SPECIAL EDITION ISSUE

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PREPARING FOR OSHA INSPECTIONS – THE FUTURE OF P3

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EST. 1984

PILE BUCK

THE INTERNATIONAL DEEP FOUNDATIO
AND MARINE CONSTRUCTION MAGAZIN

NOV/DEC 2016
VOLUME 32, ISSUE 6

THE TRUMP ADMINISTRATION AND REBUILDING U.S. INFRASTRUCTURE

TRUMPISTRUCTURE

THERE USED TO BE A *LEANING* TOWER OF SOHO

It may not have been as old or iconic as that other leaning tower over in Italy, but the 118 year old co-op building that once stood at 74 Grand Street in the SOHO Historic Cast Iron District was protected by the Landmarks Preservation Commission (LPC) because it featured one of the very first cast-Iron facades which gave the district its name.

In 2004 some hasty and ill-considered excavations to the lot next door resulted in the building beginning to slowly tip over. So much in fact, that the 118 year old co-op was referred to in its final days as The Leaning Tower of SO-HO.

The building continued to lean, and while efforts were made to save it, it had to be demolished in 2010. Before demolition the LPC required the cast iron facade be carefully removed and stored in order for it to be used on the building that would eventually rise in its place.

Fast forward to today and 74 Grand is set to quickly rise again - this time on a solid foundation, thanks to Stelcor Drilled-In Displacement Micropiles.

As with any project in the city, mobilization and demobilization costs are always higher. Limited space to use equipment and stage product is always a bit of a logistical nightmare as well, and with an area 25' wide and 100' deep, this project was no exception. In addition, the neighbors took it upon themselves to (brilliantly) stake out the property line with luxury vehicles. Effective yet frustrating if you're the equipment operator. With minimal installation equipment required, Stelcor offers huge advantages in these situations.

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					flange	web				
	in^3/ft cm^3/m	in^4/ft cm^4/m	inch mm	inch mm	inch mm	inch mm	lbs/ft kg/m	lbs/ft^2 kg/m^2	ft^2/ft m^2/m	ft^2/ ft^2 m^2/m
ESZ 17 - 630	31.1 1,670	229.2 31,300	24.80 630	14.72 374	0.335 8.5	0.335 8.5	46.9 69.8	22.7 110.8	5.43 1.66	1.32 1.32
ESZ 18 - 630	33.6 1,805	247.9 33,850	24.80 630	14.76 375	0.375 9.5	0.375 9.5	51.1 76.0	24.7 120.7	5.43 1.66	1.32 1.32
ESZ 19 - 630	36.1 1,940	266.6 36,410	24.80 630	14.76 375	0.413 10.5	0.413 10.5	55.2 82.2	26.7 130.5	5.43 1.66	1.32 1.32
ESZ 24 - 700	45.3 2,435	409.1 55,870	27.56 700	18.07 459	0.472 12.0	0.354 9.0	60.1 89.5	26.2 127.9	6.61 2.02	1.44 1.44
ESZ 26 - 700	48.4 2,600	438.0 59,810	27.56 700	18.11 460	0.512 13.0	0.394 10.0	65.0 96.7	28.3 138.1	6.61 2.02	1.44 1.44
ESZ 28 - 700	51.4 2,765	466.8 63,750	27.56 700	18.15 461	0.551 14.0	0.433 11.0	69.8 103.9	30.4 148.4	6.61 2.02	1.44 1.44

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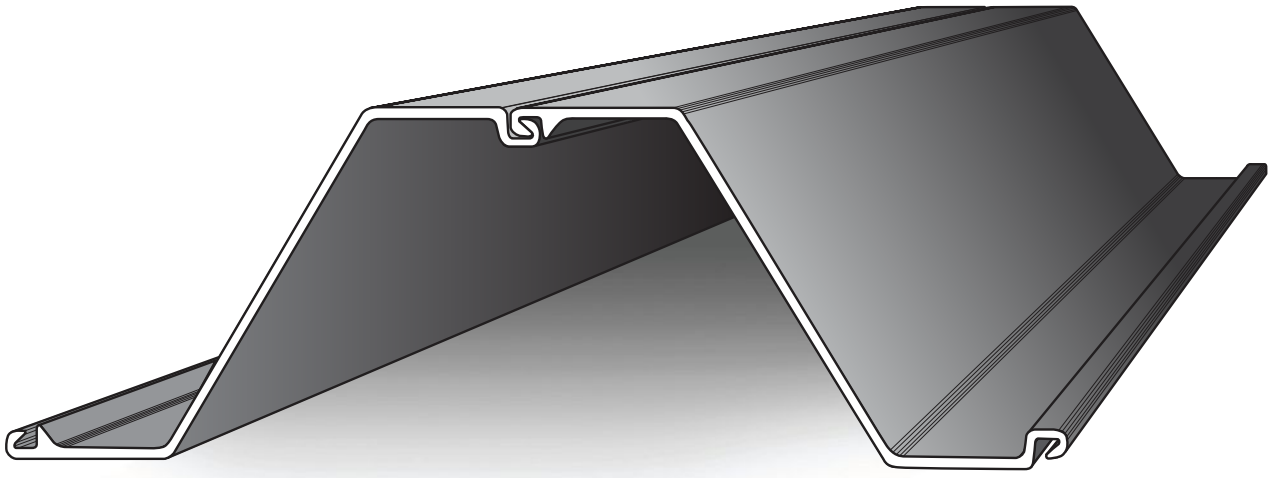

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NZ 26	27.56	17.32	0.500	71	30.92	48.50	419.9
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CONTENTS

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COVER STORY

JOB STORY

PILE BUCK SPOTLIGHT

COMPANY SPOTLIGHT

PRODUCT SPOTLIGHT

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IN EVERY ISSUE

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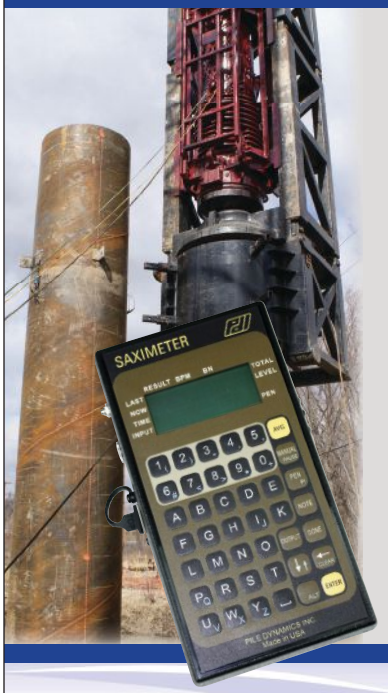

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noun

The basic physical and organizational structures and facilities (e.g., buildings, roads, and power supplies) proposed by the Trump administration in order to improve the substandard infrastructure condition of the United States.[1]

Whether you love or hate the guy, he has a game plan when it comes to improving the condition of America's infrastructure.

The question is: Is it going to work? Or, not?

In case you've been living on the moon the past ten to twenty years, America's infrastructure ratings are dismal. The 2013 ASCE report card gave America an overall rating of D+.

When was the last time America's infrastructure received a *good* rating? The first ten callers who can answer this get a complimentary lifetime subscription to *Pile Buck*.

Trump's methods, such as leveraging private dollars, tax incentives for infrastructure investment, and private-public partnerships (P3), have certainly created controversy.

That's why we wanted to bring you what we think is a matter-of-fact look at what infrastructure under the Trump administration might be like.

Be sure to visit our website to post your comments. ■

Alex Smoot, Editor
alex@pilebuck.com

[1] TRUMPISTRUCTURE is a term coined by the article author Mark Rice. This issue of *Pile Buck* is the initial publication appearance of the term.

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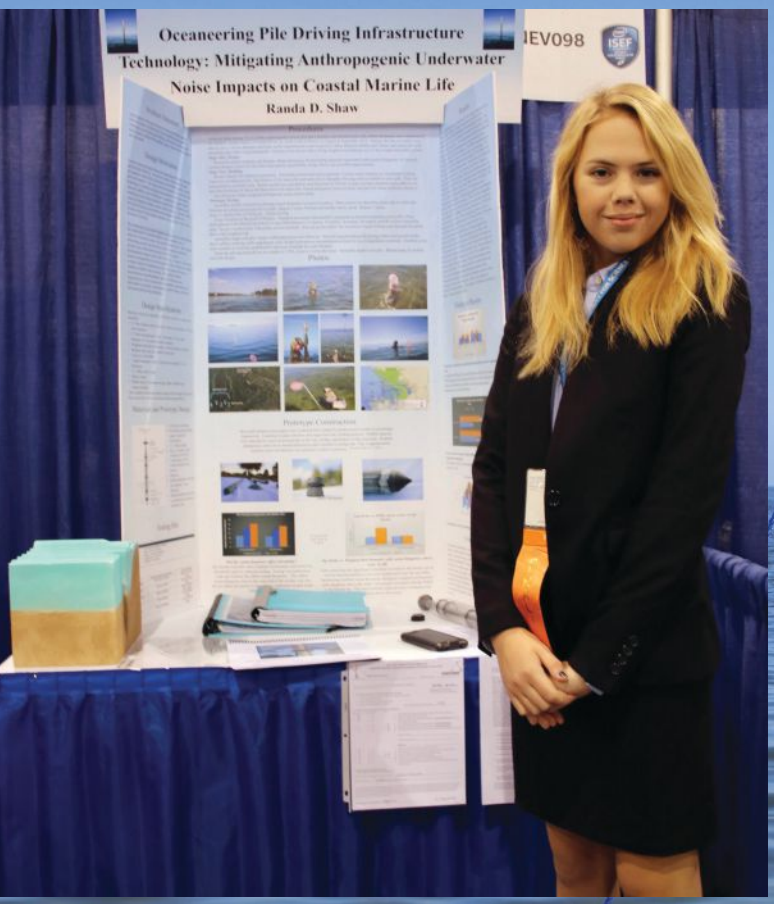

Randa Shaw, a high school sophomore, field tests her noise mitigation pile-driving prototype in the coastal waters of Crystal River, FL. A self-built hydrophone array was used to measure decibel levels. Shaw presented her ocean engineering research at the International Science and Engineering Fair in May 2016.

Send us your photo for consideration in a future Pile Buck issue.

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By Jared Poirier

JOHN HART LAKE GENERATING STATION REPLACEMENT PROJECT – FRESH WATER SUPPLY TO CAMPBELL RIVER RESIDENTS

British Columbia, Canada

The British Columbia (Canada) Utilities Commission gave the go-ahead in February 2013 to replace the hydroelectric John Hart Lake Generating Station built in 1947 and located on the east end of the lake near the city of Campbell River. A more-efficient generating station will be built underground. The replacement work involves the relocation of the city of Campbell River water supply.

The city of Campbell River and BC Hydro collaboratively developed a project plan that will see a water transmission line down Highway 28 to connect to the existing water main off Powerhouse Road and relocation of the Campbell River ultra violet and sodium hypochlorite treatment facilities to the new pump station building that will be constructed at John Hart Lake.

To deliver the required water system infrastructure, Campbell River and BC Hydro have worked together over the past two years to develop the city's Water Supply Project Plan which has recently been finalized with the signing of the BC Hydro Municipal Water Supply Infrastructure Construction and Funding Agreement. This agreement sets forth the obligations of both parties in delivering a new water supply system for the city of Campbell River and defines the overall approach to be employed in delivering the new city water system infrastructure.

Campbell River presently draws the majority of its water from a single source at John Hart Lake which is delivered to the community via a gravity-based water supply and distribution system. The lake source water is provided by way of connection to each of the three existing BC Hydro penstocks[1] serving the John Hart Generating Station at the city's water

[1] Penstocks are the pipes that deliver water from the reservoir to the generating station turbine units.

treatment facility located above the generating station and adjacent to the three BC Hydro surge towers.

As part of the John Hart Redevelopment Project, BC Hydro will be replacing the John Hart Generating Station and removing the penstocks. BC Hydro has now entered the construction phase of this project with an anticipated completion date being the end of 2018. The BC Hydro penstocks are currently scheduled to be removed in 2018 requiring Campbell River to have a new, fully-functional water supply in place by the end of 2017.

To deliver the required water system infrastructure, The City and BC Hydro have worked together over the past two years to develop the City's Water Supply Project Plan which has recently been finalized with the signing of the BC Hydro Municipal Water Supply Infrastructure Construction and Funding Agreement. This agreement sets forth the obligations of both parties in delivering a new water supply system for the City of Campbell River and defines the overall approach to be employed in delivering the new City water system infrastructure.

TO DELIVER THE REQUIRED WATER SYSTEM INFRASTRUCTURE, CAMPBELL RIVER AND BC HYDRO HAVE WORKED TOGETHER OVER THE PAST TWO YEARS TO DEVELOP THE CITY'S WATER SUPPLY PROJECT PLAN.

HENRY FOUNDATION DRILLING INC. WORK

Henry Foundation Drilling Inc. (HFDI) was contracted by Aecon/Frontier Kemper JV to install a secant pile compression ring to act as shoring for the tunneling

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operation for the water intake. HFDI contracted Isherwood Geostructural Engineers for the design of the temporary shoring. The design consisted of an approximate 10.0m diameter secant pile ring comprised of 46, 1.0m diameter piles that extended to depths of approximately 21.0m. This temporary shoring also served as form work for the permanent structure as the walls for the permanent structure were formed up against it.

For this project, HFDI supplied two drills, a Bauer BG-28V and a Bauer BG-36, along with a 100-ton support crane. These are large drills that needed to fit into a small work area, so coordination between crews, concrete supply and other contractors was key.

The pile installation was completed on schedule with both drills working in unison. A concrete guide wall was used to ensure pile location accuracy. Once pile installation was complete, 1.50m diameter relief holes were drilled in the center of the compression ring and then back-filled with sand.

The relief holes were drilled to loosen the native material to help with the bulk shaft excavation. Then, an excavator was used to remove the first 7.30m of material from the shaft followed by the use of a 1.5m^3 clamshell bucket off of the crane to achieve 11.0m of depth.

Once excavation reached the hard clay layer progress with the clamshell slowed, a 1.50m diameter digging bucket and the Bauer BG-28V were used to drill holes around the perimeter of the excavation down to bottom elevation. Excavation of the center portion of the shaft resumed through the use of the clamshell/crane and continued down to a final depth of 19.0m.

One of the main challenges on this project was trying to meet the requirement of "clean" and "roughened" walls of the shaft, as the entire excavation was filled with water. To achieve this, divers were used to check cleanliness of the shaft walls, a large drop chisel modified with the addition of drill teeth was used with the crane to scrape the perimeter walls of the shaft and then the drill and clamshell were used to clean out loose material. Flocculent was used to settle the remaining suspended material prior to final inspection.

After the shaft received the nod from Isherwood, a 3.0m tremie plug was poured at the base. Once the concrete in the tremie plug achieved the required strength, dewatering took place.

Other challenges from this project included working in an environmentally-sensitive area and an aggressive schedule.

The project is currently ongoing with the permanent structure in the shaft nearing completion. The new generating station will be commissioned in the fall or winter of 2018. ■

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By Richard Caminita

BISSO MARINE MAKES DEEP DIVES IN THE GULF OF MEXICO

BISSO MARINE, a full service offshore and subsea infrastructure services contractor and member of the ADCI and IMCA, successfully completed a two-month saturation diving campaign in the U.S. Gulf of Mexico. Using its 415′ (126.4m) × 100′ (30.4m) construction barge BISSO SUBSEA VISION, configured with a 12-man ABS Classed 1,000′ (300m) saturation system, BISSO MARINE performed a variety of subsea infrastructure services including several subsea abandonments in water depths ranging from 300′ (91m) to 723′ (220m).

Other scopes of work included a *Reverse 'J'* recovery of several miles of unpiggable 6″ pipeline from 400′ (122m) of water. The 6″ pipeline was lifted vertically through one of the moonpools on the BISSO SUBSEA VISION. The pipeline was vented, saw cut and scrapped within an enclosed decommissioning system designed to capture the contents of the pipeline.

The BISSO SUBSEA VISION also recently completed the lay and burial of several miles of bundled pipeline in the U.S. Gulf of Mexico in less than 200′ (60.9m) of water. While the BISSO SUBSEA VISION moved on to its next decommissioning assignment, the bundled pipeline tie-ins will be performed using the company's 4 point DSV JOSEPH BISSO.

All work was performed safely without downtime or incident.

