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The Official Publication Of The Pile Driving Contractors Association - Fall 2001 - Volume 2, Number 4

Evolving, Adapting, Thriving

Purdy Construction's Work
Bridges Past And Future

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Our Members Continue To Serve Our Customers Worldwide

Recent events suggest a rather sobering view of the fragility of the world we live in. Hopefully our friends and members of our organizations were not casualties of the events of Sept. 11. We extend our sincere support to all those adversely impacted by this tragedy.



Our membership continues its service to our customers worldwide,

as demonstrated by the scope of the contents of this issue.

Worker safety is a staple of our focus, as are participation in the development of machines and methods to meet new challenges and respect for our environment.

Alternative methods and materials continue to emerge, and the results are provided to our readers for their review and enlightenment.

The spirit of partnership operating within the framework of a competitive market is a key component of the foundation of our nation, and we are pleased to be able to provide a publication that distributes this information to our members, friends, customers and end-result customers.

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Cover photography courtesy of Purdy Construction Company.
An early Purdy Construction project using a Vulcan 30-C pile hammer,
which the company still owns.





Use Caution Around Power Lines

Overhead power lines are both common and dangerous. Even though many electrical installations are buried, especially in residential developments, overhead power lines are still in widespread use. It is dangerous to work near a large high-tension tower or a service drop to a single house.

Be on the safe side and consider all overhead lines to be energized power lines.

Remember that you don't need

to touch a power line to get electrocuted. If you are touching a tool, ladder, rope or piece of equipment that comes in contact with a power line, you're probably going to get zapped because electricity can arc from the power line to you or to a ladder, a piece of equipment or anything that conducts electricity. The higher the voltage in the line, the farther the electricity can arc.

Keep a safe distance from power drops when working on a roof. Be careful when carrying, moving or setting up ladders. Check your clearance if you use tools with long handles such as bull floats, squeegees or pruning poles.

Workers on the ground near the machine also are at risk. Cranes, backhoes, aerial lifts and dump trucks can easily reach high enough to contact power lines. The safe clearance is based on the voltage being carried by the power line. Always remember that the electricity can arc to the boom or bucket. If a machine becomes energized, the electricity can arc to bystanders, too, so they should keep away from the machine whenever possible.

Taglines can conduct electricity, so pay attention if you are guiding a load. Always allow some extra clearance – power lines sway in the wind and can sag on hot days.

If a piece of equipment hits a power line, the operator should remain calm and stay in the cab until the power is turned off.

Hard Hat News, Oct. 12, 2001

Corps Moves To Ease Wetlands Rules

Shrugging off the objections of the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service and other environmental agencies, the U.S. Army Corps of Engineers is trying to loosen protective measures implemented for wetlands last year. While less stringent than the 2000 rules, Corps officials said the newly proposed guidelines under the Clean Water Act are still tougher than earlier regulations.

The National Association of Home Builders, whose members had sued to block the Clinton administration rules, claiming they made it practically impossible to build small projects near wetlands, applauded the Corps for acting to ease the regulations. Environmentalists and other critics, however, said the Corp's proposal would make it easier for developers and coal mining firms to

dig up and fill in wetlands and would also encourage development in flood-prone areas.

Michael Grunwald, Washington Post, Aug. 9, 2001

I-9 Requires Adherence To Three Basic Rules

Although the rules behind the I-9 form are complex, the Immigration and Naturalization Service doesn't expect you to become an expert in immigration law. You can protect yourself by following three basic rules: 1) always take an I-9 for all your new hires, rehires and when an employee's work authorization expires; 2) complete to the best of your ability the forms thoroughly and in good faith; and 3) apply your I-9 policies fairly.

You must complete an I-9 form whenever you hire an alien or U.S. citizen. Penalties for failure to comply range from \$100 to \$1,000. For knowingly hiring or continuing to employ unauthorized aliens, you could be charged civil penalties ranging from \$250 to \$10,000. You may be liable for an unintentional authorization mistake if it turns out an employee lacks work authorization.

For new hires, you must take an I-9 form within three days of the employee's start date. If the employee will work for you for less than three days, you have to complete the I-9 by the time the employee begins work. You must also verify whenever a current employee's work authorization expires. You must obtain documents that establish your new employee's identity and employment eligibility, but you may not specify which documents the employee must show you unless you want to risk subjecting yourself to charges of discrimination.

Documents that establish both identity and eligibility include passports and certificates of U.S. citizenship and naturalization. Documents that establish identity include state driver's licenses, state ID cards and school ID cards with a photograph. Documents that establish employment eligibility include Social Security cards and birth certificates. If you are unsure whether a document is acceptable for I-9 purposes, call your local INS or the Department of Justice's Employer Hotline for Hiring Immigrants at (800) 357-2099, or consult your attorney.

Because you will be liable for any mistakes, incorrectly or sloppily taken I-9 forms can expose you to heavy penalties. Make sure you have a consistent policy and apply it equally to all of your applicants. You may give preference to citizens and nationals of the United States whose qualifications are equal to those of an alien who is authorized to work in the United States.

G. Phillip Shuler, Louisiana Contractor

OSHA Sets Date For Steel Erection Standard

The Occupational Safety and Health Administration announced July 13 that its Steel Erection Standard will go into effect Jan. 18, 2002.

The Standard requires enhanced safeguards for iron workers to protect against hazards associated with working under loads; hoisting, landing and placing decking; column stability; double connections; landing and placing steel joints; and falls to lower levels.

According to an OSHA press release, the new rule is expected to "prevent 30 fatalities and 1,142

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Pile Tips (Continued From Page 7)

injuries annually and save employers nearly \$40 million a year."

Initially the Standard was to go into effect July 18, but OSHA actually began drafting a proposed rule to revise several provisions of its Steel Erection Standard as far back as 1984. Despite all the time taken to develop the Standard, not everyone is completely satisfied with the final results. In a position statement on its Web site (www.steeljoist.com) the Steel Joist Institute agrees that the new Standard "has the potential to have a major impact on the safety of workers erecting open web steel joists and joist girders." John Robins, the Institute's president, is quoted as saying that OSHA's negotiated rulemaking process "has produced a fair and workable Standard" with a few "notable exceptions." The position statement continues:

"The exceptions referred to by Robins are instances in the regulations where specific requirements are imposed on joist manufacturing facilities. In those instances, OSHA is attempting to exercise authority over joist producers that was not granted under the Occupational Safety and Health Act. OSHA's lawful authority in this instance is limited to regulating job-site erection activities; however, the new rule contains provisions that clearly attempt to regulate product manufacturers and suppliers. Without detracting from the many excellent safety provisions in the new standard, we are compelled to challenge OSHA's encroachment into industry fabricating facilities."

The Institute has filed an appeal in U.S. District Court "seeking removal of those provisions that would regulate manufacturers and suppliers and which are a clear violation of OSHA's statutory authority."

For more information about the regulation's impact, see a detailed article in the November issue of *Structural Engineer*.

Structural Engineer, September 2001

ConExpo-Con/Agg 2002 On Target

The Construction Industry Manufacturers Association expects the 2002 ConExpo-Con/Agg trade show to

be 7 percent larger than the 1999 show.

"Right now, the number of exhibitors is up by 11 percent, and we expect to have more than 1.8 million square feet of exhibit space, in comparison to the 1.6 million square feet we had in 1999," said Ronald M. DeFeo, chairman and CEO of Terex and head of the CIMA Trade Show Committee. ConExpo-Con/Agg is slated for March 19 through March 23 in Las Vegas.

"In addition, all indications point to a record number of international visitors, especially from Latin America," he added.

"This show will receive the maximum amount of planning for show security," DeFeo said. "Much more than we've ever thought of before."

Still, he said, he continues to "be encouraged by the resiliency of those involved in show planning, in the number of space sales and in those who have already registered."

The event, the largest construction equipment trade show in North America, is held every three years in Las Vegas. *Marcia Gruver, equipmentworld.com, Nov. 6, 2001*

Air-Ride Suspension Will Be Standard Equipment

Link-Belt Construction Equipment Company has announced that rear air-ride suspension will become standard equipment on six telescopic truck crane models.

According to Roy Burger, telescopic crane product manager, the models include the HTC-8640, the HTC-8640 Heavy Lift, the HTC-8650, the HTC-8660, the HTC-8670 and the HTC-8670 Long Boom.

"It's a logical addition to round out the Link-Belt crane line," Burger said. "The air-ride system has already proven itself on the HTC-8640 and HTC-8640 Heavy Lift with greatly improved operator comfort. It's just a contin-

uation of the Link-Belt philosophy of being recognized as the leader in telescopic truck crane design."

The air-ride, bogie beam-type suspension provides a smooth ride and precise handling. For "pick and carry" operations, the operator simply flips a switch and deflates the air bags until the carrier frame rests on the solid suspension. When preparing for over-the-road travel, the operator re-inflates the air bags and is ready to travel.

An additional feature found exclusively on the Link-Belt air-ride suspension is the axle lift system, which holds the rear axles level while the crane is up on outriggers.

