all potential liabilities. Some purchasers will seek a representation that the closing balance sheet contains all liabilities of the seller, known or unknown, absolute or contingent. This is arguably an indirect guar-

antee that the business will not be subject to any future, unforeseen liabilities.

In situations where the seller has never been subject to a rigorous audit, the seller should be very cautious about making representations about GAAP. Experienced deal makers know that the application of GAAP usually results in a reduction in the earnings and net worth. Even in situations where the seller has been audited by a national accounting firm, disagreements may arise between the purchaser's accountants and the seller's accountants about what GAAP requires. Put simply, the seller should get the seller's accountants involved before agreeing to the representation.

The seller will usually seek to limit the scope and burden of the representations. One approach frequently adopted by sellers is to only require disclosure of "material" items. This makes preparation of the disclosure information simpler, but it puts the risk of minor problems on the purchaser. Different materiality standards may be used for different sections of the agreement.

The seller may also seek to limit representations with qualifications such as "to the best of seller's knowledge." This qualification limits the duty to disclose only to such information as is within the seller's knowledge. The inclusion of a knowledge limitation concerning threatened litigation is very common. Whether the seller can negotiate a knowledge limitation on other matters is merely an allocation of risk regarding the unknown. In situations involving a knowledge limitation, the definition of "knowledge" should be negotiated. The seller will sometimes argue that it cannot be responsible for the knowledge of all of its employees while the purchaser will argue that the seller should bear the risk of knowledge even by low level employees. A frequent compromise is to define the persons whose knowledge is relevant, such as officers and directors. It is also important to state whether knowledge includes constructive knowledge and whether any investigation is required.

The indemnification provision of the Purchase Agreement provides the purchaser's remedy for losses or expenses suffered as a result of the seller's breach of its representations, warranties or covenants. Either the selling company alone or the selling company and the selling company shareholders, jointly and severally, will customarily provide indemnification to the buyer. If the seller has numerous stockholders, the stockholders may wish to limit their individual liability for the seller's breach of a warranty. If the seller stockholders do not want to provide an indemnity, the purchaser may seek to provide that a portion of the purchase price be held in escrow for a period following closing to provide a fund for future indemnification obligations.

The seller or selling shareholders will usually seek to impose limitations on the potential indemnification obligation. The parties will frequently agree to a so-called "basket," which is either a threshold amount or a deductible for claims which must be satisfied prior to the seller having a payment obligation. If a threshold is built into the indemnity, the purchaser will be entitled to indemnification only if the damages exceed a specified amount. Once damages exceed that amount, the purchaser recovers from the first dollar of loss. Under the deductible approach, the purchaser will only be indemnified for losses that exceed an agreed minimum amount.

The seller will also usually seek a time limitation on the survival of representations and warranties and the indemnification obligation. The purchaser should ensure that the survival period is long enough to allow for discovery of important issues. In addition, the purchaser will want to be able to satisfy the deadline by merely giving written notice of the claim, not actually collecting the money. Certain representations and warranties with particularly long potential exposure, such as environmental liabilities or tax liabilities, may be singled out for a longer period of survival.

Finally, the parties will frequently agree on a "cap" which will limit the total, aggregate indemnification liability to a specific maximum amount. Caps frequently range between 10% and 20% of the purchase price or the entire net purchase price received by the selling shareholders.

In the final analysis, the key to a successful purchase or sale of a business depends on the honesty and integrity of the buyer and seller. The parties need to communicate clearly, make a sincere effort to listen to and address the other side's concerns and be prepared for unexpected problems and set-backs during the process. ▼

Gardner Davis is a partner with Foley & Lardner, LLP and an adjunct professor of corporate law at University of Florida Law School. gdavis@foley.com (904) 359-8726.