The fully classed 12-man saturation system on the BISSO SUBSEA VISION has a 3-man bell deployed through a moonpool and a side-launched hyperbaric rescue chamber (HRC). The BISSO SUBSEA VISION is configured with two pedestal cranes, the main crane having a 300-ton capacity and the auxiliary crane having a 60-ton capacity. The barge also features an 8-point mooring system capable of working in 1,000′ (300m). Other barge features include two project moonpools (8′ (2.4m) diameter and a 10′ (3m) diameter), a pipelay firing line system, significant open deck space, 100 bunks and a helideck rated for a Sikorsky S-76. ■

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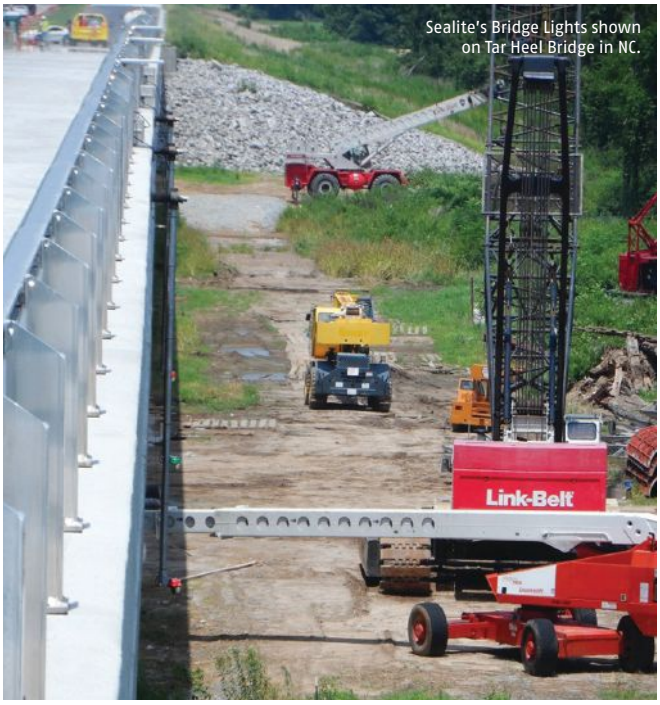
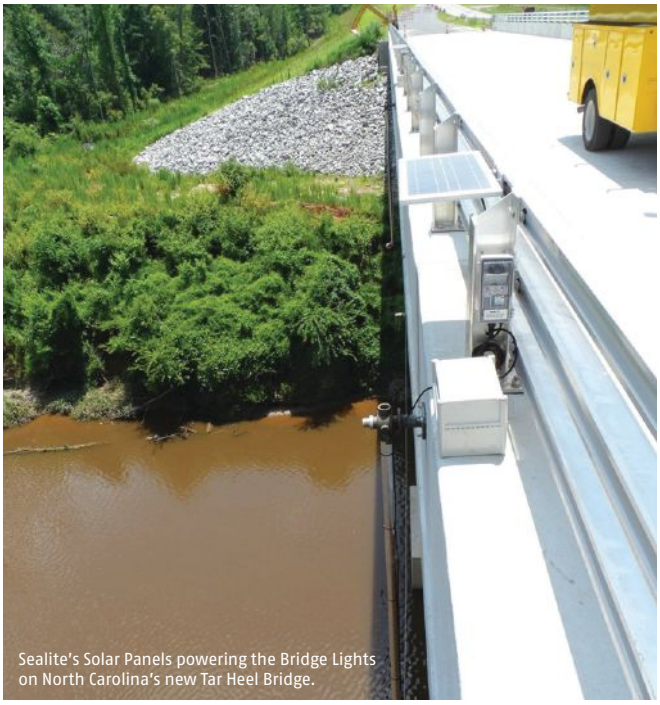
By Kim Weeks

NCDOT INSTALLS SEALITE'S SOLAR POWERED BRIDGE LIGHTS WITH GSM MONITORING ON BRIDGES IN REMOTE LOCATIONS

North Carolina, USA



Sealite's Bridge Lights shown on Tar Heel Bridge in NC.


Sealite's Solar Panels powering the Bridge Lights on North Carolina's new Tar Heel Bridge.

The North Carolina Department of Transportation (NCDOT) installed Sealite's SL-BR Bridge Lights, with Solar Power Supplies and GSM Monitoring and Control Systems, on two difficult-to-reach bridges in remote North Carolina locations. Both bridges span the Cape Fear River, the first bridge in Tar Heel, NC, and the second near Kelly, NC.

As the new Tar Heel Bridge was being built, NCDOT was looking for alternatives to problematic lighting on pre-existing bridges. The installation of hard-wired electrical conduit was labor and time intensive. Additionally, dispatching manpower to monitor light operation in the isolated bridge locations was time consuming and expensive. Another factor driving the decision towards a solar light was the state's vast topography and varying weather conditions associated with the isolated bridge locations, which would require that the lights be checked after severe weather incidents above and beyond the normal scheduled inspections.

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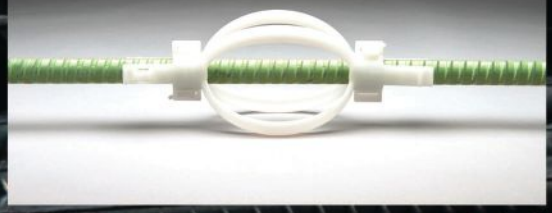

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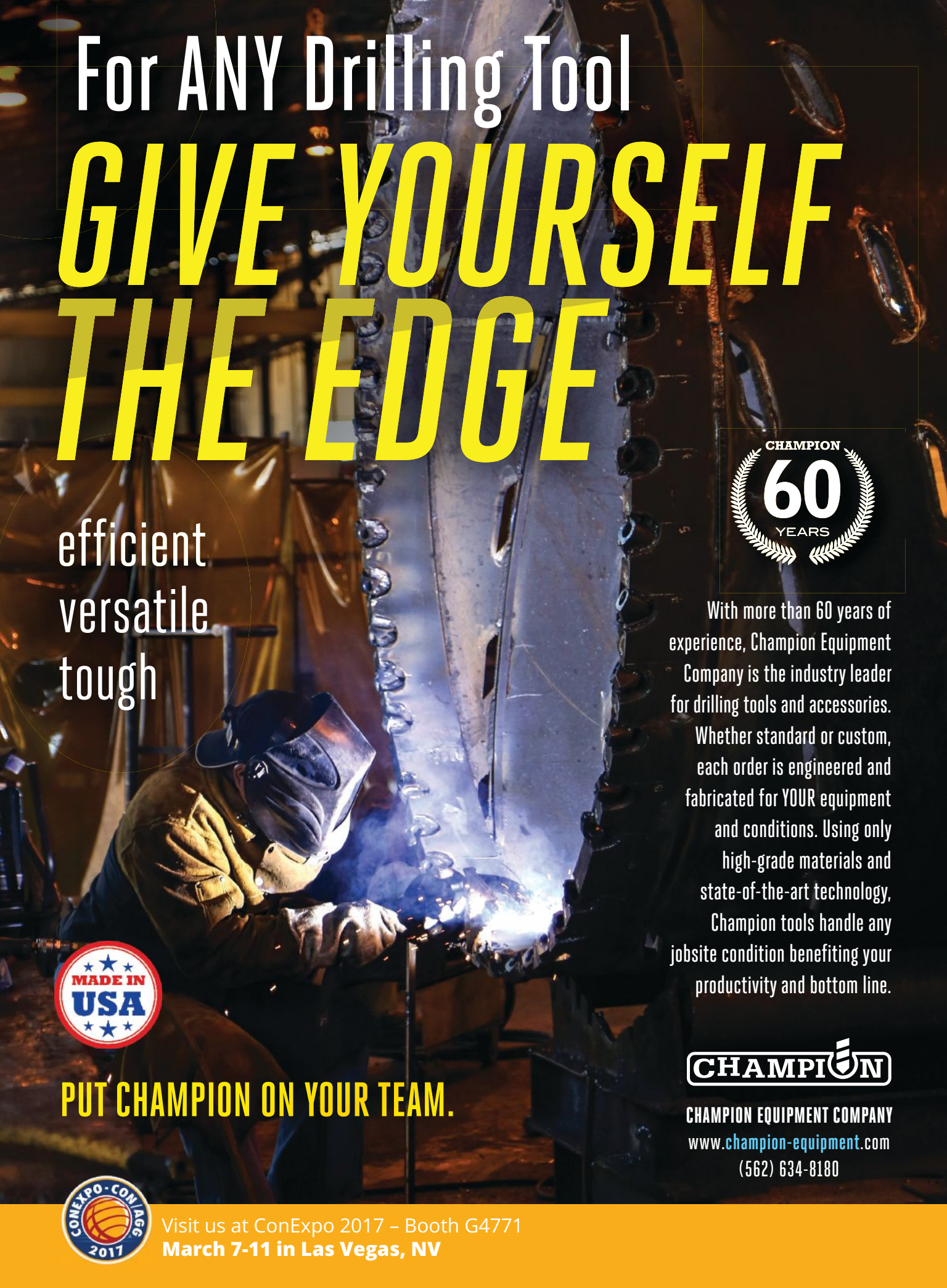
JOB STORY

GSM Monitoring of Sealite's Bridge Lights allows the NCDOT to remotely control all operating conditions from a cell phone or office computer, a savings in time and manpower. Additionally, the Solar Power Supply eases installation time and effort by eliminating the need for an electrical service, conduit or wiring. Both the GSM Monitoring System and the Solar Power Supply are expected to save the NCDOT money in labor and material costs. NCDOT will realize additional savings with Sealite's BR Bridge Light since unnecessary time and labor costs associated with checking the lights after severe weather incidents will be eliminated and recouped. ■

Sealite's Solar Panels shown on the Tar Heel Bridge in NC.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By Michael Cronenberger, P.E. and Derek Simpson, P.E.

HELICAL PILES SUPPORT NEW PAVILION IN FANEUIL HALL

Boston, MA

INTRODUCTION

The project was part of a revitalization of Boston's historic Faneuil Hall Marketplace, which is located near the City's original coastline area that was filled in the 17th and 18th centuries to increase waterfront real estate.

The revitalization project included replacing an existing 1970's structure with a new, one-story, retail glass pavilion adjacent to Quincy Market. Structural column loads ranged from about 30 to 60 kips.

PROJECT CHALLENGES

Primary project challenges included: 1) construction in a sensitive, historic tourist area; 2) limited construction access; and 3) difficult subsurface soil conditions that are common along Boston's reclaimed waterfront.

Subsurface soil conditions generally consisted of 9 to 14 feet of unsuitable urban fill (soil mixed with miscellaneous man-made debris) over up to 5 feet of soft organic silt, over thick natural marine deposits (clay, silt, sand), overlying glacial till. The upper portion of the marine layer was relatively stiff/dense and became softer with depth. Glacial till was approximately 60- to 70-feet-deep. Remnants of previous structures, such as buried timber wharfs, were present in the fill to further complicate the already challenging subsurface conditions. Groundwater was encountered at 13 to 14 feet below the ground surface.

GEOTECHNICAL DESIGN/BUILD SOLUTION

Excavation, disposal, and replacement of the unsuitable fill and organic layers was deemed impractical due to premium costs associated with off-site soil disposal, excavation dewatering, and importing large quantities of structural fill.

The project team explored several piling options in lieu of excavation/replacement, including driven timber piles, drilled micropiles, drilled shafts, ductile iron piles, and helical piles. Driven timber piles were economically viable but were eliminated from consideration due to access issues and noise/vibration concerns. Drilled micropiles and drilled shafts both offered

low-noise and low-vibration solutions, but were too expensive. Ductile iron piles and helical piles were both appealing options due to ease-of-access, low vibration, and relatively low cost. The team ultimately selected helical piles as the most suitable and cost-effective piling option.

Helical pile shafts are made of galvanized steel and are installed in short sections, each about 5- to 7-feet-long. Each pile consists of a lead helical section with welded screw-like bearing plates; subsequent straight-shaft sections are mechanically-fastened to the lead section as it is advanced into the ground. The piles are installed with a skid-steer or an excavator equipped with a high-power torque head, which is calibrated to directly correlate torque resistance with pile capacity.

The Pavilion's final structural design required 48 helical piles with an allowable compressive capacity of 30 kips each. The final pile design was performed by Helical and featured a galvanized 80 ksi steel pipe section manufactured by The Ideal Group. The piles consisted of a 27/8-inch-diameter, 0.276-inch-thick shaft with quadruple-helix (8-inch/10-inch/12-inch/14-inch) lead sections. The piles were designed to derive end-bearing capacity in the glacial till layer below the fill, organic silt, and marine layers.

THE PAVILION'S FINAL STRUCTURAL DESIGN REQUIRED 48 HELICAL PILES WITH AN ALLOWABLE COMPRESSIVE CAPACITY OF 30 KIPS EACH. THE FINAL PILE DESIGN WAS PERFORMED BY HELICAL AND FEATURED A GALVANIZED 80 KSI STEEL PIPE SECTION MANUFACTURED BY THE IDEAL GROUP.

PILE INSTALLATION

Prior to the installation of production piles, the General Contractor pre-excavated pile locations to remove potential obstructions, including timbers and granite blocks. Pre-excavation proved to be worthwhile as all 48 piles were successfully installed at their planned locations. Upon completion, all helical piles were cutoff to their specified elevation and the interior of the pipe shaft was filled with neat cement grout to provide additional corrosion protection.

QUALITY ASSURANCE AND CONTROL

Helical's crew included a full-time Quality Control person to oversee pile testing and installation. A full-scale compression load test was successfully performed on a test pile that was loaded to 200% of the design capacity. The test results showed deflection of less than ½-inch at design capacity and less than ½-inch of net deflection upon completion of the test.

HELICAL PILE ADVANTAGES

- More economical that other low noise/vibration piles such as drilled micropiles and drilled shafts.
- Eliminated the need to export/import large quantities of fill.
- Little to no noise.
- No vibrations.
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- No dewatering required.
- Use of small equipment.
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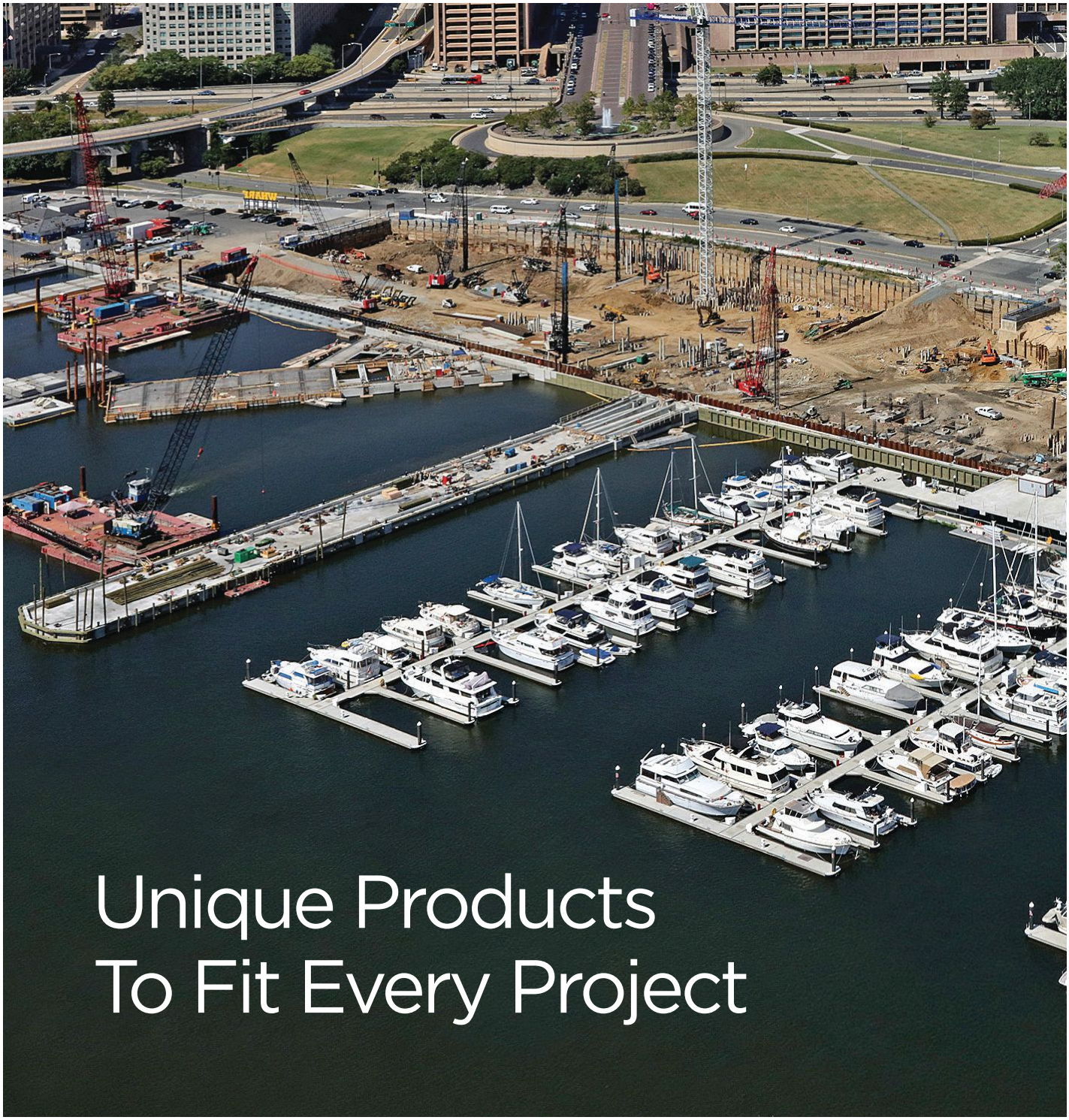
JOB STORY

Kiewit crew installing the ID milling machine in the pile.