Scott Is Link-Belt Distributor In Louisiana And Arkansas

Scott Construction Equipment Co., LLC has been named the Link-Belt crane distributor for all of Louisiana and most of Arkansas.

"Link-Belt is very pleased to be represented by Scott Construction Equipment," said John Claffin, vice president for sales and marketing. "We look forward to a very strong partnership with this outstanding organization, which has extensive crane experience and has been in business for more than 60 years."

Scott Construction will provide sales and customer support services from seven locations in Louisiana, including Baton Rouge, Broussard, Lake Charles, St. Rose,

Monroe, Shreveport and Alexandria. In Arkansas, Scott has locations in Little Rock, Ft. Smith, Texarkana and Springdale.

Jack Fendrick is president and general manager of the Southern Division, headquartered in Baton Rouge. Curley Bordelon is vice president and general manager of the Northern Division, headquartered in Monroe.



A Link-Belt HTC-8660 60-ton hydraulic truck crane with the new air-ride suspension.

Evolving, Adapting, Thriving

Purdy Construction's Work Bridges Past And Future

By Jennifer Hart
Editor

Not many companies today have the distinction of being in business for almost 80 years. Even fewer companies can so clearly trace their history to see where they have been in the past and where they are going in the future. Brad Preston, presi-



dent of Purdy Construction Company, Inc., has been fortunate enough to be intimately involved in his company's history.

In 1923, Wes Purdy opened Purdy Construction Company, a general contracting company with a bridge building focus based in Mansfield, Ohio. The first bridge Purdy Construction built is still standing today and holds an interesting claim to fame.

"Purdy Construction built their first bridge in Mansfield for the Pennsylvania Railroad," said Preston. "The bridge was built with precast concrete beams that were formed away from the bridge and carried over to it. During construction of the bridge, President Warren G. Harding's funeral train passed over it."

In the early days, Purdy Construction focused on highway and railroad bridge construction. Bridge building sustained the company while owner Wes Purdy lent his engineering talents to the effort to win World War II. Brad's father, Bob

Preston, joined the company in 1951.

"My father was an engineer who oversaw many of Purdy Construction's pile driving jobs and did estimating for the company," said Preston. "As far back as I can remember, I would tag along with my dad to visit potential job sites, stake out where bridges were going to be built or 'explore' all the fascinating equipment housed at the company's Mansfield office. It was a great way to spend time with dad, but I was also intrigued by the company's work."

Brad Preston officially began working at Purdy Construction part-time during junior high school. In 1967, Wes Purdy passed away and Preston's father bought the company. After earning his civil engineering degree at Cornell University, Brad Preston joined the company full-time in 1973 and became the sole owner in 1996.

Today Purdy Construction does about \$1 million a year in business, has 10 employees and is open shop. According to Preston, his father decided to keep the company name because it was well known and respected in Northern Ohio.

The company has evolved from bridge builder to industrial constructor, and Preston reports that pile driving for foundations and cofferdams now represents about 10 percent of the company's business.

"In the '50s and '60s, Purdy Construction began moving away from bridge building to focus on industrial construction," said Preston. "We find

that we maximize our pile driving resources when we act as a subcontractor for smaller general contractors. Often times it is too expensive for a contractor to buy or rent a crane for piling work. We have cranes and hammers readily available for this type of work."

"Often times it is too expensive for a contractor to buy or rent a crane for piling work. We have cranes and hammers readily available for this type of work."

**- Brad Preston, President
Purdy Construction Co.**

As a long-time pile driving company, Purdy Construction has a variety of equipment, some of which dates back to the 1940s. Preston reported that Purdy Construction used steam hammers with boilers up until 1976, many of which it still owns.

"We have several drop and steam hammers and have converted six of our old steam hammers to operate on air," Preston explained. "We also own a diesel hammer and some lattice boom cranes. Every now and then we find a special use for an antique hammer that we have sitting in our yard."

Preston's reference was to the conversion of a 60-year-old steam hammer that is now used to shore manholes. The 300-to 400-pound hammer was the perfect piece of equipment for the job once Purdy Construction added air, oil and a small set of leads.

Most of

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Above: This crane had a single lifting cable, so leads had to be held in place by guy wires.
Right: An early Purdy Construction project. The hammer appears to be a Vulcan 50-C.



PDCA Resources

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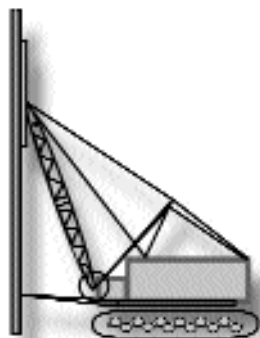
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Member Spotlight

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Purdy Construction's work is done in the Northern half of Ohio. The company has taken out-of-state jobs but finds that varying state regulations make doing business in Ohio a much better choice. Purdy Construction's most recent pile driving contract was for a small county bridge. Preston does not know what or when the next pile driving job might be.

"For us, pile driving work surfaces quickly," said Preston. "Our portion of a job may only take a week or two to complete, depending on the specifications. I personally find the engineering aspects of foundation work very interesting so I always welcome the opportunity to bid and perform a pile driving job."

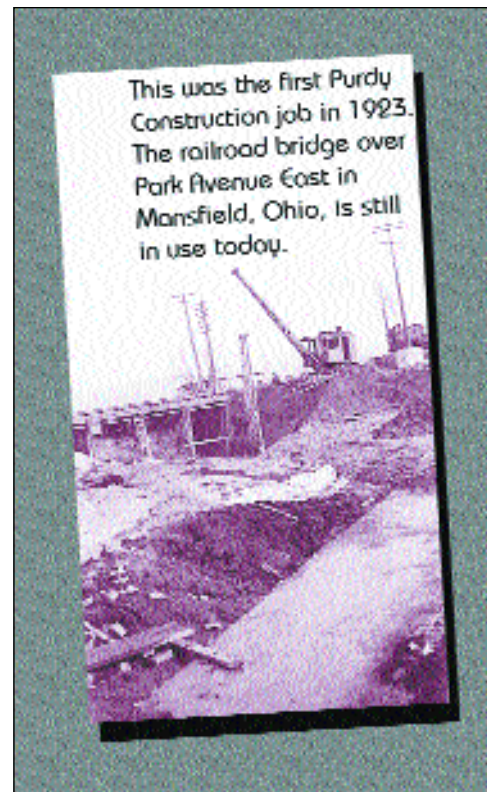
Being involved in a company such as Purdy Construction has given Preston knowledge and appreciation for the history of pile driving. He recounted a story that was told to him by a foreman who worked for Purdy Construction for 50 years, starting in 1923. The foreman explained how pile driving was done before steam-operated hammers were

used.

"When our company first started, a team of horses were the power behind driven piles," Preston explained. "The horses, attached to a drop hammer, would walk forward and trip the hammer into action. The first two times, the horses would actually fall forward when the hammer was tripped. By the third time, the horses knew where to stop and would catch themselves before falling."

Much has changed over the company's 78-year history, but the most important things have not. Purdy Construction is a profitable company with a commitment to saving customers money. If there is a less expensive way to perform a job, even if that means less or no business for Purdy Construction, that is the route the company follows. It has worked well for many years and Preston feels it is the reason the company has a high amount of repeat business.

In addition to membership in the Pile Driving Contractors Association (PDCA), Preston is a member of the



American Society of Civil Engineers (ASCE) and the American Institute of Steel Construction (AISC).



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PDCA Will Cite Pile Driving Project

By Jennifer Hart
Editor

In accordance with the Pile Driving Contractors Association's mission to promote the use of driven piles, PDCA is now accepting nominations for the first annual Driven Pile Project of the Year Award.

According to Stephen Whitty, chairman of the PDCA Public Relations Committee, the 2001 award program will be an opportunity to recognize pile driving projects that have made a contribution to the industry or to society.

"We know that driven piles have been used in many situations to solve a myriad of deep foundation challenges," said Whitty. "The PDCA Board of Directors felt an award competition would bring attention to both pile driving projects and the PDCA members involved in those projects."

To be considered for the award, the

project must involve driven piles (land or marine), at least one project participant must be a contractor, technical affiliate or associate member of the PDCA and the pile driving portion of the project must be completed in 2001.

"Various installation techniques are welcomed as long as the piles were driven during installation," said Whitty. "The project's uniqueness, timeliness and value to the field of engineering and society will also be considered during judging."

PDCA's Public Relations Committee will judge all entries, and the winning project and PDCA member will be recognized at the organization's Winter Roundtable in February 2002. The win-

ning member will be invited to make a presentation on the project during the Roundtable.

There is no fee to enter the Driven Pile Project of the Year Award competition, and all entries must be received by Jan. 4, 2002. All entries must be submitted on an official entry form with photographs or slides and a written description of the project. For more information or to request entry information, contact Stephen Whitty,

Public Relations Committee Chairman, c/o Specialty Piling Systems, Inc., P.O. Box 1607, Slidell, La. 70459-1607. Telephone and e-mail requests for applications can be directed to Whitty at (985) 643-0690 or SteveWhitty-SPS@att.net.