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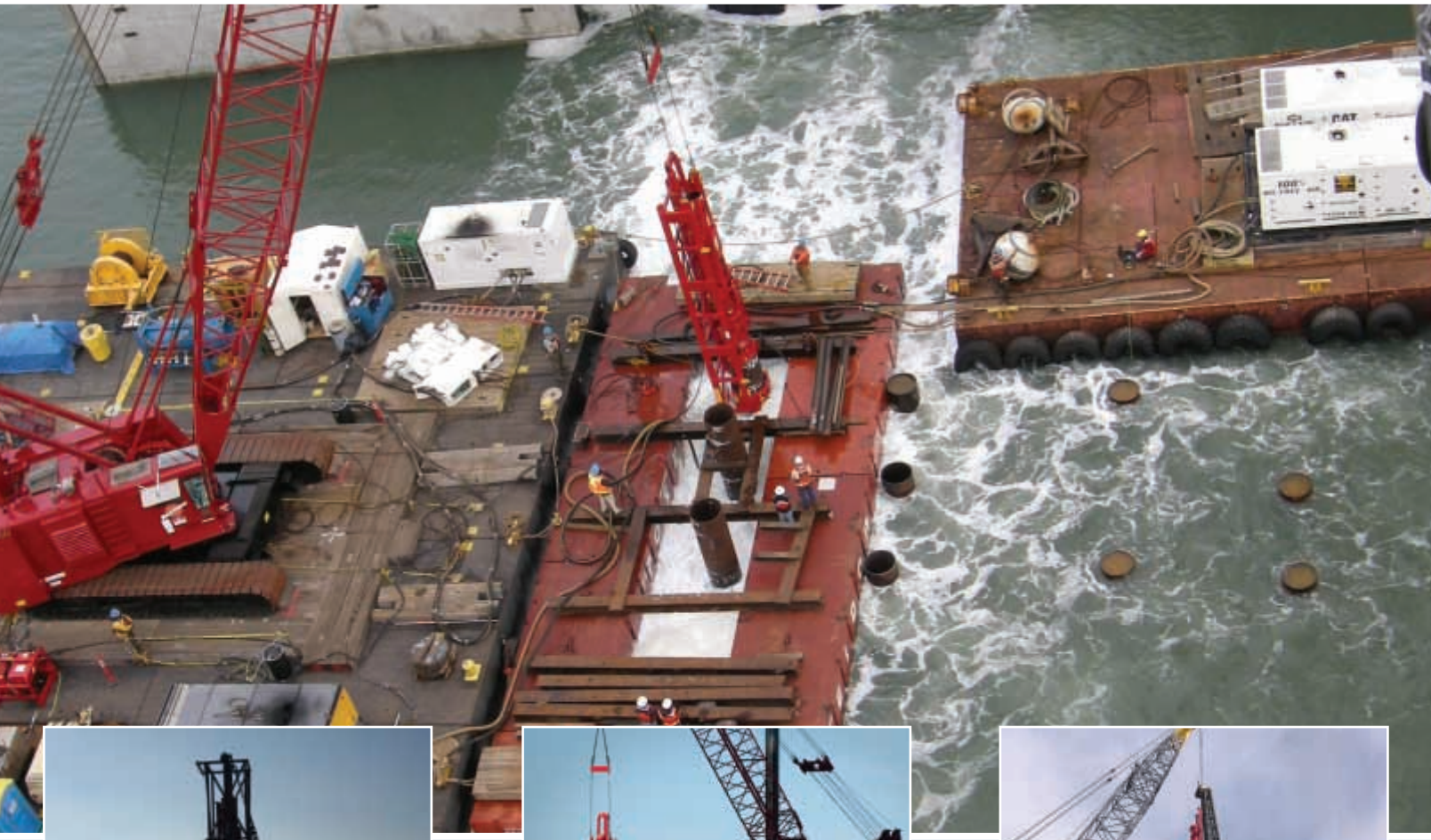

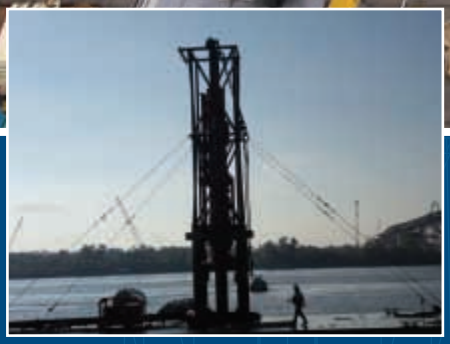

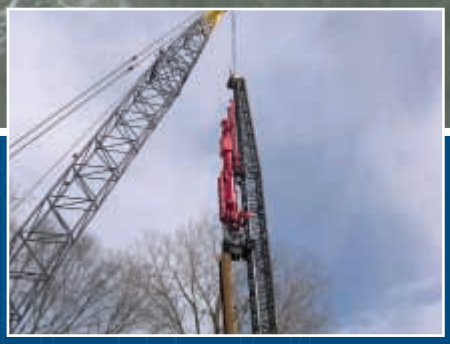

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Spliced Precast Prestressed Concrete Square Piles

Support New Rocket Launch Pad at NASA Facility on Wallops Island

By Patricia Barnes, Bayshore Concrete Products

Wallops Island is adding a seventh rocket launcher to deliver goods to the International Space Station scheduled to make its maiden flight in March 2011.