By Luke Wittenbraker

PILE CUTTING SOLUTION NEGATES MUDDY SITUATION

Port of Anchorage, AK »



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With eyes fixed on modernization, the Port of Anchorage plans to upgrade its facilities in the coming years.

An initial step of this modernization program was the implementation of a Test Pile Program that involved the installation of ten (10) 48″ diameter steel pipe piles that were re-struck and cut near the mudline.

Construction and engineering firm Kiewit oversaw these operations, which allow for future analysis of pile design and marine permit conditions, and the collection of critical geotechnical data.

The project's location in the Knik Arm of the upper Cook Inlet provided the contractor with a number of challenges, increasing the difficulty of pile cutting operations.

Tidal swings of 25 feet to 35 feet coupled with currents varying from two to four knots meant a diverless cutting solution was required.

Rather than utilize an abrasive waterjet tool, Kiewit turned to Mactech Offshore, who provided a 33″– 60″ ID milling machine package to sever the driven piles.

Prior to onsite work, Mactech Offshore had a

Mactech Offshore ID milling machine being hoisted to the pile opening.

THE PROJECT'S LOCATION IN THE KNIK ARM OF THE UPPER COOK INLET PROVIDED THE CONTRACTOR WITH A NUMBER OF CHALLENGES, INCREASING THE DIFFICULTY OF PILE CUTTING OPERATIONS. TIDAL SWINGS OF 25 FEET TO 35 FEET COUPLED WITH CURRENTS VARYING FROM TWO TO FOUR KNOTS MEANT A DIVERLESS CUTTING SOLUTION WAS REQUIRED.

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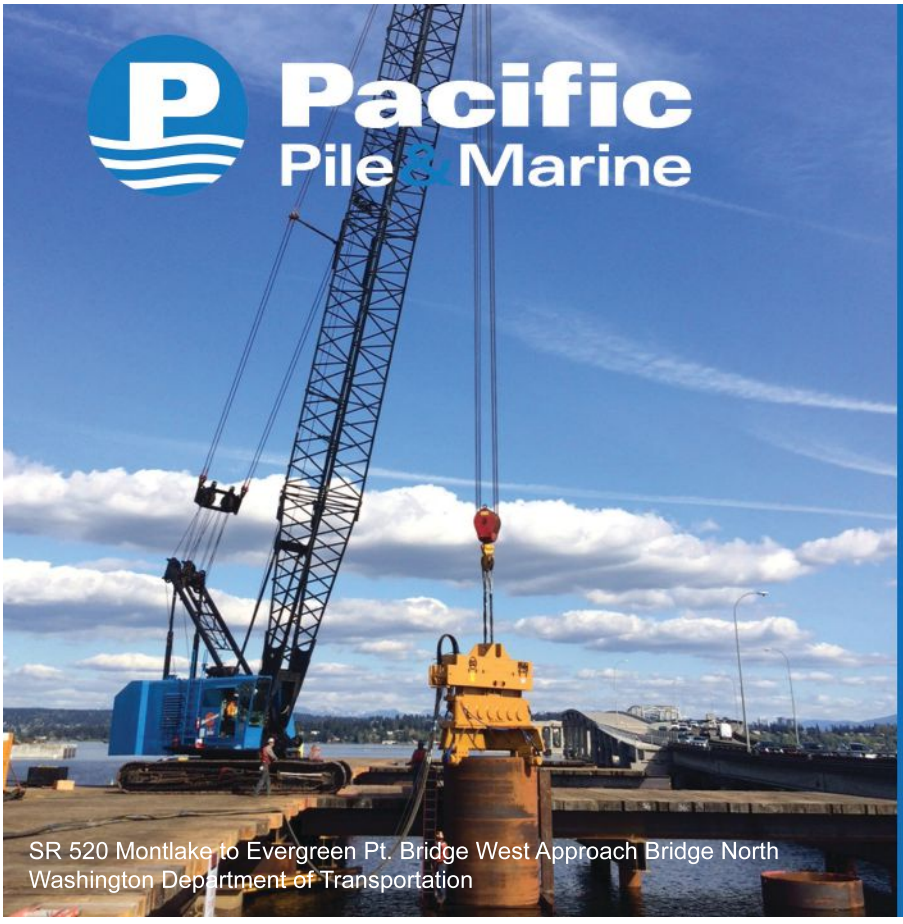

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pile sample created using Kiewit's specified material and made document proving cuts.

Once in Anchorage, the milling services provider made a total of eight cuts, with an onsite instructor training Kiewit's crew on cutter operations during the first two cuts. Following training, Kiewit made the final six cuts, which were completed within two feet of the mudline to avoid potential impacts to marine traffic.

Before cutting operations could commence, piles were installed within the existing dredge line at depths of 185 feet.

To handle the 205-foot-long, 103,000-pound piles, Kiewit used the D.B. General, the largest floating crane on the West Coast. The crew consisted of two operators (crane and deck engineers), three pile drivers and one pile driver foreman.

Throughout operations the crew adhered to strict regulations that could potentially delay pile installation. Due to the presence of beluga whales (listed as an endangered species).

Overall, out of the ten (10) piles installed, seven (7) of them were required to cut off within two-feet of mudline. All of which were done successfully. Three (3) of the piles were left as installed and will be implemented into the future modernization design. ■

End of pile cut with the ID milling machine.

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			Flange	Web	Pile	Wall			Moment Capacity (M_{max})		Both Sides of Single	Wall Surface
	in (mm)	in (mm)	in (mm)	in (mm)	lb/ft (kg/m)	lb/ft² (kg/m²)	In³/ft (cm³/m)	In4/ft (cm4/m)	kip-ft/ft (kN-m/m)	In²/ft (cm²/m)	ft²/ft (m²/m)	ft²/ft (m²/m)
ESZ 17	24.80 630	14.72 374	0.335 8.5	0.335 8.5	46.91 69.81	22.69 110.8	31.1 1670	229.2 31300	155.5 693	6.67 141.2	5.58 1.70	1.35 1.35
ESZ 18	24.80 630	14.76 375	0.375 9.5	0.375 9.5	51.07 76.00	24.72 120.7	33.6 1805	247.9 33850	168.0 747	7.26 153.7	5.58 1.70	1.35 1.35
ESZ 19	24.80 630	14.8 376	0.413 10.5	0.413 10.5	55.24 82.20	26.73 130.5	36.1 1940	266.6 36410	180.5 803	7.86 166.3	5.58 1.70	1.35 1.35
ESZ 20	24.80 630	14.82 377	0.433 11.0	0.433 11.0	57.32 85.40	27.75 135.6	37.3 2004	276.3 37734	186.5 830	8.16 172.8	5.58 1.70	1.35 1.35
ESZ 24-700	27.56 700	18.07 459	0.472 12.0	0.354 9.0	60.14 89.50	26.19 127.90	45.3 2435	409.1 55870	226.5 1008	7.7 162.9	6.30 1.93	1.37 1.37
ESZ 26-700	27.56 700	18.11 460	0.512 13.0	0.394 10.0	64.98 96.70	28.29 138.10	48.4 2600	438.0 59810	242.0 1076	8.32 176.0	6.30 1.93	1.37 1.37
ESZ 28-700	27.56 700	18.14 461	0.551 14.0	0.433 11.0	69.82 103.90	30.40 148.40	51.4 2765	466.8 63750	257.0 1144	8.93 189.1	6.30 1.93	1.37 1.37

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By Erik Pisor

HOW TO SURVIVE OSHA INSPECTIONS

The Proactive Approach

Hazardous conditions are a constant when conducting pile, caisson, excavation or marine construction operations. Because of this, OSHA and state plan agencies maintain a continual focus on contractors that perform these jobs, often enforcing health and safety compliance via onsite inspections.

For contractors that receive a scheduled (programmed) or unannounced (non-programmed) visit from an OSHA or agency inspection officer, survival of an inspection comes down to preparation and prevention.

Violations can often be avoided by adhering to a self-created OSHA checklist that stresses proactivity and training.

KNOW WHAT OSHA STANDARDS APPLY TO YOUR OPERATIONS AND EQUIPMENT

Hydraulic and diesel hammers, along with other dedicated pile drivers, fall under the OSHA crane standard. However, vibratory drivers are not covered under this standard because these drivers can also extract piles and are not considered "dedicated."

MAINTAIN ACCURATE RECORDS

During the review portion of an inspection the officer will request all OSHA 300 forms documenting injuries, illnesses, exposures, confined space permits, hazards, training, evacuation drills and self-conducted inspections. A $5,000 fine can be levied on a contractor for each unproduced record. Out-of-date or incorrectly posted forms can also garner fines.

DESIGNATE A SAFETY MANAGER

Select an employee that is capable of identifying existing and predictable hazards and designate the person as safety manager. In this role, the individual will inspect the site or facility daily and be authorized to take immediate corrective measures to eliminate any observed hazard. The safety manager should also accompany the inspection officer during the entire onsite visitation.

ESTABLISH AN INSPECTION TEAM

A group that includes the safety manager, upper management and any labor representation should be assembled prior to an inspection. The team should review OSHA compliance basics and conduct a mock inspection that takes into account multiple scenarios. The entire inspection team should meet with the inspection officer prior to a walk through.

TRAIN ALL EMPLOYEES

Because an inspection officer can privately interview any employee, your workers should receive OSHA standards-related training and be made aware that an inspection is a possibility. Keep a copy of the training materials, dates of training and who was trained as part of the documentation available for an onsite inspection.

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DEVELOP AN OSHA INSPECTION PLAN

When an inspection officer arrives, it is imperative that the person who greets visitors, such as front desk receptionist or security guard, knows to check the individual's credentials and immediately contact someone from the inspection team. Protocol should be in place to ensure all required documents are retrieved quickly and that the inspection team is assembled.

TRACK REGULATORY CHANGES AND OSHA GOALS

Rule changes related to reinforced concrete, confined spaces, fall protection systems and working surfaces are an annual occurrence, making compliance an ever-changing task. Of late, OSHA has expanded inspection criteria to include businesses with as few as 20 employees and increased focus on recordkeeping.

DEVELOP AN INTERNAL WHISTLE BLOWING PROGRAM

A number of unannounced OSHA inspections are in response to worker complaints. It's wise to proactively maintain a program where employees are encouraged to bring health and safety concerns to upper management. Stress to employees that the company is serious about code adherence, take immediate action if a violation occurs and communicate the correction.

COMMON INSPECTION MISTAKES

Even with an inspection plan in place and trained employees, mistakes can still be made that equate to unnecessary violations and fines. Be aware to avoid these common mistakes during an onsite inspection.

PROVIDING TOO MUCH INFORMATION

- A contractor is not required to provide copies of documents or allow use of their copying equipment.
- Avoid leaving documents in plain view.
- Listen to questions from the inspection officer before answering.
- Never admit fault or to having violated a standard.
- Remind employees and management that anything said to the inspection officer can be used in a decision against the company.

BEING ARGUMENTATIVE OR UNTRUTHFUL

- Always answer questions thoughtfully, basing your statements on facts and personal knowledge.
- Avoid debate with the inspection officer.
- Don't lie.

IGNORING SAFETY RULES

- During walk through, ensure that all employees and the inspection officer are following all safety rules.
- Don't allow an inspection officer to wander off alone.
- If a violation is pointed out that can be fixed immediately, do so.

OPERATIONS, EQUIPMENT

OSHA rules for pile, foundation and marine construction operations vary, as do the requirements for the equipment utilized.

CAISSON INSTALLATION

Rules focus on employee protection, stamping of outer shaft shells, staircases and landings, gauges at bulkheads, soil reports, erosion controls, and concrete strength verification.

PILE DRIVERS

Requirements concentrate on overhead protection, stop blocks, guards at

A NUMBER OF UNANNOUNCED OSHA INSPECTIONS ARE IN RESPONSE TO WORKER COMPLAINTS. IT'S WISE TO PROACTIVELY MAINTAIN A PROGRAM WHERE EMPLOYEES ARE ENCOURAGED TO BRING HEALTH AND SAFETY CONCERNS TO UPPER MANAGEMENT.

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W24 x 55# x 34'8"	99	188,765
W24 x 55# x 36'	37	73,260
W24 x 55# x 36'8"	7	14,119
W24 x 76# x 33'8"	89	227,751
W24 x 76# x 34'	18	46,512
W24 x 76# x 34'4"	43	112,187
W24 x 76# x 34'8"	63	166,005
W24 x 76# x 35'	31	82,460
W24 x 76# x 36'8"	7	19,509
W24 x 76# x 46'	4	13,984
W24 x 84# x 34'8"	28	81,536
W24 x 94# x 33'8"	42	132,930
W24 x 94# x 34'	48	153,408

DESCRIPTION	PCS	WEIGHT
W24 x 94# x 34'4"	26	83,902
W24 x 94# x 34'8"	33	107,546
W24 x 103# x 34'8"	19	67,849
W24 x 103# x 35'	4	14,420
W24 x 103# x 35'8"	26	95,524
W24 x 103# x 36'	4	14,832
W24 x 103# x 39'4"	6	24,306
W24 x 103# x 40'8"	3	12,564
W24 x 103# x 43'	7	31,003
W27 x 368# x 36'8"	11	148,423
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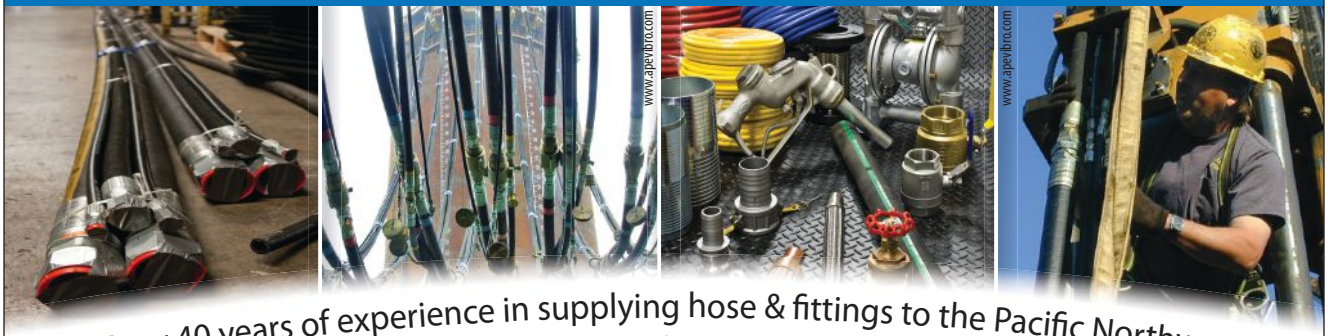

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EXCAVATION – TRENCHING

Rules put an emphasis on cave-ins, falls, falling loads, protective systems, hazardous atmospheres, trench inspection and operation of equipment near excavations.

CRANES

The recent collapse of two construction cranes in New York City likely has OSHA planning to increase its crane-related enforcement. Rules related to securing cranes in high wind conditions and pre-erection inspection should be reviewed by contractors and operators.

MARINE CONSTRUCTION

Requirements relate to drowning hazards, adequate guardrails, protective equipment, damp and slippery conditions, operating cranes on barges, maintaining rigging equipment, and diver safety, training and equipment.

OSHA RULES AND REGULATIONS ARE DESIGNED TO PREVENT AND REDUCE JOB-SITE INJURIES AND DEATH. OPERATIONS ASIDE, OBTAINING A VIOLATION-FREE OSHA INSPECTION REPORT IS BENEFICIAL TO ALL CONTRACTORS, AS BREACHES OF HEALTH AND SAFETY RULES HAVE INITIAL AND LONG-LASTING CONSEQUENCES.