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Pile Driving On A Hazardous Waste Site: Implications For Safety And Compliance

By Buck Darling
Vice President and Safety Director
Herbert F. Darling, Inc.

There are many ways the burdens of hazmat work can affect an organization. First and foremost are the additional health and safety problems that go along with performing this type of work. Another is the drastic effect these items can have on your employees' performance in the field. Yet another, which ties in with the second, is the way you estimate this work to avoid nasty surprises in financial performance.

This article will deal primarily with the additional considerations that must be given to the health and safety of your employees when pile driving on former waste sites, former industrial and plant sites known as brownfields and existing plant sites. These will be referred to collectively as hazmat sites.

The effort to protect your employees must start before you ever arrive at a hazmat site. OSHA standards (29 CFR 1926.65 specifically) require many activities to be undertaken to ensure employee safety and compliance with regulations. These include but are not limited to hazard assessment, preparation and dissemination of a health and safety plan (HASP), employee training and medical monitoring.

Efforts to protect your employees must begin with the knowledge of just what it is we need to protect them from. To that end, a thorough hazard assessment is necessary. The typical pile driving work found on hazmat sites involves driven bearing piles (because nobody wants the problems associated with disposal of hazardous soils brought up by caisson drilling or augercast piles), steel sheet piling barrier walls to contain waste plumes and sheet pile or other shoring systems for installation of deep leachate collection and treatment systems.

All the hazards associated with normal pile driving activities are present on a typical hazmat site – crane work, falling from heights, falling objects and working with processes and materials such as cut-

ting and welding, compressed gases, gasoline, diesel fuel and bituminous and epoxy pile coatings. All of these considerations are aggravated – and many more are added – when working on a hazmat site. For example, chemical exposure, chemical reaction, heat stress, fire hazards and mobility problems are added to the mix.

In guarding against chemical exposure (not only for your employees but for their families, who can be exposed to chemicals they bring home) elaborate personal protection equipment (PPE) is often required. In order to ascertain the necessary level of protection, one must assess the chemicals to which the employees might be exposed. This will determine which of the four levels of PPE (designated A through D in decreasing order of protection offered) will be needed, along with the types of materials the PPE will be made of. A typical level C requirement will be appropriate most of the time any protection is required at all. The employee will wear impermeable coveralls, rubber boots over work shoes, inner latex gloves under outer neoprene gloves with perhaps cotton glove liners in between in cold weather, a hardhat, safety glasses and possibly a face shield. Depending on conditions, any of a number of different cartridge type (half-face, full face) respirators will have to be worn or at least be immediately available to the employee.

Imagine performing normal work on even a nice summer day (as opposed to a hot summer day) in an outfit like that. The possibility of dehydration, heat stress, heat exhaustion and heat stroke goes up enormously. Now imagine that you are a welder. Add to that outfit leather welding gloves and a welding hood, with or without the respirator. Now go ahead and lay out your work, cut and fit the pieces and weld them all together. Visibility and mobility decrease while heat and fire hazards increase.

The pile driver, while wearing this gear lofting sheets, climbing the leads to center a pile under the hammer or climbing down into a sheet pile cell, is much



A typical Level B outfit, which includes rubber boots, chemical resistant overalls, taped joints and a full face air purifying respirator, as well as self-contained breathing apparatus.

more susceptible to trips and falls due to the outfit he is wearing. Level B or level A will add bulkier suits, air tanks or air hoses to the mix, affecting balance and increasing the risk of tripping. Imagine walking on a drive frame while wearing this type of outfit or cutting and fitting bracing at the bottom of a contaminated hole. The problems become enormous.

Vigilance is the answer. All supervisors must look out for their employees, and all employees must look out for and assist their work mates, as well. A very critical eye toward finding hazards will greatly reduce the probability that they will happen.

What else must be done prior to starting work in the field? After the hazard assessment, the next logical step is to put these findings down on paper in the form of a health and safety plan (HASP), as required under 29CFR 1926.65 (b). The major elements of the HASP are: 1) an organizational structure of all employees onsite and their responsibilities during daily activity and emergency conditions; 2) a comprehensive work plan; 3) a site specific health

(Continued On Page 14)

Hazardous Waste Site

(Continued From Page 13)

and safety plan; 4) the company's safety and health training program; 5) a medical surveillance program; 6) the employer's standard operating procedures for safety and health; and 7) any necessary interfaces between the general safety program and the site-specific health and safety plan.



In some cases, the owner of the project might require the plan to be attested to by a certified industrial hygienist (CIH) in the state in which the work is performed. This program must be made available to, read by and understood by all employees prior to employment on the site. As a result, all employees will know the hazards they face, as well as some of the requirements necessary to avoid them.

The next step before work on the site can start is training your employees on the requirements of 29 CFR 1926.65(e). This section holds that all employees working on the site must have either 40 hours or 24 hours of training, depending on the type of work they do. This training must follow a required curriculum and be given by qualified personnel, all of which is spelled out in the appropriate section of the regulations. The training can be done in-house or by local vendors specializing in health and safety training. In general, almost all pile driving employees and their supervisors will require the full 40 hours of training, along with an annual eight-hour refresher course. Training records should be maintained because verification of employee training is often required by the owner of the site.

Next, medical monitoring is required under 29 CFR 1926.65, paragraph (f). To protect employees from chemical exposure, you need to know whether they were exposed. You and your employees need baseline information about their condition prior to employment on the site, usually in the form of a complete medical history, including blood work, urinalysis and an EKG to ascertain the condition of the employee's heart and his or her ability to perform stressful work with PPE, and a basic physical to ascertain blood pressure, heart rate and overall health. Hearing tests, pulmonary func-

tion tests to see if the employee will be able to wear a respirator during vigorous work and, on some sites, drug testing might also be administered.

Monitoring is required prior to employment, upon termination, upon employment in an area with different chemical or physical hazards, periodically at no more than 12-month intervals to keep track of any possible exposure during long-term jobs and at any time where symptoms of overexposure may occur. Records must be kept in accordance with 29 CFR 1926.33 which, in general but with exceptions, means keeping them for 30 years after the employee leaves your employment.

Now that the preliminaries are out of the way, there is work onsite that must be done prior to any serious pile driving. Certain physical attributes of the site must be set up to promote the health and safety of employees and avoid exposure to the general public, as well.

According to 29 CFR 1926.65 (d), areas of the site must be physically separated and designated as either an exclusion zone, a contamination reduction zone (CRZ) for decontamination of tools and equipment or a support zone for clothing change and shower facilities. Points of entry and exit for these zones must be controlled so no unauthorized entry or spread of contamination can occur. House trailers with showers should be set up in the support zone so employees can change into and out of work clothes. All zones should be sited taking into account local wind and weather patterns so contaminated materials don't blow into the CRZ and support zones.

Now We Can Go To Work

At the beginning of the work day, personnel must enter the site through the support zone, proceed through the clean end of the change house where street clothes are removed, through the shower facility to the dirty end of the change house where work clothes are put on, then into the CRZ to don appropriate PPE. Only then can we proceed into the

hot zone. At the end of the day, the procedure is reversed. Employees exit the hot zone and proceed to the decontamination area for decontamination of hand tools and PPE. They then remove PPE and go into the change house to shower and change prior to leaving the site for the day.

Who Would Be Crazy Enough ...

You might ask: Why would you want to go through all this? This typical job has been portrayed as though the pile driver was the general contractor on the site and



was therefore responsible for all aspects of the health and safety requirements for the project. Very often, though, as pile drivers, we are a principal subcontractor. As such, a majority of the physical site setup will be performed by the owner or general contractor and will be

provided for your use. The health and safety plan might already be in place by the owner, who knows more about his site than anyone and will allow you with written confirmation to abide by all the principles of his plan, with slight modification by you to account for the specifics of pile driving safety. At the very least, the general contractor will know where the local facilities are to perform medical monitoring, as long as you provide for the costs.

The situation is not always as onerous as it seems. The risks are there, but so are the rewards, both financially and in terms of physical accomplishments. This is especially true for those who successfully get over the learning curve, hopefully on a smaller job, and for those who are long on tolerance for microscopic inspection. One should also consider the benefits to industry and the environment when a brown-field has been turned into a productive industrial complex, the landfill has been secured for the foreseeable future and you did everything you could to see to the health and safety of your employees.

Buck Darling is vice president and safety director for Herbert F. Darling, Inc. He can be reached for comments or questions at (716) 632-1125 or by e-mail at HFDARLING@AOL.COM.

PDCA Winter Roundtable Set For San Francisco

The Pile Driving Contractors Association has assembled a stellar lineup of leading industry professionals to speak at its 2002 Winter Roundtable in San Francisco Feb. 21 through Feb. 23, 2002.

The Winter Roundtable presents a unique opportunity to learn and network with other professionals and academics associated with the pile driving industry.