The facility located on a six square mile island off the eastern shore of Virginia and part of the barrier islands that line the eastern seaboard of the U.S., houses the Wallops Island Flight Facility operated by NASA's Goddard Space Flight Center. The Dulles, Virginia-based Orbital Sciences Corporation selected the Mid-Atlantic Regional Spaceport (MARS), located at Wallops Island, as its base of operations for the company's new Taurus II rocket. Orbital will invest approximately $45 million in Virginia to assemble, test and launch the Taurus II space launch vehicle.

The Taurus II rocket launch pad, and ancillary structures, including a Horizontal Integration Facility (HIF), are supported by 12-inch and 14-inch Precast Square Piles supplied by Bayshore Concrete Products of Cape Charles, VA and driven by Sun Marine Maintenance of Frankford, DE. Fourteen-inch square piles are the deep foundations for the pad itself, the elevated Water tower (a few feet shy of the tallest in the United States), hydraulics and electrical buildings, pipe supports, huge lightening poles, ramps, and more. The 12-inch square piles support the HIF building. The HIF will have two bays to support assembly of two Taurus II rockets concurrently. The rockets are assembled and pulled out horizontally for transport via a ramp to the launch pad where they are vertically set.

Precast prestressed square piles were determined by the design team to best meet the criteria for the load capacity and size requirements. Bayshore Concrete Products (BCP), a leader in the production of precast, prestressed concrete for 50 years and located 60 miles from Wallops Island, was the logical choice for supplying square piles for this project.

The piles are manufactured to strict quality control standards and driven precisely. The concrete piles will support the rocket, which is 131 feet tall and 12.8 feet in diameter and weighs over 265 tons, plus the launch pad itself and must withstand the force of the rocket launch. In addition, the square piles will support the water tower holding million of gallons of water that is immediately released after each rocket launch.

Concrete strength of the piles are 5,000 psi ultimate compressive strength after 28 days; 3,500 psi at time of transfer. The piles include W3.5 ASTM A82 wire black and uncoated spiral reinforcing steel. The 12-inch piles include four ½" diameter 270 ksi LRS strand and the 14-inch piles include six ½" diameter 270 ksi LRS strand. Pile sections range in length from 25-feet to 65-feet with the majority of jointed piles at 130-feet with two splices each. The longest piles are 148-feet long. BCP plants are certified by the Precast/ Prestressed Concrete Institute (PCI). Quality Control for this project is performed in accordance with PCI MNL-116. Bayshore

Concrete is ISO 14001 environmentally certified and has an industry leading safety record.

Unique to the design of the project are the use of Emeca/SPE Pile Joints used to splice the piles. The patented locking joint guarantees a sure and very firm connection at the location of the pile joint and is locked in place with four driven pins. Tensile strength of the locking mechanism has been validated through direct tensile testing at VTT Technical Research Center in Finland and analytical fleural modeling has been validated through bending tests conducted by The Citadel and The University of South Carolina. Reinforcing is joined to the patented locking mechanism through precision machine welding. During production, the full joint assembly is regularly tested to insure quality control of welding and materials. The Bayshore Concrete production team with the expert guidance of Sun Marine and Emeca SPE cast the Pile Joints at the BCP Chesapeake plant. Over 2,000 piles sections, ~ 95,000 linear feet, are being cast for both the launch pad and HIF. Splicing the piles at site results in cost savings across the board – from shipping piles, being able to use smaller cranes to lift piles on and off trucks around the erection area, to the labor and equipment to drive piles. Each step presents cost savings benefits.

Driving Piles at Wallops Island has been a challenge with some unusual underground conditions in that can change from driving in soils like cutting butter to absolute refusal at the same depths in very close quarters. The soils themselves were generally of the Coastal Plain type, characterized by undifferentiated and inter-layered sedimentary deposits derived from eroded and transported rock. Sub-soils consisted of clean sand, lean silty clay, silty fat clay, clayey sand, silty sand and combinations of all, groundwater was encountered at 4.5-feet. Typical embedment depths ranged from 65-feet to 130-feet, with many of the longer jointed piles being battered.

Sun VP, John Rhodes, worked closely with the Bayshore Team, Chad Saunders, Alvin Potter and Roxanne Worley to coordinate production and Webb Dulin of Mid-Atlantic Transport for transportation of the piles. With multiple lengths and multiple field changes, it was a challenge to keep ahead of the rigs.

Precast prestressed concrete piles are an economical, sustainable, high strength solution for building deep pile foundations. Where possible, BCP manufactures piles using recycled materials such as reinforcing steel and concrete pozzolans. Inherent in concrete construction are fire resistance, immunity to corrosion, resistance to organic attack and weathering resistance; which in turn can lower maintenance and operational costs and increase the life span of a structure.