CONCLUSION

OSHA rules and regulations are designed to prevent and reduce job-site injuries and death. Operations aside, obtaining a violation-free OSHA inspection report is beneficial to all contractors, as breaches of health and safety rules have initial and long-lasting consequences.

Post-inspection fines typically start at $7,000 and include jail time for serious abuses. A violation also damages a contractor's reputation, as OSHA frequently publicizes offenses via press releases.

Because of the short- and long-term impacts of OSHA violations, preparation and prevention on the part of contractors can't be stressed enough. ■

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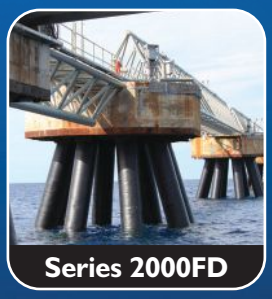

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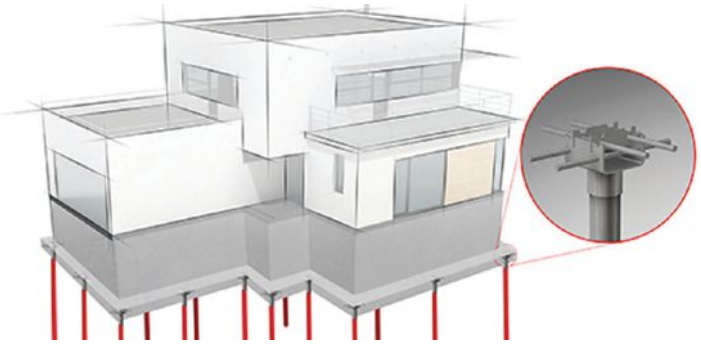

ABOUT

Owner and president of Pieux Dumontréal Inc., Mr. Paul Dumont's mission is to become a leader in the field of pile foundation stabilization.

His first objective was to help homeowners that had foundation problems due to settlement and poor soil. He created Alerte Fissure Inc., a company specialized in foundation repair and underpinning, which is in operation since 1998.

Determined to become a specialist in pile foundations, he has developed a pile driving system to meet the increasing demand of contractors looking for land on which to build.

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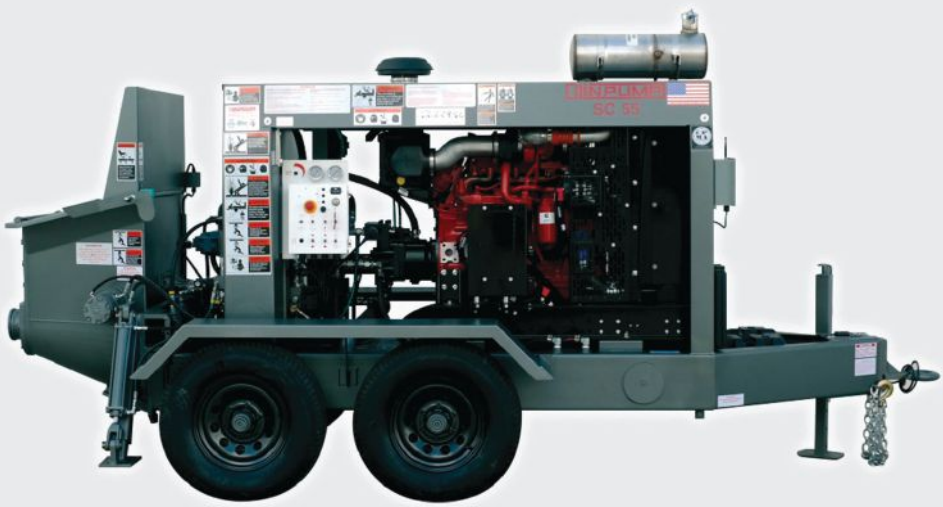

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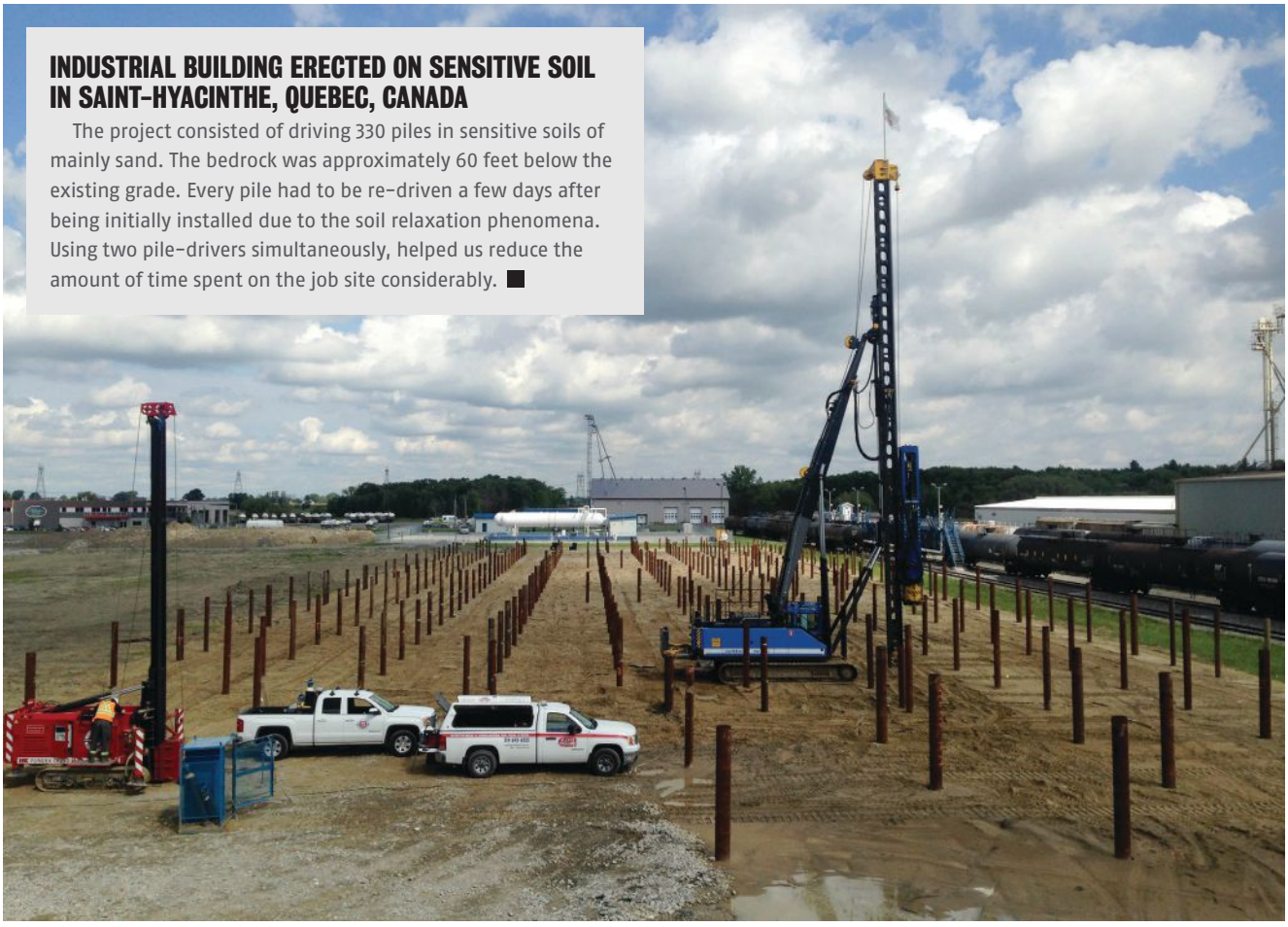

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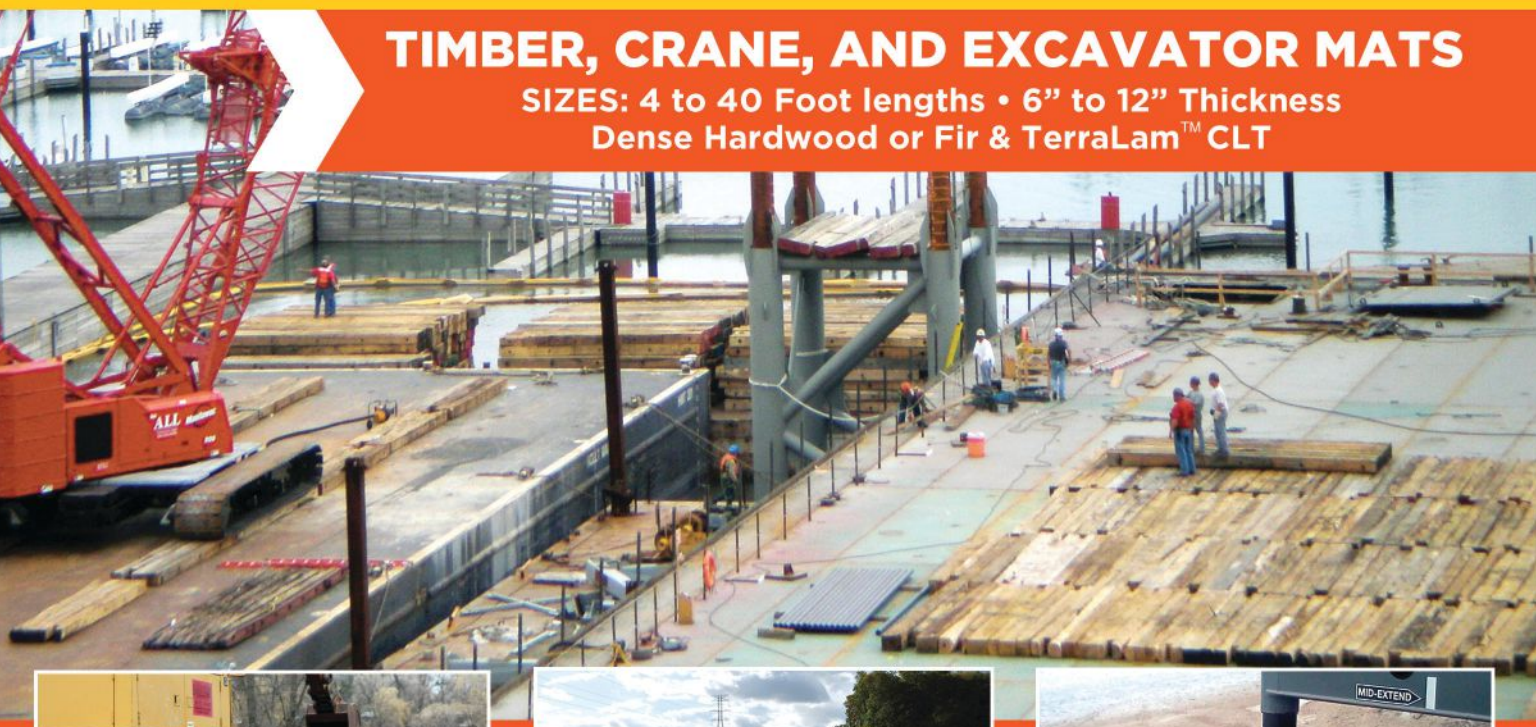

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The Deep Foundations Institute Women in Deep Foundations Committee is comprised of women and men who are advocates for retaining women in the deep foundations industry. The goal is to foster greater success and interest of professional women in the industry by promoting networking events, endorsing outreach and building mentoring relationships. Mission Statement: *"To enhance professional opportunities for women in the deep foundations industry."*

By Sarah Milstead

An Interview with Raffaella Granata from the Trevi Group

It was our pleasure to speak with Raffaella Granata from the Trevi Group who presented at DFI's NYC 2016 annual conference. Ms. Granata presented three case histories related to three different types of diaphragm walls, cutoff walls and shear-walls and three locations for them. The first project was Tuttle Creek Dam in Manhattan, Kansas. The second one was Lake Okeechobee Herbert Hoover Dam in Florida and the third was Bolivar Dam in Ohio.

Raffaella also presented a paper on grouting activity "performed through directional drilling" of bore holes under two landfills that contained waste material. The scope of work was creating an " impervious barrier" under and around the landfills, to avoid the dispersion of hazardous leachate. This work was done in Italy.

Raffaella works mainly from the office of TreviGroup in Milano, Italy. TreviGroup[1] has several branches worldwide including Treviicos in Boston. Ms. Granata extensively travels and works in many places around the world.

PB: How did you begin in the field of geotechnical engineering?

Raffaella Granata: When I was young, I studied geology specializing in geotechnical and geohydrology at Milano University. I met with Rodio S.p.A, a company specializing in deep foundation. Dr. Giovanni Rodio founded the "Ing Giovanni Rodio & C. S.p.A," Milan in 1921. Giovanni Rodio was very good friends with Karl von Terzaghi[2]; Rodio was the first to start geotechnical activity in Italy.

Raffaella first met Rodio S.p.A. in 1985.

I was very disappointed when I met the chief of human resources after sending my resume. He told me, "Okay we (Rodio) have decided to have you work with us mainly for three reasons. First, you have the maximum grade point average. Second, you live nearby so you can maximize your time and focus on your job. Third, you are a woman."

He told me, "Oh, I see you are very surprised!"

I was surprised because 30-some years ago, it was unusual to hire a women engineer, especially in Italy.

He said, "Yes! I have to tell you why: women do not look for a career."

I was surprised because you can imagine, especially at the beginning of my career and my working life, it was very difficult to enter this field which was mainly managed by men. I was like the black sheep in the middle of a thousand white sheep.

At the beginning, it was very hard to make my career and impose my presence. After I started and worked hard, they started to appreciate my work. I had the possibility to work and continue in this sector.

Over this past year (2016), I have worked almost everywhere in the world. I have worked in the United States, South America, North Africa, Europe, Asia and India... so many places.

At present, I am involved in a job in a very special place,

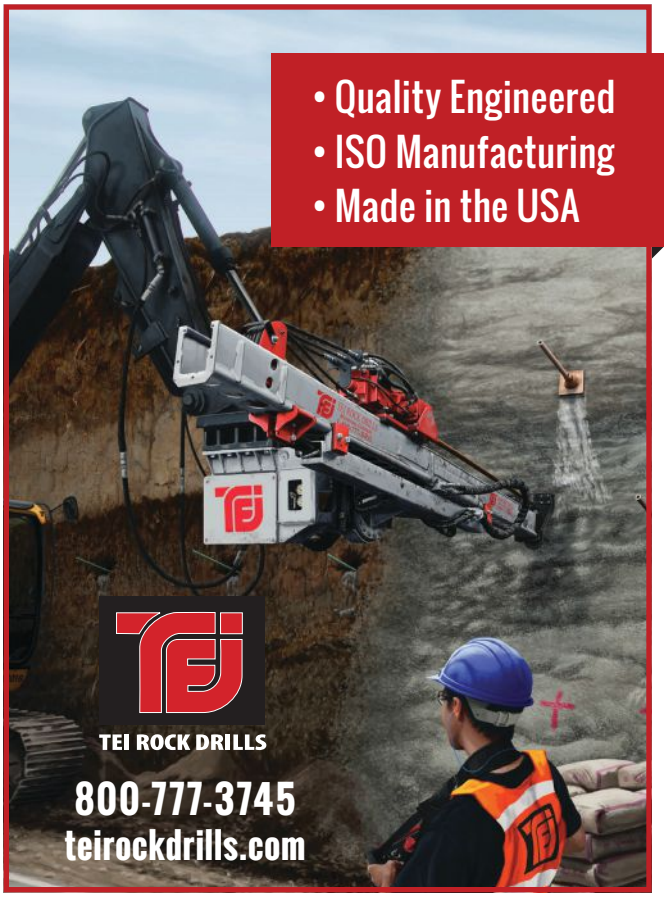
Iraq. Along with the USA team, I am the technical consultant responsible for the Mosul Dam.