Contractors, engineers, geotechs, suppliers and even students can benefit from the many seminars and group discussions offered at this year's Winter Roundtable. Technical information, project spotlights and panel discussions will encompass a number of rele-



San Francisco's Bay Bridge

vant and timely topics, including issues facing the contractor/supplier/engineer relationship, effective utilization of wood piles, the great hammer debate and wave mechanics.

The historic nature of the city of San Francisco will not be lost on Roundtable attendees. Barry Roth, PE, will present a dramatic history of the Bay Bridge and how its original design has influenced today's bridge project. And the conference itself is taking place in a historic landmark in San Francisco, the Mark Hopkins Inter-Continental Hotel.

Proclaimed architecturally perfect when built in 1926, the Mark Hopkins Hotel is known for its attention to detail, its amazing service and its breathtaking views of the city and the bay. A block of rooms with special rates has been reserved for PDCA members and their companions.

The 2002 Winter Roundtable promises to deliver cutting edge information in all the style and elegance of San Francisco. For more information on registration, hotel accommodations or the schedule of events, contact the PDCA at (970) 945-1231.

The Winter Roundtable Program

Thursday, February 21

6 p.m. - 7:30 p.m. - Opening Reception

Friday, February 22

7 a.m.-8 a.m. - Continental breakfast

8 a.m.-8:30 a.m. - 6th Annual Members Business Roundtable
President Charles Ellis Presiding

8:30 a.m.-9:30 a.m. - Opening Plenary Session: The Pile Driving Contractor and the Corps: Working Together - Brigadier Gen. Robert Griffin, Chief of Civil Works, U.S. Army Corps of Engineers

9:30 a.m.-10:30 a.m. - Opening Roundtable: The Issues Facing the Contractor/Supplier/Engineer Relationship - Moderated Q & A Session

10:30 a.m.-11 a.m. - Break in Exhibit Hall

11 a.m.-11:45 a.m. - Bay Bridge Project - Robert Stevens, PhD, P.E., Fugro-McClelland Marine Geosciences, Inc.

11:45 a.m.-12:30 p.m. - A History of the Bay Bridge - Barry Roth, P.E., Municon Consultants

12:30 p.m.-1:30 p.m. - Exhibitor luncheon in Exhibit Hall

1 p.m.-1:45 p.m. - Wave Mechanics - George Goble, PhD, P.E., George G. Goble Consulting and Engineering

1:45 p.m.-2:30 p.m. - The Effective Utilization of Wood Piles - Dean Matthews, Atlantic Wood Industries

2:30 p.m.-3 p.m. - Break in Exhibit Hall

3 p.m.-3:45 p.m. - Protecting the Environment - Using Safe Fluids in Pile Driving: Mark Miller, Terresolve Technologies

3:45 p.m.-4:30 p.m. - Marine Cofferdams - Harold V. Anderson, H.V. Anderson Engineering

5 p.m.-6:30 p.m. - President's Reception

Saturday, February 23

7:30 a.m.-8:30 a.m. - Breakfast and networking with exhibitors

8:30 a.m.-9:30 a.m. - The Great Hammer Debate, Part II - Geert Jonker, IHC Foundation Equipment
Patrick Bermingham, Bermingham Foundation Equipment
John White, American Pile Driving Equipment

9:30 a.m.-10 a.m. - Break in Exhibit Hall

10 a.m.-11 a.m. - Fountain County Project - George Goble, PhD, P.E., George G. Goble Consulting and Engineering; Jim Frazier, Lawrence Construction Company

11 a.m.-Noon - Closing Plenary Session - Ben C. Gerwick, Ben C. Gerwick and Pedco, Inc.

What You'll Find At The Winter Roundtable

Friday, Feb. 22, 2002

Opening Plenary Session - Brigadier General Robert Griffin, chief of Civil Works for the U.S. Army Corps of Engineers, will speak on "The Pile Driving Contractor and the Corps: Working Together." He will outline the contractor's role, responsibilities and relationships in working on a Corps of Engineers project.

ducted as part of the San Francisco/Oakland Bay Bridge East Span Seismic Safety Project. The PIDP was conducted to better understand pile handling, marine construction operations, driving behavior and pile setup associated with installing large diameter steel pipe piles into San Francisco Bay sediments.

The History of the Bay Bridge - Barry Roth, P.E., will present a dramatic history through pictures and documents relating to the original San Francisco/Oakland Bay Bridge. He'll explain how the original project has influenced the current project.

Wave Mechanics - Energy methods do not succeed in explaining pile penetration during pile driving. In this presentation, George Goble, PhD, P.E., will use wave

mechanics to describe and explain pile driving without the use of advanced mathematics. He also will explain how modern pile driving hammers have changed several important parameters, thus invalidating many of our old rules of thumb.

The Effective Utilization of Wood Piles - Dean Matthews of Atlantic Wood Industries will lead an informative discussion on how wooden piles can be effectively utilized in piling projects.

Protecting the Environment: Using Environmentally Safe Fluids in Pile Driving - Mark Miller will lead this fascinating session on the tremendous

advances in safe alternatives to petroleum products. The characteristics of lubricants, measurements of biodegradability, measurements of toxicity and types of base fluids and their effect on performance will be discussed. Environmental regulations and the role of safe products also will be covered.

Marine Cofferdams - Dr. Harold Anderson, an industry-leading expert on cofferdams, will clearly define the uses of the cofferdam, the common problems encountered during construction, the types of cofferdams recommended for different applications and several examples of successful cofferdams, including the San Mateo Bridge Pier Foundation Extension for Seismic Retrofit, which was completed in 1999.

Saturday, February 23, 2002

The Great Hammer Debate, Part II - Moderated by John White of APE, with panelists Geert Jonker of IHC and Patrick Bermingham of Bermingham, this fast-paced session will pick up where it left off at last year's Roundtable. All attendees will be surveyed prior to the session so presenters will be able to answer your most pressing questions.

Front Range Power Plant Project in Fountain County - Presented by Jim Frazier of Lawrence Construction and George Goble, PhD, P.E. of Goble Consulting & Engineering, LLC, this session will present the various aspects of the recently completed project that utilized the contracting and engineering services of several PDCA members. A lot of money was saved by using high capacity piles.

Closing Plenary Session - Ben C. Gerwick, owner of Ben C. Gerwick & Pedco, Inc. and one of the most highly respected members of the pile driving profession, will provide his insights and thoughts on the state of the industry in this important closing session.



San Francisco's Union Square

Opening Roundtable Discussion - The Issues Facing the Contractor/Supplier/Engineer Relationship - The Conference's opening roundtable, this open forum will provide valuable insight into the relationship among the players in your driven pile project. Share your opinions and learn from others. This will be networking at its best!

An Overview of the San Francisco/Oakland Bay Bridge Project - Robert Stevens, PhD, P.E., of Fugro-McClelland Marine Geosciences, Inc. will discuss the results of the Pile Installation Demonstration Project con-

Photos courtesy of the San Francisco Convention and Visitors Bureau

San Francisco: America's Favorite Playground

San Francisco is a golden dream come true, a place where heart, mind and soul embrace, lost in the simplicity of delightful deliverance. Fog and sun mingle playfully above America's favorite city; the cool, cloudy comfort of early morning slowly dissolving into the peaceful warmth of a gentle afternoon glow. Touch it. ... It is real. Feel it. ... It is the essence of escape. Savor it. ... It is one of a kind. Little wonder why San Francisco has been named the world's top city twice by readers of *Condé Nast*



Traveler; the top U.S. city seven times since 1988.

San Francisco's neighborhoods comprise its inner beauty, enhancing day-dreams and opening doors to new and exciting visions. The city is a cultural wonderland, an ethnic treasure chest

One of San Francisco's famed cable cars

where custom, tradition and history are preserved, celebrated and shared. So take your time and explore San Francisco. You'll find that the Gold Rush days have never really ended here; there's still plenty of gold to be found. The restless spirit of the city's Barbary Coast past lives on, fueled by a desire to be different, nurtured by infinite viewpoints, personalities and styles.

Magical moments abound: the echo of cable car bells from atop great hills; the rejuvenation of the soul upon crossing the Golden Gate Bridge; the splendor and elegance of a boat cruise on San Francisco Bay; the soft touching of wine glasses over a gourmet meal; the views; the people; the sights; the sounds; the city.

So come and share the wealth. Let your heart, mind and soul wander. Stay as long as you like. San Francisco encourages lingering. It was designed with adventure, romance and pleasure in mind. It is one of life's great indulgences, so indulge. It is one of the world's most gratifying escapes, so escape. It is where the world comes to unwind. It is America's preeminent playground.