BCP has produced over $^{1}/_{2}$ million square piles in lengths ranging from 25 feet to 171 feet long (over 35 million linear feet). Standard square pile sizes range from 10-inch to 30-inch square. Bayshore has 12 beds for the production of square piles which allows it to meet the needs of multiple customers and projects at the same time. Bayshore's batch plant potential output of well over 200 cubic yards per hour provides a reserve capacity for unusually large-volume continuous pours. BCP also has the capability to epoxy coat piles in the splash zone for use in marine projects.

In addition to square piles, BCP offers precast prestressed cylinder piles, beams and girders, segmental bridge pieces with expertise in heavy construction, marine facilities, offshore structures, bridges, mass transportation and commercial construction. Bayshore Concrete Products has two facilities: one in Cape Charles, Virginia and one in Chesapeake,

Shipping Comparison on 14-inch Square Piles:

Pile Lengths	# of Piles per Truckload	Standard Escort Required?	Police Escort Required	Permit Required
30' - 34'	7	No	No	No
35' – 39'	6	No	No	No
40' – 44'	5	No	No	No
45' – 54'	4	No	No	No
55' – 60'	3	No	No	No
70' – 80'	2-3	Yes	Possible	Yes
100' and over	1	Yes	Yes	Yes

Virginia. Both plants combined occupy 115, including 1,400 feet of bulkhead dock serviced by mobile cranes and gantries for easy loading of product onto barges for shipments. This convenient and economically sound access to marine transportation allows BCP to meet the needs of clients from New England to Florida and beyond. BCP has supplied precast concrete components for projects in the Caribbean, Nigeria and South Vietnam. In addition, the BCP Cape Charles plant has over 2,000 linear feet of railroad siding on site for loading of materials for shipments by rail, making BCP one of the only precast, prestressed producers in the country with the ability to ship by barge, rail or truck directly from its own facility.

Sun Marine Maintenance, Inc is responsible for regional pile driving jobs for the Delmarva Peninsula. Sun Marine Maintenance has been in the marine construction and pile driving business since 1974 and has extensive experience driving all types of piles, in all types of subsurface conditions in both commercial and residential applications. Sun Marine Maintenance, Inc. can meet all of your timber, steel and concrete piling needs. ▼

Photos courtesy of Patricia Barnes, Bayshore Concrete Products

BAYSHORE CONCRETE PRODUCTS
PRESTRESSED CONCRETE SQUARE PILES
AASHTO - PCI STANDARDS

PILE PROPERTIES

Pile Size	Area Ac $in.^2$	Approx. Weight lb. ft	Number of 1/2" 270 KSI L.R.S.		Prestress fpc psi	Section Modulus $in.^3$	Perimeter in.	Capacity Tons Concrete Strength 5000 psi	6000 psi
		(1)	(2)		(3)			(4)	(4)
10"	100	105	4	(5)	967	167	40	69	86
12"	144	150	4		751	288	48	104	128
12"	144	150	5		920	288	48	101	124
14"	196	205	6		821	457	56	140	172
16"	256	265	8		836	683	64	182	224
18"	324	338	10		827	972	72	231	284
20"	400	418	12		806	1333	80	286	352
24"	576	600	16		751	2304	96	417	512
24"	576	600	20		920	2304	96	403	498
30" Solid	900	816	24		724	4500	120	654	803
30" Void (16" ø)	900	607	24		910	4285	120	490	606

Notes:

(1) Weights based on 150 lb. per cubic foot

(2) L.R.S. - Low Relaxation Strand

(3) fpc - Compression stress in concrete due to prestress after all losses

(4) Design bearing capacity based on an allowable unit stress on the pile of $F_a = 0.33f'c-0.27$ fpc for laterally supported piles fully embedded in soil.

(5) Prestress for 10" piles is .070 f's

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Victoria Canal Intake and Pump Station

By Dermot Fallon, Project Executive, Foundation Constructors Inc.

Foundation Constructors Inc. of Oakley, California, possessing a depth of knowledge and experience using different pile driving techniques and equipment, provides their clients with value for a wide range of applications, such as vibratory and diesel impact installation. Foundation's 39 years in business brought together hundreds of years of expertise to complete their multi-faceted and time critical project at The Victoria Canal Intake and Pump Station project in Holt, California. This project consisted of a new 250-cubic-foot-per-second intake and pump station that includes an automated fish screen and cleaning mechanism. The new Intake and Pump Station is a key piece of Contra Costa Water District's plan to upgrade and modernize its water delivery system.