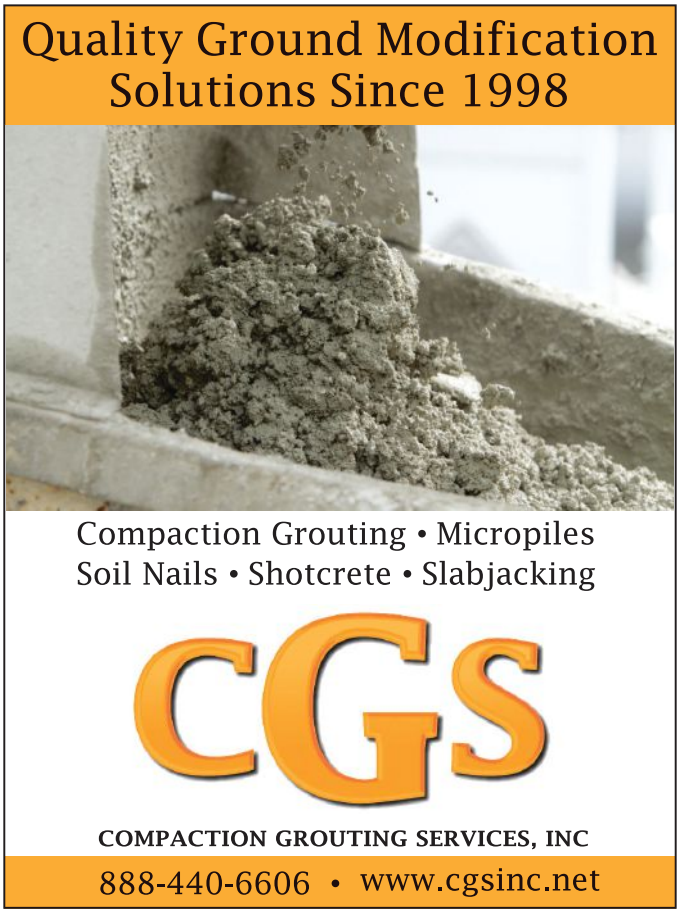
This dam has a very problematic feature in the foundation so we have to work to create a new grout curtain to stop the leakage and seepage problems under the dam, which in turn cause the dissolution of gypsum strata.

PB: What has it been like for you, as a woman engineer, going to such places as Saudi Arabia?
RG: Saudi Arabia is and has been the most difficult place. We have a company there and I have traveled there several times.

[1] In 1957, Davide Trevisani founded the company later known as Trevi in Cesena, Italy. The Trevi Group today has more than 40 branches in more than 80 countries. In 1997, to better support the entry into the North American market, Trevi acquired I.C.O.S. Boston, an historic company that was leader in the execution of special foundations works and that had already become known for having carried out the foundation works of the twin towers in New York. The American subsidiary became Treviicos and remains part of the Trevi Group. In 2005, Trevi acquired the business unit Ing. Giovanni Rodio S.p.A. that was founded in 1921. Rodio was the first historical Italian company specialized in the field of geotechnical engineering.

[2] Karl von Terzaghi is considered the Father of Soil Mechanics. Born in Prague, he is considered an American civil engineer who founded the branch of civil engineering science known as soil mechanics, the study of the properties of soil under stresses and under the action of flowing water. In 1925, he went to the United States as a member of the faculty of the Massachusetts Institute of Technology, Cambridge and then, after a stint as chair of soil mechanics at Vienna Technical University, returned to the United States and served as professor of civil engineering at Harvard University from 1946 until his retirement in 1956.





"At the beginning, it was very hard to make my career and impose my presence. After I started and worked hard, they started to appreciate my work. I had the possibility to work and continue in this sector. Over this past year (2016), I have worked almost everywhere in the world."

To go, I needed a visa. It took nearly three years to get my first visa. Every time I tried to obtain the visa, the passport was returned simply with the reason "denied." Denied, why? Because I was a woman.

I traveled alone. When I exited the aircraft, I had to completely cover myself with a long black dress and cover my head. Moving through the job site is difficult in this condition.

About 20 years ago, I worked one year in Egypt. In the beginning in the Arabic countries, there is always a certain type of perplexity from the engineers but after the beginning when we become more involved in talking about the job, they forget that I am a woman.

PB: You have quite a lifestyle of travel and experiencing other cultures. Is this something that you have enjoyed?

RG: Absolutely, yes! I am not tired even after so many years spent in this way. It has given me opportunities to meet different people and different cultures outside of my own country. Milano is my home. I travel for two weeks at a time on average to advise on a job. When I was younger, it could be up to a year.

PB: What are some of the projects you have found most fascinating?

RG: That is like asking a mother what child she favors the most. It is difficult. There was one dam project in the Himalayan Mountains of India. There were so many projects in the U.S. because they are beautiful as well as being very well organized, have good engineers, control is very well done to do a very good job with our advisor from Treviicos compared to some other countries.

PB: What is your expertise at these jobs?

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**Program subject to change.*

RG: I am a technical advisor. With my colleagues, we prepare the construction design to make the activities at the site possible. I am especially involved in the jobs such as grouting. So I am involved in the starting phase of the mixed design, the procedure for the implementation of these activities, and to train the people.

PB: Your career has spanned how many years so far?
RG: About 33 years so far.

PB: What are some of the advancements you have seen?
RG: Not so many to be honest. For instance, from the point of view of women, there are very few in our kind of job. Especially in Europe and Italy, we are very rare like 30 years ago. I have not met colleagues in East Europe or Asia.

About the field itself, the use of computerized systems is very helpful and has made our work easier because it helps in monitoring, controlling and recording all of our activities. This is probably the most important change.

PB: On a personal level, the travel alone is amazing. Do you have other interests you enjoy?
RG: Oh yes! I love to travel of course and sometimes I do it together with my husband as a tourist. His name is Maurizio Margutti; in Europe when we marry, we maintain our name as we were born. He works with the public administration responsible for the cultural heritage and so I follow him in his area.

We like theatre, music and museums. We live in Milano so we have very good opportunities to go to the La Scala Opera.

PB: Have you become involved in DFI's WIDF?
RG: I have not had much opportunity until now. There was a meeting in New Orleans in 2012. I would like to do work with this committee maybe exporting some of this activity to Europe. There is nothing similar in Europe. We have the European Federation of Foundation Contractors (EFFC) which works often and cooperates with the DFI. The EFFC has so few women that it may be harder to organize. We have worked together recently to put together a guideline and it was published by the two organizations.

PB: In conclusion, is there anything you would say to a young woman going into engineering or foundation work?
RG: Yes! I think we should be more numerous!

PB: Thank you Raffaella for taking the time to speak with us. It has been a great pleasure. ■

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By Gerald Verbeek

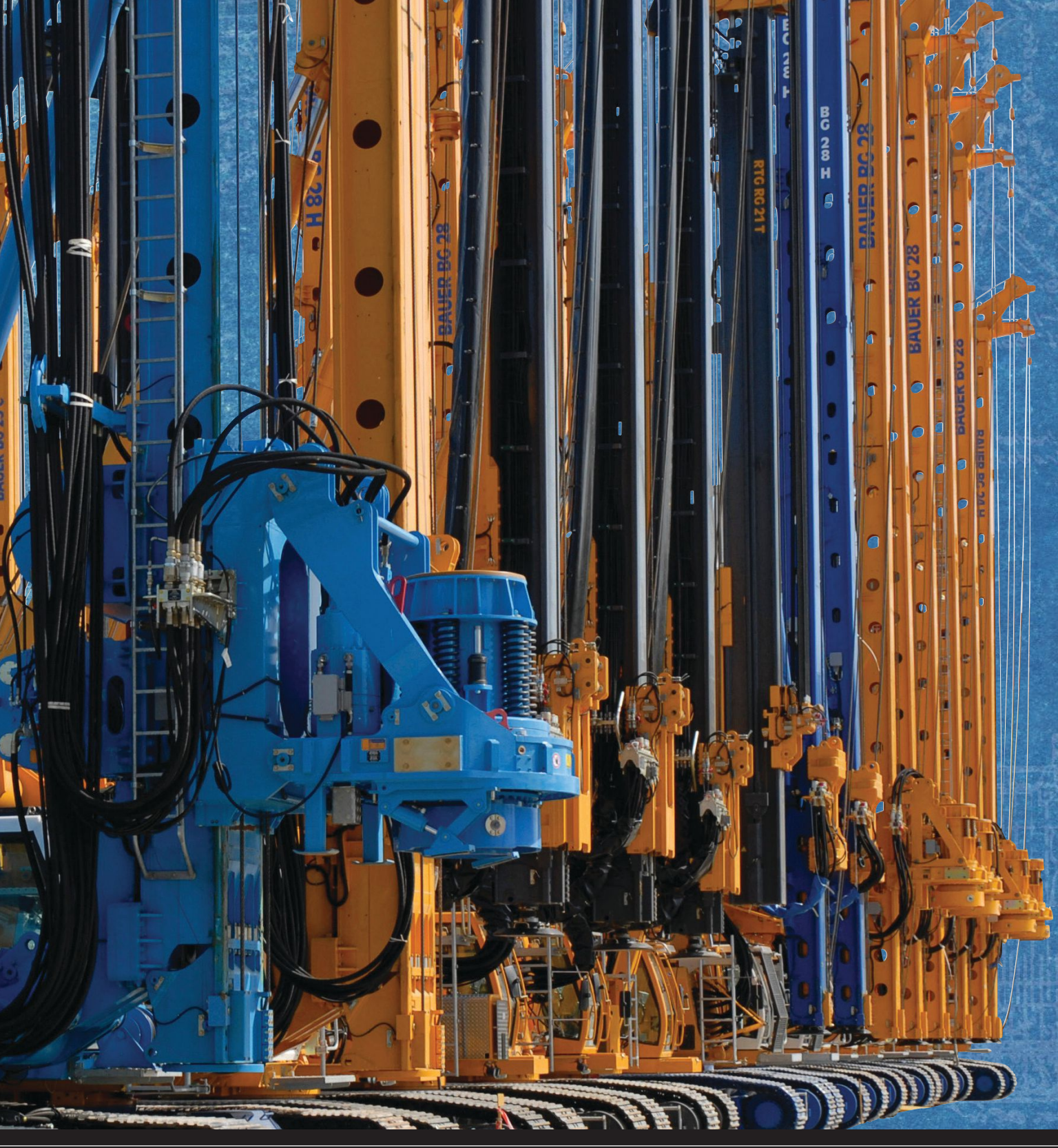
ITS MONEY

Increased Testing Saves Money

In the previous issue I wrote an article on sustainability which concluded that, when it comes to foundations, sustainability is really a win-win situation. Whether sustainability is achieved by reusing an existing foundation, using fly ash instead of cement in the concrete, or applying additional testing (which allows for an increased resistance factor and thus a smaller foundation), the carbon footprint is reduced — as is the overall cost of the foundation.

This last suggestion, applying additional testing, is the focus of this article, and for the title I used the name of a new initiative of the DFI Testing & Evaluation Committee. More often than not, testing is seen solely as a quality control activity, as a necessary step to demonstrate that the foundation has the capacity it is supposed to have — and when viewed from this angle, testing is just an additional cost item.

But when foundation testing is applied more strategically, it becomes much more than just a quality control activity, especially when the foundations are designed with use of the Load and Resistance Factor Design (LRFD) methodology. This is obvious when you examine a LRFD specification, such as the current edition of the AASHTO LRFD Bridge Design Specification. In this document, the various resistance factors for driven piles as a function of the condition/resistance determination method are included in *Table 10.5.5.2.3-1*, which is shown on page 62.



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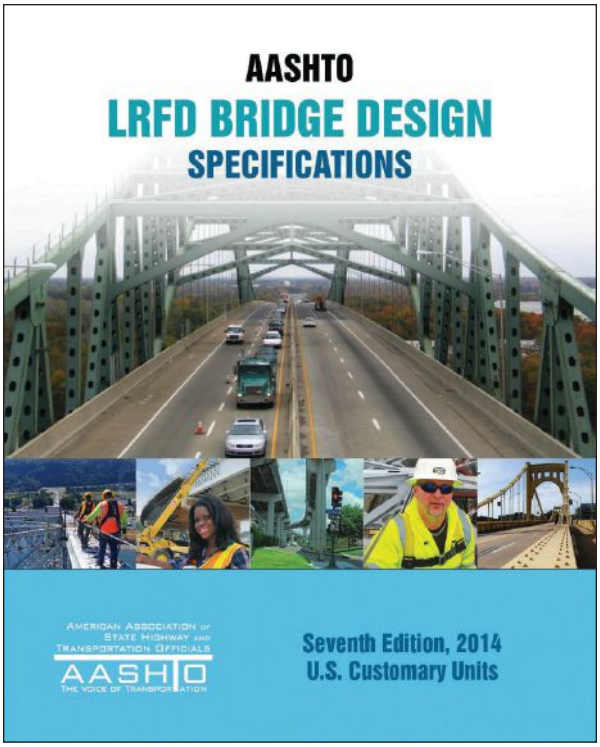
From this table, it is clear that as more testing is done the resistance factor goes up, which in turn means that either the size or the number of the piles driven for a particular foundation can be reduced, resulting in material cost savings and a reduction in installation time. And while the latter also reduces the cost, the schedule benefits may even be more valuable.

For this reason, I would like suggest a paradigm shift — a fundamental change in our approach to foundation testing. What if, instead of using as the starting point minimal testing (just enough to demonstrate that the pile foundation has adequate capacity), the starting point becomes the condition/resistance determination method that allows for the highest resistance factor, and then comparing that base case with alternatives with less extensive testing? The costs associated with testing will undoubtedly be lower for these alternatives, but the extra material and installation costs, as well as the additional time to install the foundation, may show very clearly that these alternatives are not the right way to proceed.

A typical example would be a project where 8 test piles are driven (24 inch square concrete piles with an average length of 107 ft.) that are monitored during pile driving and subsequently subjected to a dynamic load test. The information is used to establish the driving criteria, which allows the use of 0.65 as the phi factor (as per AASHTO *Table 10.5.5.2.3-1*). The results are then used to drive 76 production piles (24 inch square concrete piles with an average length of 92 ft.).



AASHTO LRFD Bridge Design Specifications

The associated costs can be summarized as follows:

- Test piles: $118,128
- Production piles: $559,360
- Testing & monitoring test piles: $24,980
- TOTAL: $702,468

An alternate approach (that reflects the paradigm shift) would be to apply 100% dynamic testing on all production piles, using the EDC technology, which would eliminate the need for test piles and allow the use of a phi factor of 0.75. The associated costs for 72 production piles (24 inch square concrete piles with an average length of 92 ft.) and the Embedded Data Collectors to monitor and test each pile are then as follows:

- Production piles: $529,920
- Testing & monitoring production piles with EDC: $114,585
- TOTAL: $666,105

With this alternate approach, 72 piles are installed instead of 84 — resulting in an approx. 5% savings cost — as well as a shorter installation schedule. And, to go back to the article on sustainability in the previous issue of *Pile Buck*, with this approach, 16% less concrete is used, demonstrating once again that a more sustainable design can also be more cost effective (in other words, this is a win-win approach).