- *San Francisco Convention & Visitors Bureau*

Registration Form

PDCA 2002 Winter Roundtable

Company Name _____

Attendee Name _____

Attendee Name _____

Attendee Name _____

Attendee Name _____

Address _____

City/state/zip _____

Phone _____ Fax _____ E-mail _____

Information about companion:

Name _____

Address _____

Phone _____

Conference registration

- PDCA member \$245
- Non-member \$275
- Additional company reps - PDCA member \$220
- Additional company reps - non-member \$250
- Student (includes student membership in PDCA) \$100
- Companion registration (includes all receptions, companion events) \$145

Total _____

Full payment must accompany this registration

Payment method: Check Visa Mastercard Amex

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Expiration date _____

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The Pile Driving Contractors Association

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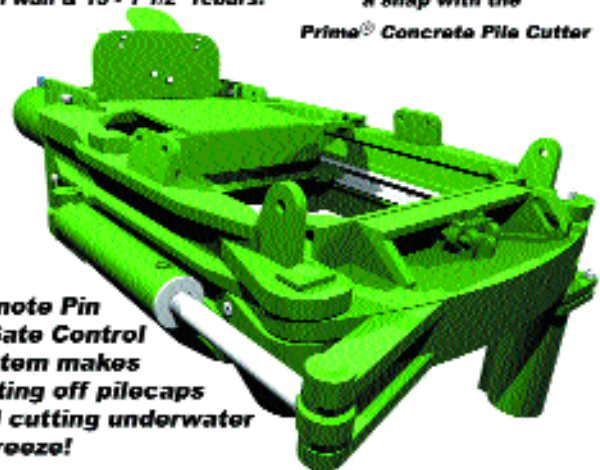


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Are All Biodegradable Lubricants The Same?

By Shari Miller

Director of Marketing
Terresolve Technologies

Are all biodegradable lubricants the same? In a word: no.

There is increasing interest in utilizing biodegradable lubricants to protect the environment and reduce the risk of expensive cleanups and fines in the event of a leak or spill. However, there is no clear answer as to what is biodegradable and what is the appropriate product to use.

There are many types of biodegradable lubricants that utilize various definitions of biodegradability and offer different levels of performance. First, let us look at the definition of biodegradability.

Biodegradability

There is a wide range of environmentally preferable definitions of biodegradability, as outlined in Table 1.

The ASTM has defined biodegradable as a function of degree of degradation, time and test methodology. Table 2 outlines the ASTM definition.

Despite these definitions, there are two widely used designations for biodegradability. Readily biodegradable is defined as degrading 90 percent within 28 days as measured by the

decrease of a test sample. This type of degradation is preferable because, in most cases, the fluid will degrade long before environmental damage has occurred. Because of this, they require little in terms of long-term bio-remediation. Vegetable-based lubricants and some synthetic ester-based products exhibit readily



Table 1 - Definitions Of Biodegradability

Approach	Country
ASTM D 6046 - 98a (EPA)	USA
ISO/CD 15380 (draft)	International
Umweltbundesamt (UBA) RAL-UZ Blue Angel	Germany
UBA WGK Water Hazard	Germany
VAMIL	Netherlands
City of Gothenburg "clean lubricant project"	Sweden
SS 15 54 34	Sweden

biodegradation.

Inherent biodegradation is defined as having the propensity to biodegrade, with no indication of timing. These types of products can persist in the environment for several years, continuing to cause substantial damage, and they require long-term remediation. Typically these products are petroleum-based, like conventional lubricants. Chart 1 on page 20 illustrates the difference in degradation timing of a readily biodegradable product compared to an inherently biodegradable product.

Performance

There is a wide variety of performance levels among biodegradable products. Traditionally, a lubricant is compounded from base oil and a variety of performance chemistries. Early pioneers in the vegetable-based lubricant markets used the same chemistry that was used for petroleum lubricants. That was a great idea, but it didn't work. The characteristics of vegetable oils are vastly different than those of petroleum oils. Vegetable oils had to be formulated for their strengths and limitations. Today, there are several vegetable-based products on the market. They offer good performance and a fair price. While all vegetable-based lubricants have temperature limitations, some are better than others. One should check with the lubricant supplier to determine their maximum and minimum operating temperature. While most vegetable-based lubricants have a maximum operating temperature of 140° F, some offer protection

(Continued On Page 20)

Table 2 - The ASTM Definition Of Biodegradability

Persistence Designation	Test Method	% Degradation	Days
Pw1	Ultimate	60	28
Pw2	Ultimate	60	84
Pw3	Ultimate	40	84
Pw4	Ultimate	<40	84
PwC	Primary	80	21
Pw4	Primary	<80	21

Table 3 - The Characteristics Of Various Oils

Characteristic	Petroleum Oil	Vegetable Oil	Synthetic	XBO
Biodegradability	Very Low	Very High	Moderate	High
Oxidative Stability	Good	Moderate	High	High
Temperature Range	Wide	Moderate	Very Wide	Wide
Thermal Stability	Good	Moderate	Very Good	Very Good
Mineral Oil Compatibility	Very Good	Good	Moderate	Very Good

Cash Prize Offered For Driveability Prediction

The Geotechnical Institute (GI) International Deep Foundations Congress promises a wealth of information on deep foundations and an opportunity for geotechnical engineers to test their driveability predictions.

The theme of the Congress, scheduled for Feb. 14 through Feb. 16 in Orlando, is "Down To Earth Technology."

At the Congress, the Pile Driving

Contractors Association (PDCA) will offer two cash prizes for predictions based on a pile driving demonstration to be held close to the GI Conference site. Three 12-3/4" steel pipe piles will be driven by local contractor and PDCA member Ed Waters and Son, Inc., of Jacksonville. A \$1,000 prize will be awarded to the conference attendee who can best predict the number of blows per foot it will take to drive the pipe pile to the specified depth.

Two other piles will be driven prior to the conference and will be used to measure capacity and pullout strength. A \$500 prize will be awarded to the conference attendee who can best predict the load capacity and tension resistance for these piles.

According to PDCA member George Goble of Goble Consulting Engineers, one of the organizers of the demonstration, this friendly competition will underscore an important

process in the field of pile driving.

"Driveability predictions are difficult to make yet very significant to driven pile design," said Goble. "The PDCA felt this contest would be an entertaining way to highlight this."

The conference has organized a committee, chaired by Professor Menoj Chopra of the University of Central Florida, to provide ongoing information about the contest and judge the predictions. Subsurface investigation information as well as pile and hammer specifications will be available at the GI 2002 Conference Web site at www.asce.org/-conferences/deepfound2002. Predictions can be made online and at the conference up until the pile driving demonstration begins. The attendee with the winning prediction must be present at the demonstration to win.

For complete contest rules and details, contact Chopra at (407)-823-5037 or visit the Web site.

Biodegradable (Continued From Page 19)

as high as 220° F. Similarly, most vegetable-based lubricants offer good performance to 30° F, yet some flow below -30° F.

When an environmentally preferable product is needed outside the common temperatures range, a biodegradable synthetic is required. While offering biodegradation, these products can

resistance; can cause foaming.

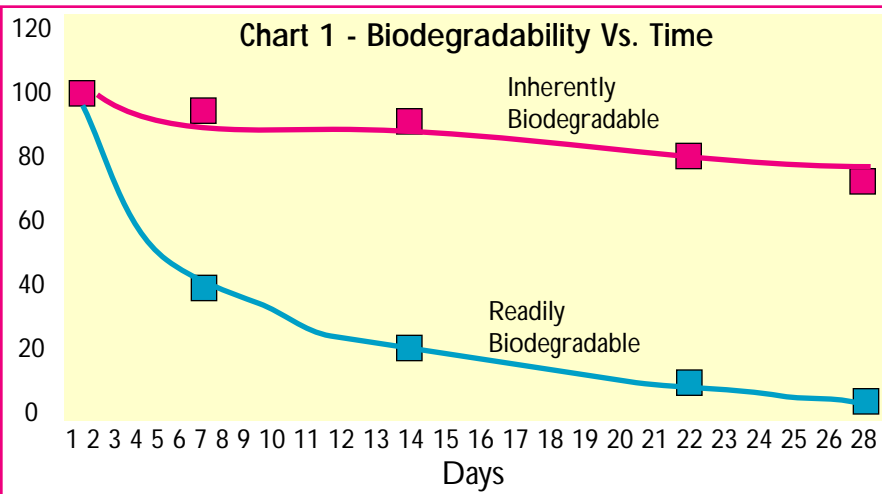
"Combining the performance of a synthetic with the vegetable oil are XBO oils," said Shari Miller, director of marketing for Terresolve Technologies. "These are a new type of enhanced vegetable oils, developed by our company in conjunction with the U.S. Department of Energy and the United Soybean Board. XBO oil allows a vegetable based lubricant to meet the performance of a synthetic. The cost structure is slightly higher than conventional vegetable oils and about half of synthetic oils. XBOs have longer useful life than petroleum oils, handle temperatures over 400° F and below -40° F and offer no seal incompatibility."

Table 3 on page 19 summarizes the characteristics of various types of oils.

Utilizing biodegradable lubricants makes good sense when operating in environmentally sensitive areas. They reduce exposure to expensive fines, clean up and downtime as well as protect the environment. These types of products can provide good performance for equipment, but it is important to realize that not all

biodegradable products are the same and to choose the right product for your application. When in doubt, seek the advice and recommendation of a reputable biodegradable products company.