The main components of this project consisted of a water intake structure and pump station at Victoria Canal supported by precast concrete piles; a shored setback levee designed to surround the intake structure using an OPEN CELL SHEET PILE® wall and a water conveyance pipeline across Victoria Island built on precast concrete piles. "Each element of the project presented unique challenges, which the Foundation team met head on," said Foundation's Project Manager Donovan Nixon.

Pile driving and Shoring Scope

Victoria Canal Intake and Pump Station was a phased project that utilized several driven piling technologies to complete the structure. Foundation's pile driving scope consisted of five distinct elements of work:

1. Permanent open cell sheet pile shoring system
   a. Install 1368 linear feet of wall
2. Temporary cofferdam
   a. Furnish, install, and remove 300 linear wall feet of PZ 35 sheets
3. Permanent wet well shoring system
   a. Furnish and install 132 linear feet of PZ 18 sheet pile
4. Closure wall
   a. Install 105 linear feet of PZC 13 sheet pile
5. Precast concrete piles
   a. Furnish and install 140 each 24-inch square PCPS piles in lengths of 12 feet and 26 feet
   b. Furnish and install 131 each 14-inch square PCPS piles in lengths of 31 feet and 45 feet

The challenges of this project began in the preconstruction and design phase. The owner's original design for the setback levee and shoring system consisted of heavy section Z-shaped sheet pile wall with tie backs, requiring extensive excavation of underlying peat. L.B. Foster and PND Engineers met with the owner's engineers and suggested changing this shoring system to a custom-designed Open Cell Sheet Pile wall. This innovative design saved the Contra Costa Water district over $1 million at the onset of the project.

PND Engineers used an open cell® bulkhead to reduce the material and excavation cost while retaining design integrity. The design uses flat sheets oriented in such a way that back

fill and sheet tension generate the bulkhead's strength, which is created by interaction with soil backfill. The system requires accurate keystone points between cells with very tight positional tolerances. This design-specific open cell bulkhead consisted of 18 radius bays and 17 tail walls. In an effort to accommodate the intake structure, each bay had different lengths and angles, which posed several challenges to the installation process. To construct the various angles, Foundation fabricated a steel radius template that was installed to align sheets at each bay.

The radius template allowed Foundation's crews to install the flat sheet to very tight tolerances. Foundation utilized a Manitowoc 4000 crane and a HPSI 250 vibratory hammer to install the sheets. Due to limited access on top of the existing levee, once the face sheets were installed, a second, smaller crane (a Link-belt LS 338) was utilized to install the tail walls.

After the bulkhead was completed, Foundation installed a temporary cofferdam designed by D.H. Charles Engineering, Santa Rosa, California, consisting of 300 linear wall feet of PZ 35 sheet pile in 50- and 60-foot lengths designed to withstand a 100-year flood.

The temporary cofferdam was installed 80 feet offshore into the waterway, tying back into open cell structures on each end. The temporary cell was then de-watered to allow construction of the intake and pump station. The California Department of Fish & Game had strict "out of the water" construction dates. This mandate created critical, time-sensitive scheduling that required a fast-paced, high-production pile installation, as well as the management of short interval scheduling with the client.

"Our extensive and diverse fleet of equipment allows us to be available at a moments notice," comments Foundation's General Superintendent, John Honaker.

After the temporary cofferdam was de-watered, the general contractor, Proven Management Inc., of San Francisco, California, excavated the area between the Open Cell system and the temporary shoring wall. Foundation's Manitowoc 4000 crane was then mobilized 25 feet deep into the excavation to drive the foundation pile for the intake and pump structure. One hundred-forty each 24-inch square PCPS piles were installed to accommodate an ultimate design capacity of 265 tons.

Upon completion of the 24-inch diameter pile and wet well shoring, Foundation moved topside to install 131 each

14-inch square PCPS piles with an ultimate capacity of 79 tons. These piles were installed on the project to support outflow tanks and piping.

Once the Intake and Pump Station was constructed, the removal of the temporary cofferdam required crane reaches of over 110 feet from center of rotation to extract the 60-foot-long PZ 35 sheet piles. To accomplish this, Foundation utilized a Manitowoc 4100 Series II crane rigged with 160 feet of Number 22 boom. Foundation's crews worked multiple shifts to meet the out-of-water deadlines. By completing the removal of the temporary cofferdam prior to November 31, 2009, nine months was saved off the project schedule.

During the course of this project, Foundation overcame environmental restrictions and logistic requirements that at first seemed insurmountable. However, through forward thinking, committed staff, and an unparalleled workforce, the project was completed ahead of schedule and under budget. And although total man-hours on the project exceeded 10,000, not a single reportable injury was incurred. ▼

Photos courtesy of Dermot Fallon
Project Executive, Foundation Constructors Inc.