Obviously, this is just one example, and it should be clear that this paradigm shift will not always result in a more economic solution, but as LRFD is getting applied more widely, this paradigm shift among engineers and owners is essential. Because an initial reaction may well be that more testing does not make sense, because more is not always better

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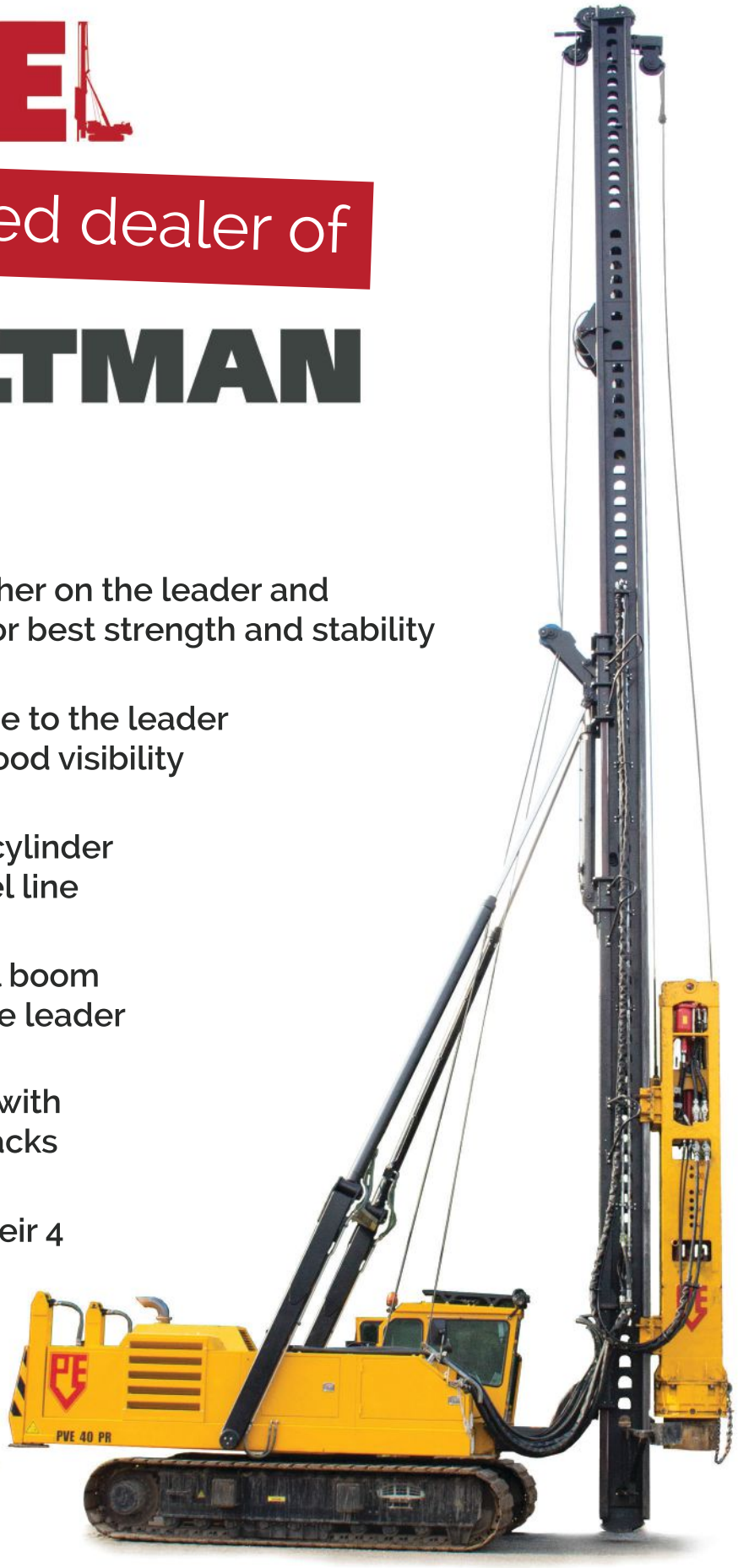

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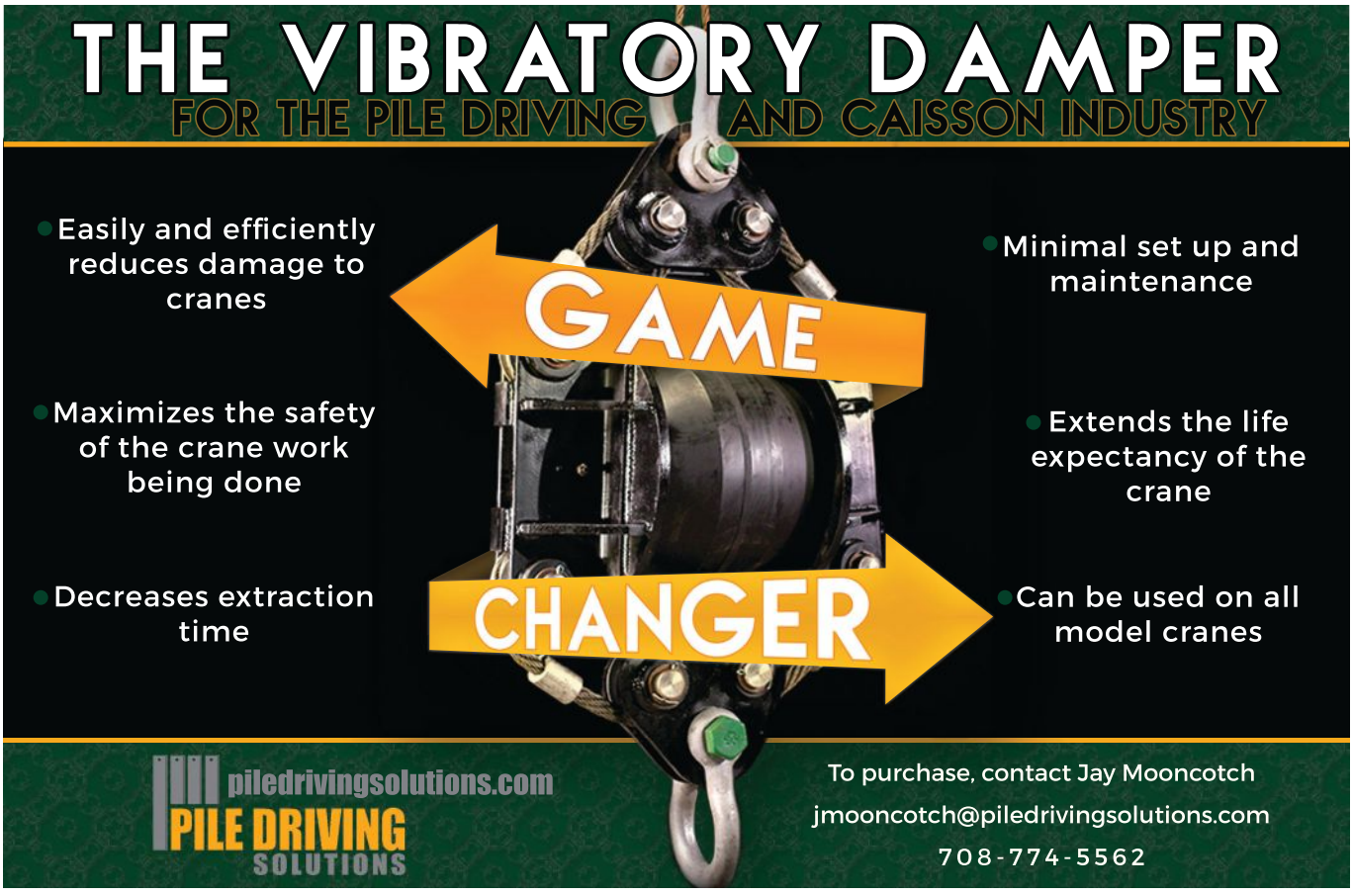
TABLE 10.5.5.2.3-1: RESISTANCE FACTORS FOR DRIVEN PILES

CONDITION/RESISTANCE DETERMINATION METHOD		RESISTANCE FACTOR
Nominal Bearing Resistance of Single Pile – Dynamic Analysis and Static Load Test Methods	Driving criteria established by successful static load test of at least one pile per site condition and dynamic testing* of at least two piles per site condition, but no less than 2% of the production piles	0.80
	Driving criteria established by successful static load test of at least one pile per site condition without dynamic testing	0.75
	Driving criteria established by dynamic testing* conducted on 100% of production piles	0.75
	Driving criteria established by dynamic testing,* quality control by dynamic testing* of at least two piles per site condition, but no less than 2% of the production piles	0.65
	Wave equation analysis, without pile dynamic measurements or load test but with field confirmation of hammer performance	0.50
	FHWA-modified Gates dynamic pile formula (End of Drive condition only)	0.40
	Engineering News (as defined in Article 10.7.3.8.5) dynamic pile formula (End of Drive condition only)	0.10

*Dynamic testing requires signal matching, and best estimates of nominal resistance are made from a restrike. Dynamic tests are calibrated to the static load test when available.

— sometimes it is just more. It is impossible to argue with such reasoning (and indeed, in the example above, the total testing cost increased substantially), but maybe we should not think about more testing. Maybe the answer is that more material or more piles is not always better — sometimes it is just more. And maybe we need to look back in time to see a clear parallel: it has always been common practice to use stronger materials to reduce the size and number of the piles for a particular foundation, and increased testing might just result in the same outcome, in which case increased testing simply saves money, as illustrated in the example. There is no guarantee that it will do so in every situation, but it should at least be considered. ■



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GRL: A HISTORY AND CELEBRATION OF 40 YEARS OF TESTING DEEP FOUNDATIONS

Pile Buck felt privileged to be invited to GRL's 40th anniversary celebration.

The GRL anniversary celebration was first class from start to finish. The entire event ran like clockwork and rivaled any put on by a top-tiered company.

The all-day event was meticulously planned and carried off with perfection.

The day started with a tour the GRL factory, which reflects their innovation, attention-to-detail and forward-thinking philosophy. Designed by architect Yolita Rausche, Frank Raucshe's wife, the repurposed factory is LEED certified[1] and allows ample light to lessen any dreary Cleveland day. Cleveland is a welcoming, warm city and GRL fits right into the hospitality it offers.

The day's conclusion began with classical pianist Dimitrios Sellountos, who opened the evening at the Cleveland Institute of Music, followed by nationally-acclaimed speakers and ending with an exquisite formal dinner at the Cleveland Botanical Gardens. The dinner finale was a custom-designed cake supported by pile foundations. The family of GRL inspires!

It is obvious that the innovative team at GRL is a close-knit family. This was shown by the ease with which every detail was graciously granted to their employees, clients and guests to make it an affair to remember.

Thank you for inviting us to this memorable occasion!

Pile Buck

[1] Leadership in Energy and Environmental Design (LEED)-certified buildings are resource efficient. They use less water, energy and reduce greenhouse gas emissions.

By Frank Rausche, Ph.D., P.E., D.GE

A BRIEF HISTORY OF GRL ENGINEERS: LOOKING BACK AND LOOKING FORWARD

GRL Engineers Celebrate 40 Years

Forty years ago, a new type of consulting firm was incorporated in Cleveland, Ohio. A company totally focused on providing the pile driving industry with dynamic testing and related services. Its mission was to support geotechnical firms, construction managers, pile driving contractors and owners with highly-specialized testing and monitoring services.

These services encompassed state-of-the-art technology originating from a late 1950s idea by Professor Harry Nara of Case Institute of Technology (now Case Western Reserve University). Nara's idea was that each hammer blow applied to the pile represents a quick loading test. Measuring force and velocity near the pile top, under the hammer impacts, and analyzing this dynamic data should then yield the static soil resistance and a reliable means of construction control and quality assurance.

In the mid-1960s, Professor George G. Goble became the principal investigator of a research project at Case which was based on Nara's idea and was titled "Dynamic Studies on the Bearing Capacity of Piles." The project was funded by the Ohio Department of Transportation and the Federal Highway Administration (FHWA). My [Rausche] 1970 Ph.D. dissertation developed and tested the basic sensors to measure force and motion, derived the Case Method equation for real time capacity calculations, and developed the CAPWAP® computer code for more-detailed soil resistance evaluations.

A field computer that analyzed sensor measurements was also developed at the time. The research clearly

Guest tour of GRL Offices (L to R): Steven Hall, PDCA, Bengt Fellenius, Dr. Tech, P.E.; Patrick Hannigan, P.E.; Mohamad Hussein, P.E., Clyde Baker Jr., P.E. S.E., and Dan Brown, Ph.D., P.E., D.GE

showed that the most successful computations involved the traveling wave concept, providing a true physical representation of what happens in a pile during the hammer impact.

In the early 1970s, Goble saw the potential benefit from the Case research to the driven pile industry and began to informally offer testing services for the private sector. In 1972, Goble founded Pile Dynamics, Inc. (PDI), a firm dedicated to building the necessary hardware to carry out dynamic load testing. This became known as the Pile Driving Analyzer® (PDA) system.

There were quite a few early champions who supported the implementation of this new breakthrough technology. Ray Grover, bridge foundation engineer with the Ohio Department of

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Transportation, often attended demonstration tests for other state transportation departments such as Minnesota, New York, Pennsylvania, Georgia, Idaho and Florida.

Ken LaFond of Twin City Testing took advantage of dynamic testing on his many foundation projects around Minnesota and the upper Midwest. News of this practical approach to construction monitoring and pile load testing spread offshore and to other countries.

Engineers at Chevron Oil Company specified dynamic testing on large-diameter, open-ended pipe piles for platform installations in the Gulf of Mexico. Ing. Carlos Molina, construction manager at the Las Truchas Steel Plan construction site on the west coast of Mexico, scheduled a series of dynamic load tests.

Chris Thompson of Trow Consulting Engineers Limited in Canada requested tests at various construction sites in Ontario.

On March 17, 1976, Gobel, with two of his former graduate students, Frank Rausche and Garland Likins, incorporated his consulting practice as Goble and Associates, Inc. (later Goble Rausche Likins and Associates, Inc., and then GRL Engineers, Inc.).

The interest in dynamic pile measurements and analyses was so great that Goble, Likins and I logged frequent flyer miles, most of them unrewarded, traveling from one end of the country to the other. It got a little easier when Wondem Teferra joined the company and later became the Philadelphia GRL office manager.

Shortly thereafter, Goble accepted the position of chairman of the civil engineering department at the University of Colorado and opened the first GRL branch office in that state. Rausche took over as GRL president and Likins

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directed PDI. Both were also active in the GRL day-to-day consulting work.

After joining the team in 1982, Mohamad Hussein, P.E. opened the Florida branch office.

Pile driving hammer manufacturers and their representatives were instrumental in the development of GRL. An intimate knowledge of the working principles of pile driving hammers is invaluable when analyzing measured data or predicting drivability. In the early 70s, a close cooperation with Al McKinnon of the Foundation Equipment Company (FEC) in Newcomerstown (Ohio) helped both GRL and FEC better comprehend and model diesel hammers.

Orto Kammerer of Pileco in Houston (TX) frequently asked GRL to test new diesel hammer models on their test stand.

In the mid-1970s, GRL was entrusted by the Federal Highway Administration to write a computer program based on the approach to model pile driving behavior developed in the

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1950s by E.A.L. Smith of Raymond International. The program would include a thermodynamic model for diesel hammers.

The FHWA felt that incorporating the monitoring experiences GRL had gathered on hundreds of driven piles would make the wave equation method more realistic. Indeed, the resulting code, which is now called GRLWEAP, has achieved worldwide acceptance and is used by engineers and contractors. Performing drivability analyses for its clients remains an important part of GRL's work.

Occasionally, a standard pile driving hammer was either not available, or the available pile driving hammer was not large enough to provide the necessary energy for full-capacity mobilization. Finding a suitable loading device within a short time period was often impossible.

To meet GRL's promise of providing immediate service when needed, the company built a fleet of nine modular drop hammers strategically located in Cleveland, Honolulu, Houston, Los Angeles and Tampa. With weights between one and 80 tons, these units can mobilize pile capacities as high as 8,000 tons under favorable conditions. Obviously, these hammers are not only suitable for testing driven piles, but can test any type of deep foundation.

Like other members of the deep foundation industry, GRL had to diversity and not only work with the PDA, but also with various other devices to test the integrity of both drilled and driven concrete piles.

One of the reasons for GRL's successful growth was the experience of its engineers and their dedication to providing quality work to their clients, regardless of how tough the schedule or the project requirements and conditions. Today, 35 engineers in 10 offices around the country, all fully equipped with testing equipment, are managed by Patrick Hannigan, P.E., GRL president, and Mohamad Hussein, P.E., board chairman and manager of the Florida office.

ONE OF THE REASONS FOR GRL'S SUCCESSFUL GROWTH WAS THE EXPERIENCE OF ITS ENGINEERS AND THEIR DEDICATION TO PROVIDING QUALITY WORK TO THEIR CLIENTS, REGARDLESS OF HOW TOUGH THE SCHEDULE OR THE PROJECT REQUIREMENTS AND CONDITIONS.

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Other long-time senior engineers include Michael Morgano, P.E., manager of the Ohio and Pennsylvania offices; Scott Webster, P.E., who oversees and participates in offshore monitoring jobs from his North Carolina office; Camilo Alvarez, P.E., located in California, frequently takes advantage of the SiteLink® technology, allowing him to monitor pile driving in South America, Central America and the Middle East while simultaneously working on local projects in California.

Similarly, Travis Coleman, P.E. and the other Illinois office engineers work onsite or remotely in nearby states and offshore. GRL has opened additional offices in Denver, New Orleans, Houston and Seattle to better serve clients in those regions.

It is that kind of flexibility that makes it possible to effectively be available on short notice practically anywhere in the U.S. or worldwide.

Today, many GRL engineers are dedicating much of their free time to professional services and activities. Likins expertly and reliably contributed to PDCA's technical committee during the development of AASHTO's LRFD code and most recently to their review of the IBC code, while also serving on ASTM committees and serving as an associate editor for both ASCE and ASTM geotechnical journals.

Hussein has been co-editor of several ASCE special geotechnical publications and teaches the ASCE deep foundations continuing education class.

Hannigan has completed the updating work for the FHWA manual, Design and Construction of Driven Pile Foundations, available for free at www.grlengineers.com. Most of the senior personnel, now including Brent Robinson Ph.D., P.E. and Ryan Allin, P.E., reach all around the world in workshops, seminars, webinars and training sessions, and prepare the participants for and sometimes help administer PDCA's Dynamic Measurement and Analysis Proficiency tests.

Goble retired from GRL in 2000, and Likins and Rausche are now slowly reducing their workload. They still help with internal training, lecturing, analysis and report review, and most importantly, client support.