Shari Miller is director of marketing for Terresolve Technologies, a Cleveland, Ohio, based company that develops, markets and sells biodegradable hydraulic fluids, lubricants, greases and diesel fuels. She can be reached for comments or questions at (440) 951-8633.



operate in temperatures in excess of 400° F and still offer long fluid life. As would be expected, these products are significantly more expensive.

Synthetic oils fall into three categories:

- **Polyalphaolefins (PAOS)** - excellent low temperature properties; tends to shrink seals;
- **Diester** - good anti-oxidation characteristics; good seal compatibility;
- **Polyalkylene glycols (PAG)** - water soluble, good fire

The Uses And Benefits Of Steel H, Pipe And Wood Piles



A Lima 770H driving pile with a Berminghammer diesel pile hammer over the Saco River in Fryeburg, Maine.

By John Linscott, President
H. B. Fleming

Steel H-piles are versatile and capable of supporting very high loads. Design loads can range from 80 kips up to more than 400 kips (117-pound section at 12 ksi design load). With higher design loads and higher strength steels, the design load could be up to 850 kips. The piles are easily spliced and therefore can be driven as deep as necessary.

Modern steel mills have improved quality control, and therefore most of the steel rolled is grade 50. Steel H-pile prices today are between \$400 and \$420 per ton, delivered to most of the United States. These prices are only slightly higher than they were 10 years ago. After adjusting for inflation and factoring in the added capacity of grade 50 vs. grade 36 steel, H-piles usually provide the lowest cost for high capacity piles where favorable soil conditions permit. H-piles are a relatively poor friction pile, typically developing the majority of their capacity in end bearing.

H-piles are tough and can be driven in the worst soil conditions. They are strong in tension and light in weight. Therefore they are significantly easier to handle and are not prone to cracking and breaking if not lifted properly.

H-piles are readily available in the United States – three U.S. steel mills and numerous foreign mills produce them at competitive prices. This competition has reduced prices and improved availability of almost all types of H-pile sections. Steel lengths are usually limited by truck-

ing restrictions. Lengths of up to 70 feet can be trucked, but longer lengths must be delivered to job sites by rail.

Cost-efficient dynamic testing is now available and proven to be reliable. Several piles can be tested in one day, vs. several days to set up and perform one static load test. For example, in one day of dynamic testing both H-piles and pipe piles, three or four piles might typically be tested at a total cost of \$5,000 or \$6,000. A typical static load test for a 100-ton pile design load could cost \$20,000. The saying that “a driven pile is a tested pile” is truer than ever. Drilled-in piles or augercast piles are difficult to test and not proven like a driven pile.

There is a perception that steel piles will corrode.

“It is our understanding that the only time corrosion may be an issue is in a marine environment or if there is electrolysis,” said John Linscott, president of H. B. Fleming. “We have pulled piles on bridges and buildings driven 40 years ago and have seen no corrosion. We have removed uncoated steel sheeting in salt-water marine environments. Exposed steel showed significant corrosion. However the steel a foot or so into the soil did not.”

Pile materials are often as much as 50 percent of the total cost of a pile job. Steel H and pipe piles are easily spliced, thus reducing pile waste significantly. A 10 percent pile waste factor instead of 20 percent can save the project a lot of money. These conclusions about corrosion and waste reduction are true of both

H-piles and pipe piles.

Steel pipe piles are versatile and capable of handling very heavy loads. Design loads can range from 80 kips and up to loads with almost no limits, since these piles are available in large diameters. Pipe piles are easily spliced and can therefore be driven deep.

When driven closed end, pipe piles are considered displacement piles and are usually better in friction than H-piles.

When filled with concrete, usually up to 25 percent of the compressive strength in the concrete can be allowed to increase the allowable design load. Steel pipe piles, when filled with concrete and the design load increased accordingly, can be competitive with H-piles.

Pipe piles are generally available as A252 grade 2 (35,000 yield, 60,000 tensile) and A252 grade 3 (45,000 yield and 66,000 tensile). Costs are usually 27 to 20 cents per pound delivered. For example, a 12-inch

“We have pulled piles on bridges and buildings driven 40 years ago and have seen no corrosion. We have removed uncoated steel sheeting in salt-water marine environments. Exposed steel showed significant corrosion. However the steel a foot or so into the soil did not.”

– John Linscott, President
H.B. Fleming

(Continued On Page 22)

Piles (Continued From Page 21)

diameter pipe, 0.375 inches thick weighs approximately 50 pounds per foot and would cost roughly \$14 per foot. Design loads for this pile filled with concrete might be in the 160 to 200 kip range. A comparable HP 12 x 53 grade 50 steel pile will cost approximately \$11 per foot. Design loads for this pile, if driven to rock, might also be in the 160 to 200 kip range.



LS-118 and LS109 crawler cranes driving HP 12 x 53 piles for a Home Depot in Portland, Maine. The pile hammer is an ICE 42S diesel.

Pipe piles make a lot of sense for marine environments, where corrosion is a concern. If the piles are filled with concrete, corrosion on the inside is considered nonexistent. The outside can be coated with various paint systems.

When the piles will likely be in friction rather than end bearing, and they are also in a marine environment with corrosion concerns, pipe piles are often the best pile for the project. Like H-piles, pipe is readily available in all sizes throughout the country.

Wood piles usually cost less than other deep foundation material. The piles are readily available and can be driven with light equipment. Pile testing is usually not necessary for piles less than 40 tons design load. But wood piles still need to be properly designed and installed to carry the intended load. Testing may be prudent for the wise contractor or engineer.

Wood piles are efficient when you have relatively light design loads such as 10 to 30 tons. In the East, piles are usually Southern yellow pine pressure treated with chromated copper arsenate, a wood preservative injected into the timber through a pressurized chamber and measured in pounds per cubic foot.

Wood piles can be driven with almost any hammer in the 10,000 to 22,000-foot-pound class. They are readily available in lengths up to 60 feet. Longer lengths, such as 65 or 70 feet, can also be purchased but usually with a significant increase in unit cost. The longer length piles

(Continued On Page 23)

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Piles (Continued From Page 22)

are generally frail and are easily broken.

According to Linscott, wood piles are good in both friction and end bearing.

"We have had numerous projects where the piles are driven through peat or marine clay into a medium or dense layer of granular material or till. The capacity seems to develop over 10 to 20 feet of penetration in the granular soils," Linscott commented.

Wood piles will also develop significant friction in clay. Building codes vary from state to state. Friction allowances of 0.5 kips per square foot of surface area are usually acceptable and considered conservative. For example, a 50-foot-long pile with approximately 2 feet of surface area per foot driven through a layer of peat in the top 20 feet will develop 1 kip times 30 feet to 30 kips of capacity.



An LS-109 crawler crane finishing the erection of the concrete blocks for a static load test of a 100-ton HP 12 x 53 steel pile.

On some projects with higher loads, wood piles can be spaced closer together and therefore reduce the size and reinforcing in concrete walls and grade beams.

Rocks or wood in the upper layers of the soil can result in large numbers of broken piles. In these conditions, allowances for breakage should be budgeted. If these obstructions cannot easily be removed, H-piles might be a better option.

Pressure treated wood piles have a long expected life span. The American Wood-Preservers' Association recommends various pressure treatments, depending upon the location. For example, for most of the coastal waters, a 2.5 # CF/CCA treatment is required. For buildings not in marine environments, 0.8 #/CF CCA or 1.0 #/CF CCA treatments are required.

Cost, design specifications and long-term usability play a key role in determining the proper pile type for a job. An understanding of a pile's strengths and weaknesses, as well as experience in using a specific pile type, are also important factors.

John Linscott is president of H. B. Fleming. He can be reached for comments or questions at (207) 799-8514 or by e-mail at john.linscott@hbfleming.com.

Driving Old Technology Into The 21st Century

By Dean Abbondanza
Sales Engineer, L.B. Foster Company

The history of domestic steel sheet piling dates back more than 100 years. Producers such as Bethlehem Steel, Jones & Laughlin, Carnegie Steel (U. S. Steel) and Inland Steel all played a part in its evolution.