Project Facts:

Pile Driving & Shoring Contractor:	Foundation Constructors Inc. Oakley, California
Project Title:	Victoria Canal Intake and Pump Station
Project Owner:	Contra Costa Water District
Contract Amount:	$3,100,000
Project Start Date:	July 21, 2008
Project Completion Date:	Pile Driving Scope
	Completed Nov. 30, 2009
General Contractor:	Proven Management, San Francisco, California
Soils Engineer:	Hultgren-Tillis Engineers
Structural Engineers:	Carollo Engineers, Walnut Creek, California
Open Cell Engineer:	PND Engineers, Seattle, Washington
Open Cell Material Supplier:	L.B. Foster, Union City, California
Temporary Shoring Engineer:	D. H Charles Engineering, Santa Rosa, California

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Association Member Teamwork at Camp Lejeune, NC

By Laura S. Hayden, Corporate Communications & Research, Cox Industries

The PDCA membership offers many opportunities for business networking in the industry. Recently, PDCA members worked together on a new Child Development Center located on the Marine Corps Base at Camp Lejeune in North Carolina. The connections formed through PDCA provided the foundation for working relationships within the industry and have led to much business success for all involved.

Ford Pile Foundations, based in Virginia, was awarded the general contract for the project. The Vice President of the company, Trey Ford, then subcontracted the pile driving to John King of Pile Drivers, Inc., located in Hollywood, South Carolina. John King is a former 2009 PDCA president and has been an estimator since 1990 for Pile Drivers, Inc. King acknowledges the teamwork inherent to PDCA members and to his experiences at Camp Lejeune. "There's nothing better than when PDCA members get together for the good of the industry," he says.

The unique and challenging nature of the construction was defined both by the project's scale and its military location. The Camp Lejeune base location meant that military safety, security and construction regulations were involved. The necessary paperwork exceeded that of a typical non-military construction project. The challenge of working on a military base created the unique logistics of juggling a limited amount of construction materials on site at a time and only so much piling could be stored on site.

Test Piles were driven on January 25th 2010; Production Piles started March 4th and were finished on March 23rd. During the foundation's construction, King drove more than 800 timber piles, approximately 35' in length. These poles were manufactured by Cox Industries, Inc., a pressure-treating wood preservation company that specializes in kiln dried lumber and industrial pilings. Cox is headquartered in Orangeburg, South Carolina and has ten locations. The piles were manufactured at Cox's Leland, North Carolina industrial plant. Equipment included an air hammer, sold by Jonathan Tremmier of Pile Hammer Equipment, located in Rising Fawn, Georgia and an innovative type of pile machine, the Junttan PM 16. It was sold by Miika Eskelinen, sales manager at Junttan Oy, headquartered in Finland.

Junttan Oy is a leading cutting-edge manufacturer of hydraulic piling equipment. Since 1976, the company has been on the forefront of development. The Junttan PM 16 is the most compact Junttan piling rig and quickly mobilizes between tasks. Its fast all-in-one maneuverability means that multiple machines are not needed to complete the job. King says: "Thanks to the PDCA, I learned about the Junttan Machine at DICEP in Minneapolis and that machine has helped us survive these tough times. It just shows you get what you put into PDCA."

At Camp Lejeune, association members worked together. Don Surrency of Cox Industries said, "If you not an association member, you should become one and benefit from the network of professionals, who provide a wealth of resources which makes the complexity of any project manageable. Our industry has been fighting through very tough times, but when the right relationships are in place, we not only can survive, we can thrive." ▼

Pictures of Junttan PM 16, used at Camp Lejeune. Courtesy of John King.

Driven Piers and Leveling of a Hospital

PDCA 2010 Project of the Year Award Winner
Category: Land Project Value: $500,000 - $2 Million

By Alain Desmeules, Pretech

During autumn of 2009, the Bisson-Pretech Consortium raised more than a hospital; it brilliantly took on a technical and logistical challenge in the world of piles and underpinning work - one of a scope seldom seen in America.

The accomplishment of this project was noteworthy due to the innovative solutions brought to bear, both from a technical as well as a cost management aspect. It consisted of an important contribution to the piling industry, a contribution which could inspire many businesses in the efficient accomplishment of their projects.

Description of the problem

Since its construction in 2002, the Centre hospitalier Cloutier-Du-Rivage, located in Trois-Rivières, Québec, had gradually been sinking into the soil composed of soft clay.