A succession plan devised and executed by CFO Adrian Rausche has assured a seamless transition of duties and transfer of knowledge from senior to junior engineers. This assures that GRL's tradition of providing the best possible service and highest quality product to its clients continues to be fulfilled in the future as it has in the past. GRL started out as a company focused on providing dynamic pile testing services and now continues to be dedicated to serving the deep foundations industry with specialty testing and analyses services.

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Cleveland Institute of Music, Mixon Hall, welcomes GRL Engineers.

GRL ENGINEERS CELEBRATES 40 YEARS OF TESTING DEEP FOUNDATIONS

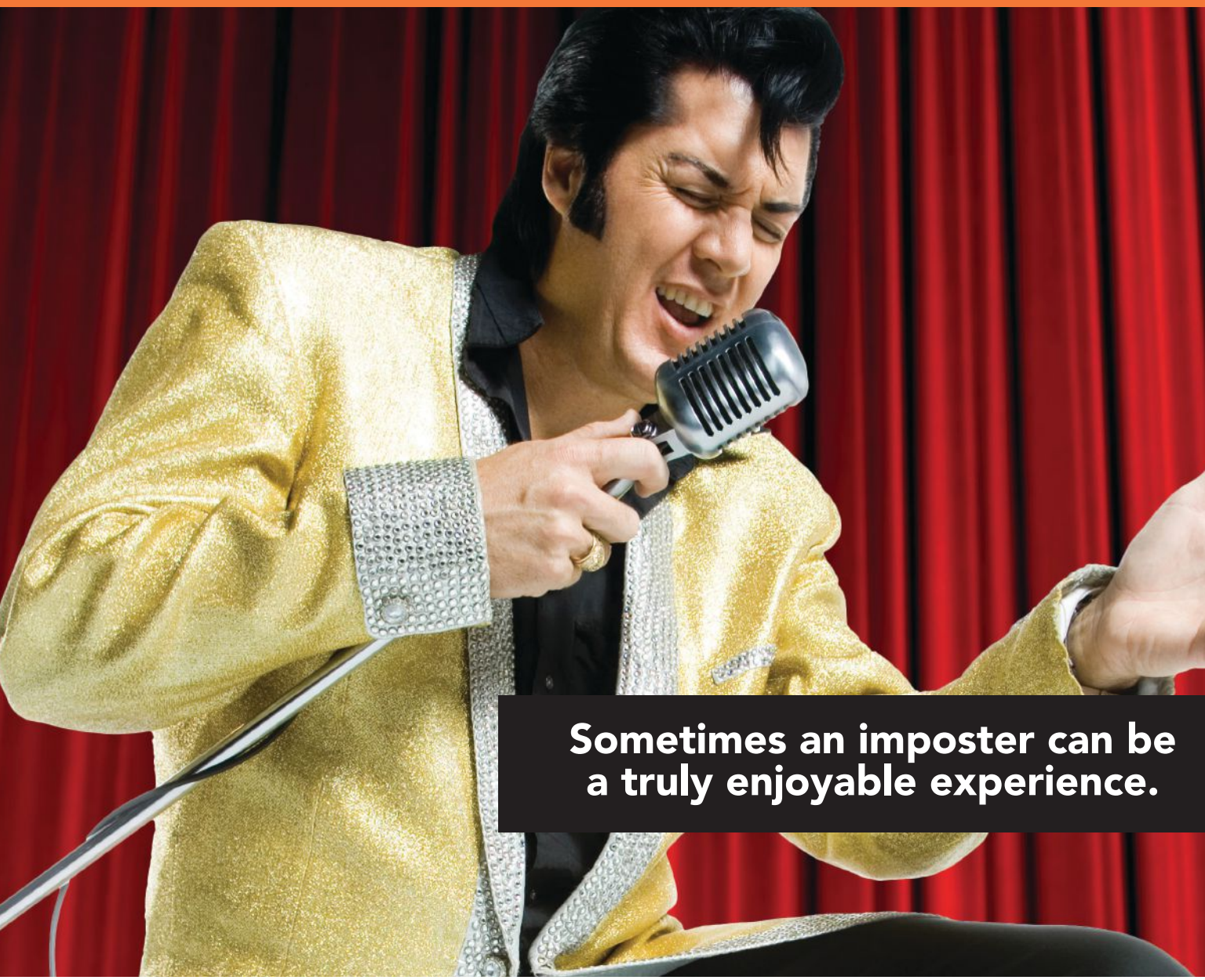
On Friday, September 30, 2016, over 100 GRL engineers guests and employees joined in to celebrate their 40th Anniversary in Cleveland, OH. The day began at the Cleveland Institute of Music's Mixon Hall, where attendees were greeted with a musical arrival by pianist Dimitrios Sellountos.

Mohamad Hussein, P.E., board chairman and GRL Florida manager, began with an introduction of the day's events.

Founding member, Dr. Frank Rausche, P.E., president emeritus of GRL Engineers, shared his journey over the past 40-plus years in the deep foundations industry. As a graduate student from Germany, Rausche was instrumental in launching the GRL dynamic testing services and developing of the Wave Equation and CAPWAP® signal matching software, which has become today's industry standard.

Following Dr. Rausche was Dr. Bengt H. Fellenius, "Dr. Tech," P. E., a former professor of civil engineering at the University of Ottawa and internationally recognized in the field of soil mechanics and deep foundation engineering. Dr. Fellenius provided an educational view with case studies, test results and soil statistics on the history of the driven pile and dynamic measurements, from stress waves to wave equation to CAPWAP® to the Pile Driving Analyzer®.

Two broad themes of the deep foundations industry trends were presented by Dr. Dan Brown, president and principal of Dan Brown & Associates, Inc. They were: Increasing Sophistication/ Complexity, and Risk Allocation Contract Delivery. Dr. Brown is recognized as one of America's leading authorities on the design and construction of deep foundations for transportation



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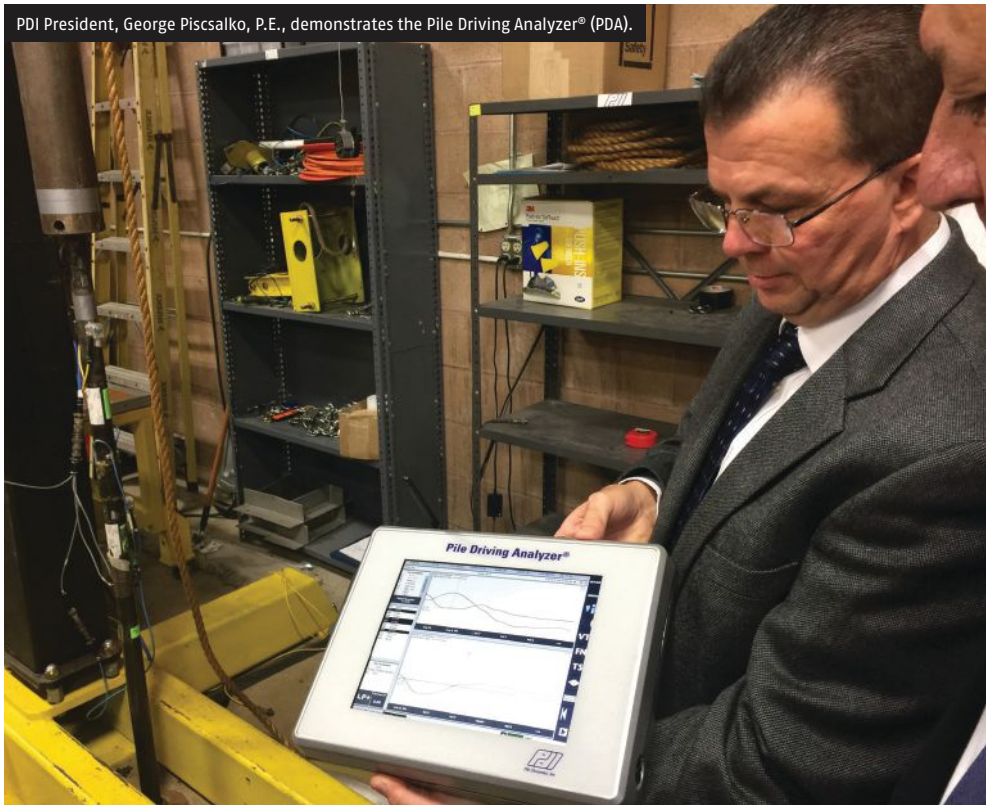
structures. He has published over 90 technical publications and research reports. Dr. Brown explained the foundation demands in continuous flight auger piles, drilled displacement piles, and bearing tests, through real-life project examples in Oregon, Connecticut, Mississippi, Minnesota and Kentucky. He also discussed the risks associated with foundation engineering associated with timelines, budgeting and performance.

One of GRL's longtime clients, Buck Darling, president and co-owner of Herbert F. Darling, Inc., a pile driving and shoring organization specializing in driven deep foundations, spoke of the many experiences he has had working with various GRL engineers on jobsites. He noted, "no matter the time of day, the weather condition or in what location, GRL could always be counted on."



PDI President, George Piscsalko, P.E., demonstrates the Pile Driving Analyzer® (PDA).

GRL's president, Patrick Hannigan, P.E., followed Mr. Darling's discussion by illustrating how far GRL has come in the past 40 years. He recognized past and current employees and explained how each position is an integral part of the organization. Mr. Hannigan also offered a look into the future of the industry, recognizing the challenges that lie ahead in the deep foundation testing market. "GRL is committed to continued innovation, quality, professionalism, and superior service, as well as active participation in industry committees and collaboration with peers,

> **"I am proud of the way we've built GRL Engineers over the last 40 years. Hard work, dedication and striving innovation got us here. It's also what will continue to fuel our growth in the years to come."**
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customers and academia," stated Hannigan.

Once the formal presentations concluded, the attendees went across the street to the beautiful Cleveland Botanical Gardens where cocktails and a formal dinner were served. The dining room was decorated with centerpieces resembling pile driving and fall colors. Both a land- and an offshore-piling foundation supported the commemorative cake adorned with GRL historical images.

Dr. Rausche noted, "I am proud of the way we've built GRL Engineers over the last 40 years. Hard work, dedication and striving innovation got us here. It's also what will continue to fuel our growth in the years to come." ■

Brent Robinson, Ph.D., P.E. and George Piscsalko, P.E. welcome guests by the GRL Engineers/Pile Dynamics, Inc, Wall of History Showcase.

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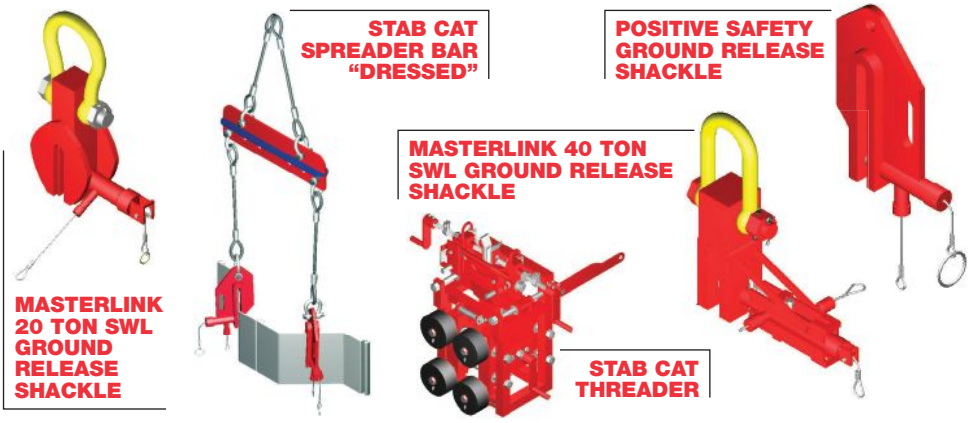

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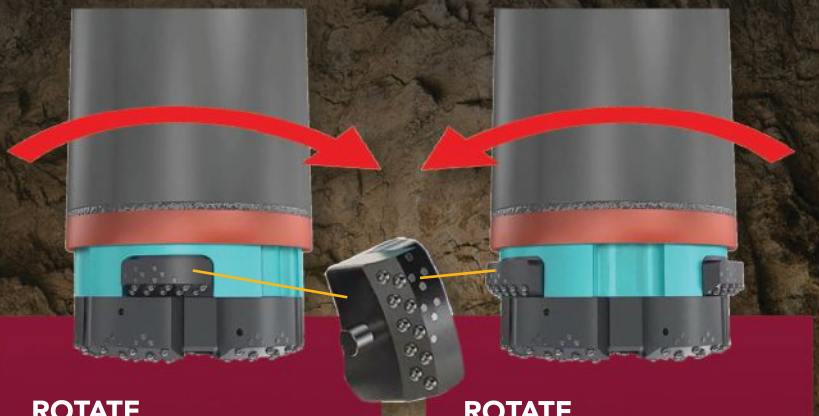

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By Erik Pisor

ARE PPPs THE FUTURE OF PUBLIC SECTOR DEVELOPMENT?

Public and Private Entities Team Up in Greater Frequency on Large-Scale Projects

Sizable infrastructure projects are neither rarely on time nor on budget. One combating solution by the public sector has been an increased usage of public-private partnerships (PPP, 3P or P3).

For contractors, a working knowledge of PPP should prove beneficial, as the frequency of this project structure is likely to spike with a potential $1 trillion infrastructure plan being discussed under a Trump administration.

In short, PPP typically involve a private entity financing, constructing and operating a public project in return for promised payments over the projected life of the project.

Payment can stem directly from the government in the form of tax credits or a project's operating profits, or, indirectly from users, often via a toll, within the contract period that commonly can exceed 25 years.

Proponents of PPP believe the structure is the best model for major public projects because it imposes discipline on all players involved, with delays and cost overruns affecting everyone. Yet, entering into this partnership can be cumbersome if not executed with attention and proper education, or, if responsibilities are unbalanced between parties.

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PROS AND CONS

Pro: The private sector can provide better public services through improved efficiencies.
Con: PPP can become more expensive than publicly-managed projects. A PPP project might rely on a more-pricier private financing source instead of public bonds utilized by state agencies.

Pro: Creating economic diversification can make the country more competitive in facilitating its infrastructure base which boosts associated construction, equipment, and support services.
Con: The private partner faces availability and liability risk if unable to provide the operational or management services promised.

Pro: Private parties have a vested interest in the quality and success of the project because they will operate it for a lengthy period of time.
Con: PPP can evolve into monopolies motivated by rent-seeking behavior.

SWELLING SUPPORT

A potential $1 trillion Trump infrastructure plan could utilize repatriated corporate profits currently held overseas to put billions in the Federal Highway Trust Fund, which could potentially create a new U.S. investment bank with a $750 billion infrastructure fund available to state and local governments.

Dubbed a self-financing strategy that would produce a sizable volume of projects at no net cost to the government, the plan would offer private investors tax credits equivalent to 82 percent of the equity they commit on infrastructure.

The plan would rely on a new, direct federal revenue stream created by construction companies and their employees paying business and wage taxes into multi-year projects. The increased tax revenue is looked at to make up for the tax credits

PROPONENTS OF PPP BELIEVE THE STRUCTURE IS THE BEST MODEL FOR MAJOR PUBLIC PROJECTS BECAUSE IT IMPOSES DISCIPLINE ON ALL PLAYERS INVOLVED, WITH DELAYS AND COST OVERRUNS AFFECTING EVERYONE. YET, ENTERING INTO THIS PARTNERSHIP CAN BE CUMBERSOME IF NOT EXECUTED WITH ATTENTION AND PROPER EDUCATION, OR, IF RESPONSIBILITIES ARE UNBALANCED BETWEEN PARTIES.