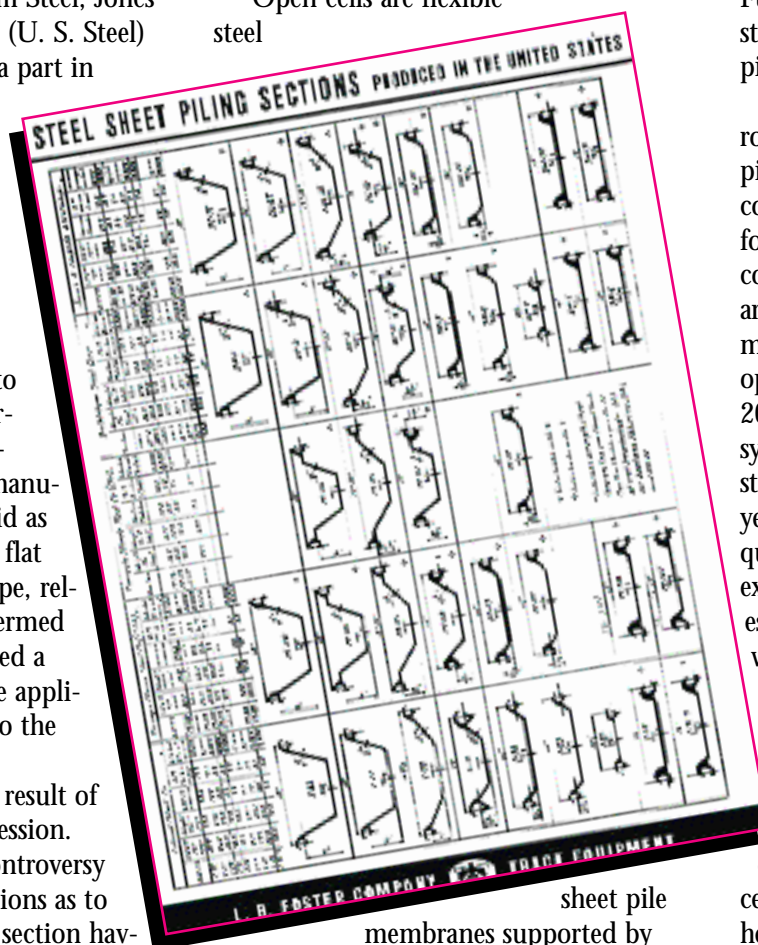
Sheet piling first took shape in the form of "flat web." Flat steel piles were developed to serve in perhaps the simplest form of structures featuring tension or membrane action. These sheets were primarily used to form circular cells for cofferdam construction on waterways. As time progressed, manufacturing and technology did as well. By the late 1920s, the flat web evolved into a "U" shape, relegating the flat web to be termed as old technology. This added a new dimension to sheet pile applications and eventually led to the development of "Z" pile.

The "Z" profile was the result of a natural engineering progression. There was an element of controversy over the years, raising questions as to the structural integrity of a section having the interlock located about the centroid. The ingenuity of transferring the interlocks away from the neutral axis achieved greater strength-to-weight ratio with higher section modulus. This also brought about the modification of the "U" thumb and finger interlock to what eventually would be known as the ball and socket. The flexibility and durability of the "Z" ball and socket would win over the domestic market. After 60 plus years, it is still recognized as the preferred interlock.

With a new millennium came new piling-based engineering challenges. One such challenge was faced by Peratrovich, Nottingham & Drage, Inc., a consulting firm specializing in civil/marine engineering disciplines. Some 20 years ago, Dennis Nottingham, PE, was determined to meet client demands for an economi-

cal and easily built waterfront structure with high strength and a capacity for heavy loading. Nottingham responded with the open cell concept.

Open cells are flexible steel



sheet pile membranes supported by soil contact with embedded tail anchor walls. This concept creates an integral reinforced soil system. The result is a structure that can withstand large settlement and support a variety of loads. In effect, viewed from above the structure, it becomes a series of U-shaped horizontal membranes that require no toe embedment for stability. The open cell bulkhead is constructed of only three components – PS31 flat sheet piles, fabricated connector wyes and HP14 anchor piles. Compared to alternative structures, the open cell method is cheaper because of reduced sheet pile area, greater construction tolerances, minimal pile penetration and reduced backfilling procedures.

Most recently, the port of Anchorage, Alaska, required an expansion of an existing waterfront structure – a 1,100-foot retaining surface capable of resisting

extreme ice, waves and erosion. The expansion was necessary to provide room for a railroad track loop suitable for turning and staging an entire fuel car train. Fuel delivered by train to Anchorage is stored and dispensed through marine, pipeline and land links.

Alternative designs initially included a rock-armored buttress and an anchored Z pile bulkhead. The anchored bulkhead cost came in at \$4.5 million and was found to be structurally inadequate due to concerns with soil settlement. The rock-armored buttress system was priced at \$5 million. Economic studies found that the open cell cost of \$4 million offered up to 20 percent savings compared to the other systems. The more than 100 open cell structures that have been built over a 20-year period have endured 3,500 earthquakes. These structures have weathered extreme environments of moving ice masses six feet thick and the cyclical loading of waves 14 feet high.

The open cell structure can be applied to virtually any condition for which a marine waterfront application is needed. There is always the possibility of extreme conditions, but these conditions would pose the same concerns to any other competitive piling bulkhead structure. Furthermore, open cell sheet piles are not dependent on toe embedment for structural support. Therefore, varying soil site conditions are not as relevant to the system as is the select backfill that is contained with the cells.

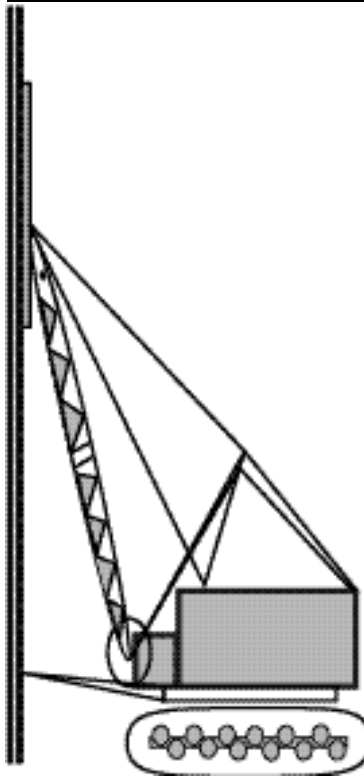
In addition, there are no geographic limitations to the location of these structures. Most of them were placed in Alaska because the engineering firm was based there, but many have been installed recently in Washington, Louisiana, Florida, Missouri and Oregon. Because these structures can endure the harsh environment in Alaska, other regions may not present the same challenges.

Dean Abbondanza is a piling sales engineer with L.B. Foster Company. He can be reached for comments or questions at (412) 928-7841 or by e-mail at dabbondanza@lbfosterco.com.

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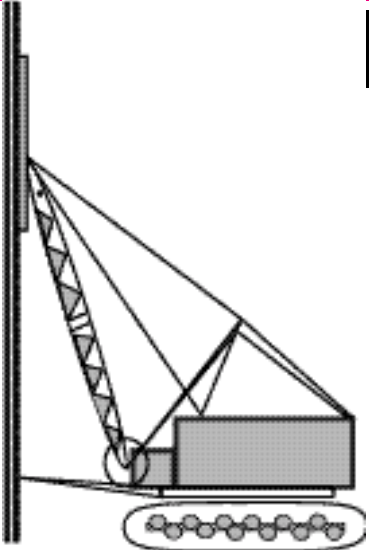
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The Great Pile Wall Of China

APE Plays Key Role In Ambitious Pile Driving Project

By Steve Gough

Director of International Sales

American Piledriving Equipment

Nearly two years ago in 1999, the Design Institute of the Marine Harbor Engineering Group, part of the Chinese Ministry of Transportation, contacted American Piledriving Equipment (APE) in Kent, Wash., to enlist its help on a major project underway outside Shanghai in the Peoples Republic of China.



The Yangtze River Estuary Project was a key part of the Chinese government's five-year plan. Neither party understood at the time that these early collaborations would lead to one of the most ambitious projects ever attempted in the world of pile driving.

The idea was as simple as it was breathtaking. The city of Shanghai was in the process of solidifying itself as the commercial and trade center of China. To

"Nothing I learned during the process of starting this business could have completely prepared me for dealing with a totally different culture in such a deep way."

— John White, President
American Piledriving Equipment

accomplish this, the city was looking for ways to make itself more attractive to business by improving its port facilities. But there was a problem: Silt and clay deposits, brought downstream by the Yangtze River, constantly needed to be dredged to allow large cargo and cruise ships to make it to Shanghai. This process was proving to be time-consuming, inefficient and expensive. Every time the city attempted to dredge, the wall banks of the river would repeatedly collapse inward, re-depositing the sediments.

The Chinese engineers' solution was to drive concrete caissons along both sides of the river to create a retaining wall that would shore up the bank walls and greatly reduce the need for dredging.

"What was truly amazing about the project was not necessarily the idea of the project but the incredible scale of it," APE President John White remembered. "I felt the proposed project was equivalent in the pile driving industry to the Great Wall of China."

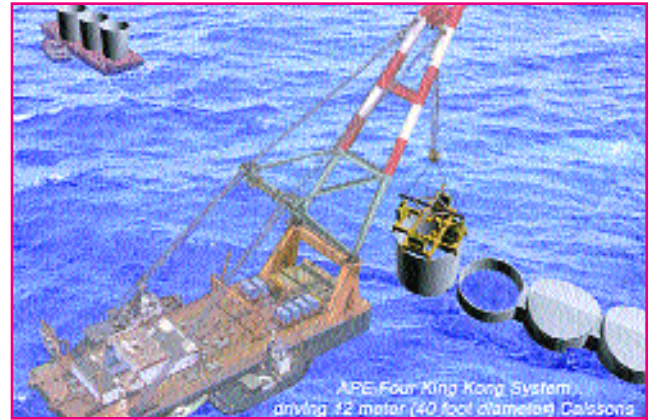
The Chinese engineers wanted to drive nearly 2,000 concrete caissons – 45 feet in diameter, 60 feet long and weighing a million pounds each – all the way along the mouth of the Yangtze to create a retaining wall.