Due to its weight, the reinforced concrete staircase was sagging 10 inches whereas the remainder of the building exhibited a settlement of zero to 4 inches. The building adjoined another older building dating back to the 1950's which didn't demonstrate structural problems.

The project consisted of driving piles into the loose soil until rock bottom had been reached at a depth of about 100 feet, thereby using this solid surface as a support. The piles were then to be attached to the building foundation using steel brackets, and, finally, the 5-story building (over 22,000 tons) was to be raised to its original level and stabilized in a permanent manner.

The challenges to be encountered

The technical challenge

The building had to be set on piles, make it resistant to seismic shocks over a soft clay soil. The lifting operation was one of the biggest technical challenges; considering that the structure of the building was made of concrete, there were a large quantity of isolated foundations and the considerable height to be raised to regain its original level. This raising operation did not allow for any errors.

The levelling of the whole of the foundations had to be accomplished in a simultaneous and synchronized manner, and with the greatest precision. Moreover, the raising work, being a "risk" operation, had to be done and completed in one week-

end in order that the ongoing operations of the hospital would be the least disturbed.

One of the main problems concerned the weight of the reinforced concrete staircase which ascended several stories and represented the greatest danger in the event of jolts. The Bisson-Pretech Consortium team had to drive 140 piles at an angle of 14° (one for four) in relation to the vertical using hydraulic jacks to ensure bracing of the staircase. For the team, driving piles at an angle was a first. No one was aware if such a practice had ever been carried out elsewhere. It was therefore necessary to rethink the way of doing things.

The logistical challenge

The whole of the work must take place in 12 weeks in the framework of a "Fast Track" construction design mode. The Bisson-Pretech Consortium team must produce more than a hundred workshop drawings for this accomplishment, and the plans for attaching six kinds of brackets to the structure of the foundations and columns for a total of 650 piles measuring about 100 feet in length.

Innovative technical solutions

The Consortium experts quickly suggested technical modifications to the structural engineers' plans in order to facilitate the levelling work.

Modification of the brackets

The engineering firm had foreseen a system of eight to 12 brackets for the piles at the perimeter of the footings. This technique carried the risk of causing cracks in the footings and the attachment of bolts during the levelling, thus causing delays during the construction.

Bisson-Pretech proposed drilling at the base of the columns through the footings which are already 16 to 20 inches thick and adding only two brackets at the perimeter of the footings. This technique permitted the levelling process to be accomplished faster and in a safer manner while reducing the cost of work.

A new raft foundation

After having raised the concrete staircase using a first series of piles, the Bisson-Pretech experts noticed that there was a lack of space to insert piles at an angle. These later would come in contact with the piles of the first row. The team again demonstrated its leadership by suggesting to the consulting engineer firm to rebuild a new raft foundation around the existing raft foundation, thereby adding 9-inches of reinforced concrete beneath (to fill the empty space left by raising) and 20-inches above the existing raft foundation, resulting in a 4-feet 4-inches high footing.

To ensure that the old and new raft foundation were well-bonded together, 120 bolts of 1 inch diameter were put through the raft foundation from top to bottom. The bolts, which are highly resistant to NCA, were then tightened to 25,000 pounds each to ensure a good bonding of the assembly.

Piles without welding

Micro-piles measuring 3.75 inches in diameter with a wall

thickness of 0.25 inches were used. The installation of 650 piles over a length of 100 feet necessitated 7,800 sections of 8 feet steel piles which normally would have required 7,800 welded joints.

In fact, the piles installed at an angle had to be welded, whereas the 410 vertical piles were assembled using a technology which did not require welding. The patented technologies contributed by each of the companies, in the field of hydraulic jacks, permitted the accomplishment of work according to the tight 12 weeks schedule while reducing the cost related to welding.

Work logistic

The accomplishment of the work required 300 hydraulic jacks (of which 130 operate at a low pressure of 3,000 PSI with 42 tons cylinders) and 100 hydraulic jacks operating at a high pressure (10,000 PSI with 50 tons cylinders).

To perfectly control the levelling of such a large scope project without causing undue stresses in the structure, the Bisson-Pretech Consortium engineering team chose to use specific control modules per zone in order to have greater precision and constant monitoring of the pressure of each hydraulic jack.

A team of 30 professionals consisting of engineers, technologists and surveyors were allocated to each phase to oversee the work progression during levelling. The latter was done in two phases for a total of 20 hours; first, the staircase was raised to the same level as the remainder of the building, then the assembly of the staircase and building were simultaneously elevated.