"After my initial surprise, I immediately began brainstorming," said White. "APE had already driven large diameter piles by joining two of its largest vibratory pile drivers into a giant tandem machine. The enormous weight of the pile for this project would require four of APE's largest vibratory pile drivers hooked together as one unit."

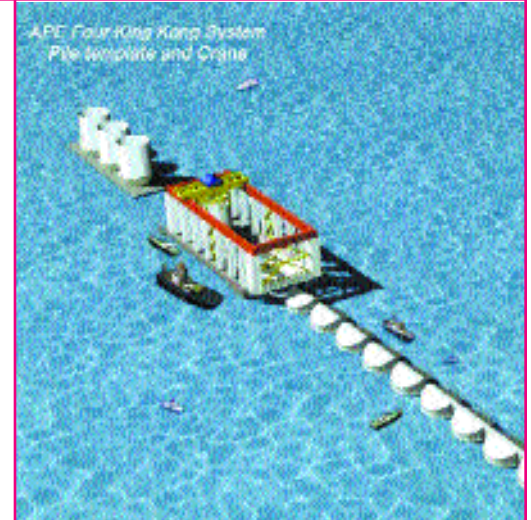
APE began working on the design. It took more than a year of collaboration between APE's technical groups and the marine construction groups of China.

"We had to overcome many technical roadblocks along the way, and I would be lying to you if I said it was easy," remarked White. "In the end, we were able to come up with a system both parties could believe in."

This system would become the backbone of the project. It consisted of four Model 400 King Kong vibratory pile hammers synched together and vibrating in unison to vibrate the pile into the ground. The technical hurdles that needed to be overcome were only half the bat-



APE Four King Kong System driving 12 meter (40 foot diameter) Caissons



APE Four King Kong System Pile template and Crane

tle, according to White.

"I started this company 10 years ago with my partner Pat Hughes, chairman of APE, from very humble beginnings," commented White. "Not once did I dream of a job like this. Nothing I learned during the process of starting this business could have completely prepared me for dealing with a totally different culture in such a deep way."

About a year ago, APE hired Steve Gough, director of international sales, to focus on greater China and large infrastructure projects throughout the region. Gough had spent 10 years selling construction equipment in the region and speaks fluent Chinese. It was clear to White that, for this project in particular, APE's product was the right tool for the job. It was also clear that the customer also believed this. But putting the two working cultures together would be the most difficult task.

(Continued On Page 30)

Project Spotlight (Continued From Page 29)

"Sometimes it is difficult for Americans to understand the very formal nature of Chinese negotiations and the time-consuming procedures that are involved. At the same time, it is hard for the Chinese to work with the more flexible, less structured and more efficient U.S. style," said Gough.

"Cultural misunderstandings can be the death blow to a project that in every other way should be a done deal. I have seen projects larger than this one fall apart for less. Luckily for us we were sensitive enough to it and were able work through it."

– Steve Gough

**Director of International Sales
American Piledriving Equipment**

Gough remembered one incident that put these cultural differences into better focus.

"One thing that I have learned over the years is how important the con-

cept of 'face' is to the Chinese. This means that one must not lose control of one's emotions, even in tense business situations."

Gough continued: "During some difficult moments, the customer – while standing together with John White at the blackboard and unable to understand the meaning of one of John's points – lost his composure and pushed John's arm away from the blackboard. This shocked everyone and was a great loss of face for the customer. It could have caused the end of the negotiations.

"John, however, starting to understand this concept of face, immediately went and filled a cup of tea and brought it to the man who had lost so much face. This immediately gave face

back to the man and for everyone in the room marked a turning point from which a new spirit of cooperation ensued. This spirit carried all the way to the signing of the contract."

David White, John's son, assisted during negotiations. David moved to China a year ago and studies Chinese at the Shanghai Language Institute. He had been teaching his father the meaning of face in China, and it was these lessons that enabled White to understand how important it is to control all emotions when dealing with the Chinese and how to deal with emotional breakouts when they happen.

"Cultural misunderstandings can be the death blow to a project that in every other way should be a done deal. I have seen projects larger than this one fall apart for less. Luckily for us we were sensitive enough to it and were able work through it," said Gough.

The contract was signed at the end of November and the first pile will be driven in the beginning of January.

"We are very optimistic that this design will be a success and are excited to be working with the Chinese on such an important project," said Gough. "We aren't just selling a product to a customer. We are collaborating with the Chinese to try something completely new and, at the same time, bringing our two cultures together."

If this new method is successful, the same problem with river deltas all over the world could be solved in the same way. This will have all begun with what the Chinese side and APE now call the Great "Pile" Wall of China.

Steve Gough is director of international sales for APE. He can be reached for questions and comments at steveg@apevibro.com.

UPCOMING EVENTS

6th Annual PDCA Winter Roundtable

Feb. 21-Feb. 23, 2002

San Francisco, Calif.

Contact: Stan Orr, CAE - (970) 945-1231

CEO@piledrivers.org

CONEXPO

March 19-March 23, 2002

Las Vegas, Nev.

Visit PDCA's booth: GL3631

(800) 867-6060

info@conexpoconagg.com

7th Annual PDCA Winter Roundtable

Feb. 21-Feb. 22, 2003

Atlanta, Ga.

Contact: Stan Orr, CAE - (970) 945-1231

CEO@piledrivers.org

8th Annual PDCA Winter Roundtable

Feb. 20-Feb. 21, 2004

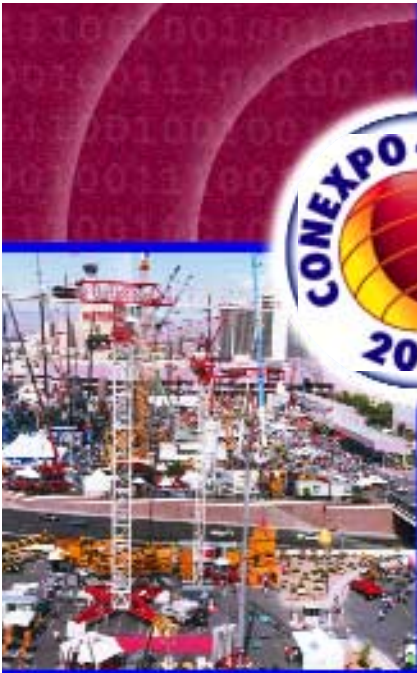
Orlando, Fla.

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Announcing The 2001 PDCA Driven Pile Project Of The Year Award

The Award

To acknowledge noteworthy contributions to the pile driving industry, PDCA will cite an outstanding project that uses driven piles to solve foundation problems. The 2001 winner will be recognized Feb. 23 during the Annual PDCA Roundtable in San Francisco. The award will be in the name of the PDCA member directly involved with the project.

Entry Requirements

All nominations must be submitted on the official entry form with accompanying photographs and a written description of the project. Entry forms are available from PDCA headquarters, the chairman of the Public Relations Committee or the PDCA Web site. The winner will be expected to make a presentation that includes photographs or slides at PDCA's Winter Roundtable in February 2002. The written description should explain the project's design concept, highlight any problems where piles provided a solution and point out economic considerations or innovative solutions or techniques employed in the project.

Nominations

There is no entry fee. To nominate a project, submit the completed entry form, available on the PDCA Web site or from PDCA headquarters or the chairman of the Public Relations Committee, with photographs or slides and the written description to:

Steven K. Whitty Jr.
Public Relations Chairman
c/o Specialty Piling Systems, Inc.
P.O. Box 1607
Slidell, La. 70459-1607

All information requested on the entry form must be provided, and entries must be received by Jan. 4, 2002.

Project Qualifications

Any project that uses driven piles is eligible for the PDCA Project of the Year Award, including but not limited to those that use piles to solve deep foundation problems, earth or water retention situations or anchorage problems. Projects may be marine-based or land-based and may involve any installation technique. Projects will be judged on qualities such as uniqueness, timeliness, unusual aspects of pile driving or unusual solutions to foundation problems, value engineering or value to the public or the industry.

Eligibility

To be considered for the PDCA Driven Pile Project of the Year Award, projects must involve driven piles and at least one participant who was a PDCA contractor, technical affiliate or associate member during the year. Projects may have commenced before the year 2001 and may be incomplete at the end of the year as long as the pile driving portion of the project was completed in 2001.

Judging

A jury consisting of the members of the PDCA Public Relations Committee will select the winning project.

Hurry!
Entries
must be
received by
Jan. 4, 2002

Entry forms are available on the PDCA Web site at
www.piledrivers.org
or by calling PDCA headquarters at (970) 945-1231

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