A perfect achievement

Just the jacking and levelling required 2,800 working hours, of which 65,000 linear feet of piles were driven into the soil, 22,000 tons of lifting capacity for a distance of more than 12 inches and a team of well trained experts with lots of know-how.

The work was completed as planned in October 2009, respecting the schedule and forecasted cost. The cost is at $1,830,000 (US) solely for the jacking and levelling, including piles installation. The building has regained its initial level. ▼

Photos courtesy of Alain Desmeules, Pretech

The stakeholders

The client:
la Corporation d'hébergement du Québec
The general contractor:
AECON
The jacking and levelling subcontractor:
Consortium Pretech-Bisson:
Étienne Desmeules, Project Manager
Yvonick Houle, Project Engineer
The architectural firm:
Locus 3
The structural engineering firm:
CIMA+

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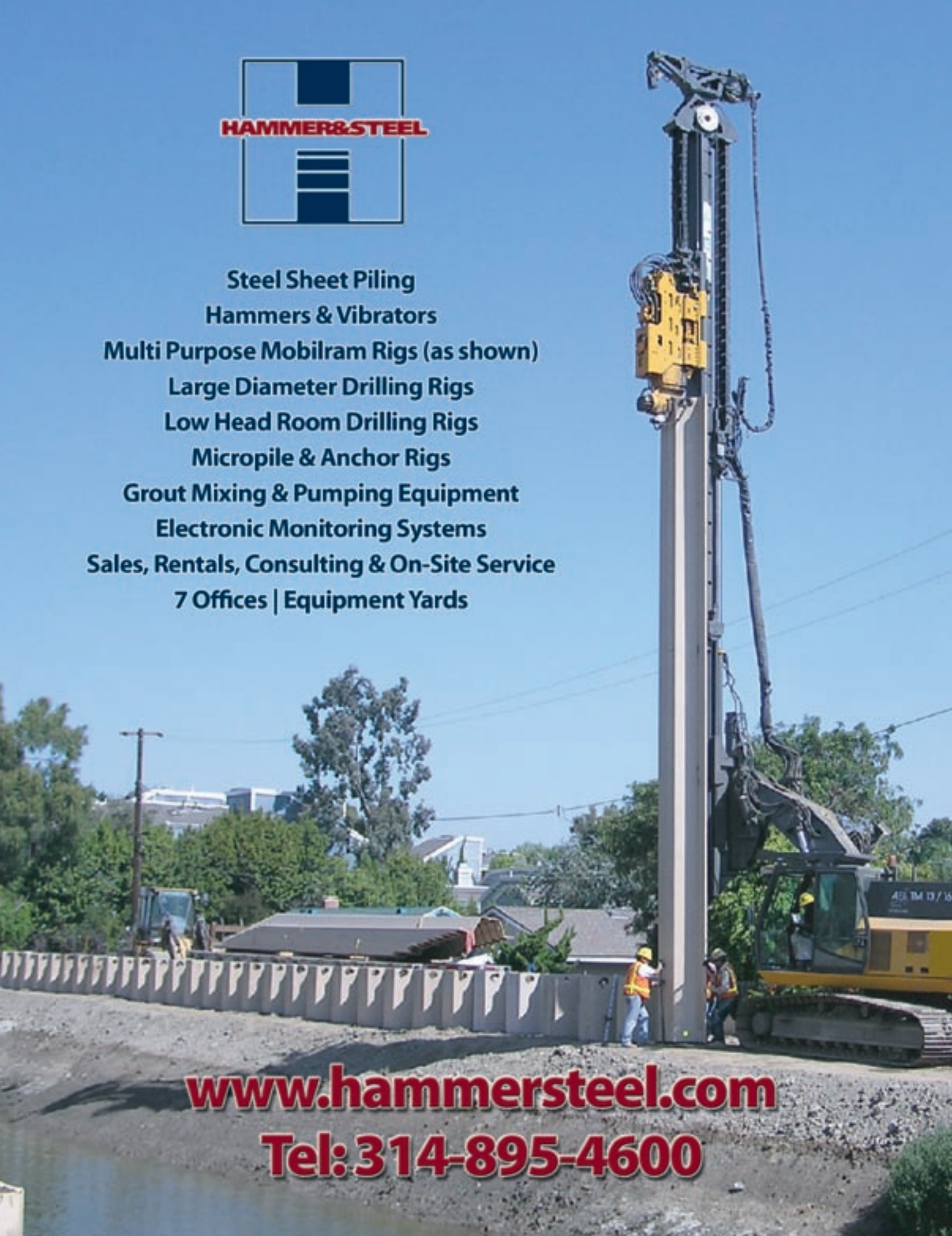
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