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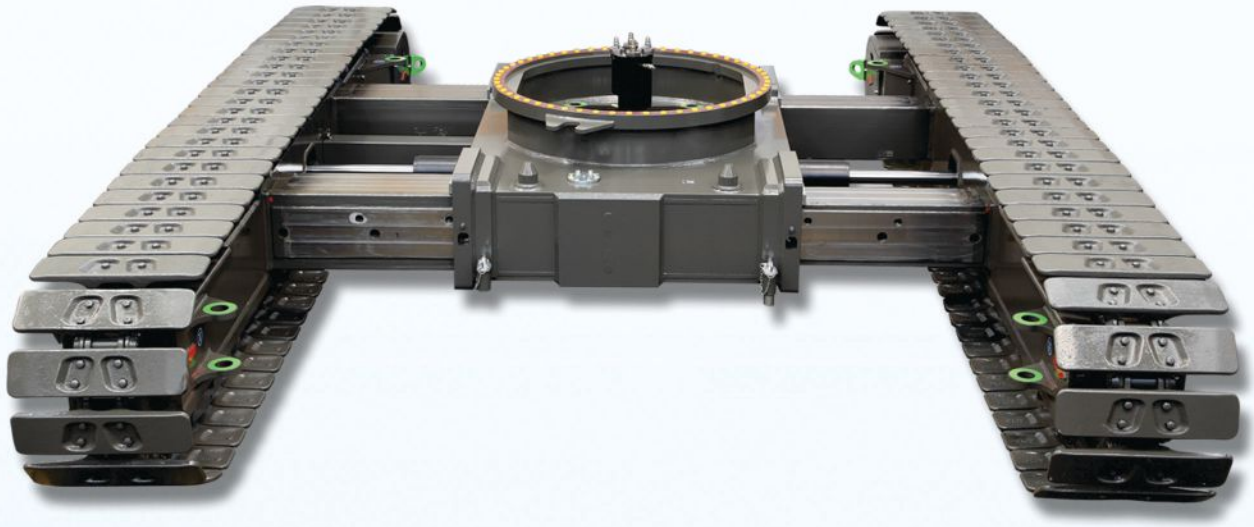

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given to the private investors and pay for the remaining costs.

Opponents say such an infrastructure plan would help individual large projects reach completion but will not represent a cure-all to the nation's infrastructure improvement need.

In addition to the proposed Trump plan, the U.S. Senate recently approved the Cross-Border Trade Enhancement Act of 2015, which encourages PPPs to improve border security and trade by making improvements at a land border port of entry subject to payment of a fee to reimburse the U.S. Custom Border Patrol for providing such services.

TRANSPORTATION INFRASTRUCTURE PROJECTS ARE ROUTINELY BUILT VIA PPPs, INCLUDING HIGHWAY, AIRPORTS, RAILROADS AND TUNNELS. PPPs ALSO ARE BEING USED FOR PUBLIC SERVICE PROJECTS.

FROM COAST-TO-COAST

Transportation infrastructure projects are routinely built via PPPs, including highway, airports, railroads and tunnels.

This summer, construction started in Queens, New York City on a $4 billion project that will scrap LaGuardia Airport's main terminal hub-and-spoke design, replacing it with two islands of gates connected to the main terminal building via pedestrian bridges.

LaGuardia Gateway Partners, a consortium of private companies including Skanska, will carry out the design and construction of the airport, operating and maintaining it through 2050. The private group is putting up $2.6 billion.

PPPs also are being used for public service projects involving school building, student dorms, prisons, entertainment and sports facilities.

At the University of California, Merced, the newest of the University California campuses, international developer Plenary Group has committed to a 39-year project that will cost more than $3.6 billion.

The Merced campus will double the university's footprint, with Plenary standing to earn $1.77 billion over the 39-year span for design, construction and operation of the new buildings.

The progress and performance of these and other ongoing PPPs will serve as examples for what should be a wave of future partnerships, as the nation plans to significantly improve its infrastructure in the coming decades. ■

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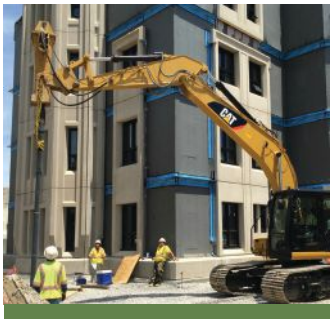

Virginia Tech
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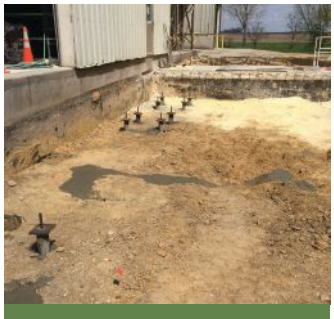

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Construction of Trump International Hotel and Tower in Chicago. Photo credit: Bryan Busovicki.

By Mark Rice, Esq.

THE TRUMP ADMINISTRATION AND REBUILDING U.S. INFRASTRUCTURE — OR IS IT TRUMPISTRUCTURE?

The last eight plus years of divided government and gridlock in Washington has meant, literally, gridlock.

Gridlock of cars on our roads, highways, bridges, airport reconstruction, and a bevy of other overdue public works. Not good. Not good for the tires on my car, and worse for American families, jobs, and good old-fashion American roll-up-the-shirt-sleeves buzz of activity.

President-elect Trump has promised investment in infrastructure.

"We are going to fix our inner cities and rebuild our highways, bridges, tunnels, airports, schools, hospitals," Trump said. "We're going to rebuild our infrastructure, which will become, by the way, second to none. And we will put millions of our people to work as we rebuild it."

We now have one party, so to speak, running Congress and the White House. Therefore, there is no reason to "say, no" anymore to roads, jobs bills and traditional, transportation and infrastructure appropriations.

Historically, along with American ingenuity and entrepreneurship, large infrastructure projects have made the economy tick. Contractors know this more than anyone.

In 1785, George Washington, a surveyor by trade, created the Potomac Company to build five skirting canals past waterfalls to commercially connect the Potomac and Ohio Rivers from the Great Lakes to the Atlantic to give America's inland goods access to world markets. If George could do it, then so can we.

Starting right now, the heavy construction industry is unusually poised to speak with one voice and help government re-learn from over-regulation and dried-up financing and funding, to get money back into the ground where it converts to economic growth, efficiency, and well- paying, secure jobs.

It used to be the case that no matter the party in power, and no matter the state of the economy, keeping the highly-qualified, high-end heavy construction workforce busy with big, public projects was common bread,

fully-supported by industry leaders, collective bargaining teams, politicians, and pork on the barrel.

Then, the 2008 the great recession hit. By then, emerging "identity politics" and scorched- earth media in all directions had replaced the get-along model exemplified by scenes of Ronald Reagan and Tip O'Neil singing songs together to cajole lesser souls to compromise and bring home bread for constituents.

Instead, gas taxes collected and earmarked for transportation works were shifted to other unmet needs such as schools and entitlements, themselves both bloated and flailing.

Once again, not good.

Decaying roads, highways, bridges, airports, major waterworks, and other infrastructure were left to sit on the sidelines while new politics sifted itself out.

It seemed so long ago, the era of the great highway systems built under President Eisenhower, or the dynamic public works such as the Hoover Dam and Tennessee Valley Authority (TVA) under the New Deal that inspired the nation out of the Great Depression.

The country was, and is, in need of new iterations and new inspirations, that go beyond the creative genius of I-phones and Pixar, cultural salve and 24-hour news.

The nation yearns for grit again and engineering feats.

It sorely looks to today's new Joseph Strauss's[1] and public-private partnerships to convince the nation's finance and bond markets to back reinvestment.

The new and iconic replacement of the eastern approach of the San Francisco-Oakland Bay Bridge fit that bill, though much of the work was outsourced and prefabbed in China, where questions about the seismic bolts still persist.

President-elect Trump is, to be sure, from a family with a history of building projects. He knows how to build. That know-how will come in handy.

The approach one hopes is to leverage private dollars, tax incentives for infrastructure investment, and private-public partnerships, as well as traditional Federal funding for qualified local and state infrastructure projects.

There is not going to be one-size-fits-all. Hopefully though, "yes" votes on transportation appropriations and tax incentive bills in Congress will aim at restoring not just infrastructure.

[1] Joseph Baermann Strauss (January 9, 1870 – May 16, 1938) was an American structural engineer who revolutionized the design of bascule bridges. He was the chief engineer of the Golden Gate Bridge, a suspension bridge.

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INLAND WATERWAYS	D–	TRANSIT	D
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A = Exceptional B = Good C = Mediocre D = Poor F = Failing

Information according to American Society of Civil Engineers (ASCE). http://www.infrastructurereportcard.org

Legislation can bullseye squarely at the message of the election — the deep commitment in America to infrastructure building, *as what we do. As who we are. And as what made us great and makes us great.*

So the specifics — the devilish details.

Here has been our national report card on infrastructure investment of late. Every four years, the American Society of Civil Engineers (ASCE)'s issues a national, industry-by-industry, state-by-state report card on infrastructure.

The last report was in 2013. The grade was a D+ overall — failing — with an unmet infrastructure replacement and refurbishing need of $3.6 trillion:

The 2013 Report Card grades show we have a significant backlog of overdue maintenance across our infrastructure systems, a pressing need for modernization, and an immense opportunity to create reliable, long-term funding, but they also show that we can improve the current condition of our nation's infrastructure — when investments are made and projects move forward, the grades rise.

The only B grade that year was in solid waste management. ASCE said it well in the report's comments:

We know that investing in infrastructure is essential to support healthy, vibrant communities. Infrastructure is also critical for long-term economic growth, increasing GDP, employment, household income, and exports. The reverse is also true – without prioritizing our nation's infrastructure needs, deteriorating conditions can become a drag on the economy.

While our politics have split along rural and urban lines, when it comes to infrastructure, the grade has been bad everywhere.

In 2013, California, New York, Texas and North Carolina all pulled in C's.

Michigan, a D. New Jersey and Arkansas, each a D+.

According to the World Economic Forum, the U.S. infrastructure now ranks 12th in the world, after Singapore and the United Arab Emirates. That hurts.

Another four years has passed since that report card. There has been no significant rebuilding or rebooting of America infrastructure.

As the website for the U.S. Chamber of Commerce points out, while we seem to agree that rebuilding U.S. infrastructure is key to economic growth, jobs and competitiveness, we have real trouble agreeing on how to pay for it.

If this last election sent any core

WHILE WE SEEM TO AGREE THAT REBUILDING U.S. INFRASTRUCTURE IS KEY TO ECONOMIC GROWTH, JOBS AND COMPETITIVENESS, WE HAVE REAL TROUBLE AGREEING ON HOW TO PAY FOR IT. IF THIS LAST ELECTION SENT ANY CORE MESSAGE, IT WAS ONCE AGAIN, "IT'S THE ECONOMY, STUPID."


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message, it was once again, "it's the economy, stupid."

Rural America has not received the bounty that the coasts have from globalization, and the ballot box was a scathing and sobering report card on those misaligned interests.

Those hurt the most showed up to vote. Aside from relentless political punditry, the message was, and now should be, about fixing decaying roads, bridges, hospitals, airports, and other important barn-raising projects that invariably make an economy hum.

We are on the cusp of 2017. *Trumpistructure* is around the corner. Posted on Trump's campaign website is a ten page white paper[2] on what this may look like.

Highlights:

- There is bipartisan support in Congress for a massive infrastructure bill. Its shape — that is where politics hopefully can be set aside ever so briefly for the good of the nation.
- The Wall Street Journal reported that construction industry stocks soared on hearing of the Trump electoral victory — even if the details were unclear.
- President-elect Trump has pledged a $1 Trillion infrastructure plan over the next ten years — albeit, that is but 30% of ASCE's 2013 unmet investment need amount of $3.6 Trillion.
- Cutting regulations both at state and federal levels that bog down the flow of funds to local agencies issuing bid solicitations, is at the heart of getting dollars to donuts. These include endless studies, and then endless lawsuits over the endless studies.
- There are tax incentives in $139 billion of Federal tax credits to those investing in transportation projects, intended to leverage Federal monies.
- Among the benchmarks of the Trump private-over-public approach in the white paper is a new emphasis on private money that will be different than traditional, government funding models: "The Trump infrastructure plan features a major private sector, revenue neutral option to help finance a significant share of the nation's infrastructure needs... This innovative financing option would serve as a critical supplement to existing financing programs, public-private partnerships, build America bonds, and other prudent funding opportunities."

By revenue neutral, *Trumpistructure* means not financed by deficient spending — e.g., *a non-Keynesian plan*[3]. While Public Private Partnerships (P3) have had success, it is usually around a long term ground lease model, such as toll roads, where the private partners

[2] https://www.donaldjtrump.com/policies/an-americas-infrastructure-first-plan/

[3] http://www.investopedia.com/terms/k/keynesianeconomics.asp

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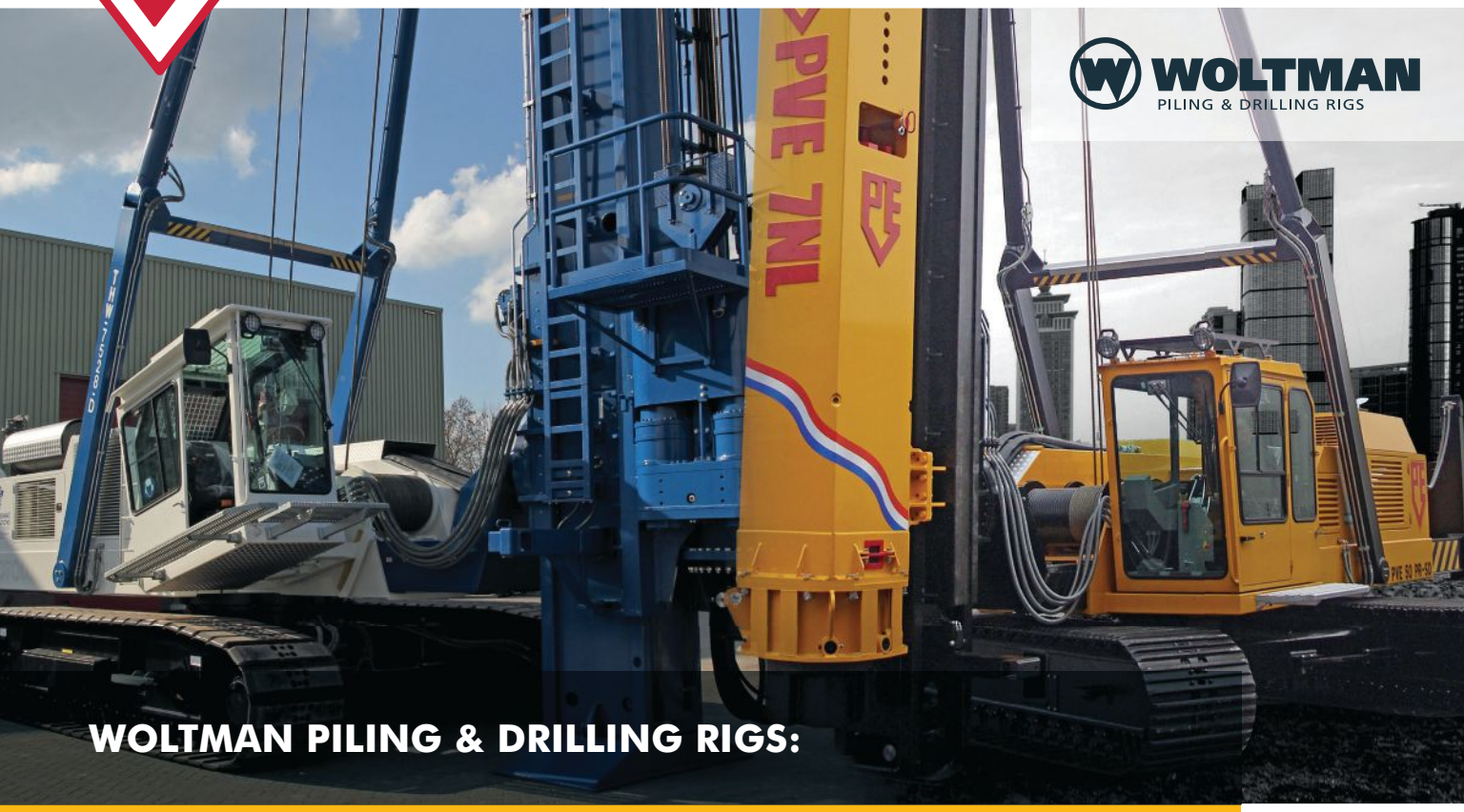

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secure long term paybacks with fair rates of built-in investment return. Naturally, facing such a plan, there are critics and skeptics on both sides of the aisle. Fiscal conservatives think that the plan will not be revenue neutral and will increase the national debt.

On the other side of the aisle, expect that the more Keynesian, Blue State, tax-and-spend types see the revenue neutral as unlikely, or a wink-and-a-nod, to the right's disdain for government spending projects as solutions.

In contrast, too little spending is an incentive to investors to back American infrastructure in earnest over other options such as investing in China, gold or high tech.

As we cannot forget, in an internet age of instant wire transfers, global dollars fly fast by automatized investment logarithms and are not very nationalistic.

Global dollars flow where the returns are seen as highest and have no borders. Adam Smith's Invisible Hand theory[4] reminds us that supply-and-demand means, if a large investor can make more money on global futures instead of American tax breaks for roads, the futures it is.

It has been reported that the Trump transition team is starting to talk about a private infrastructure bank — Bravo. The idea of an national infrastructure reinvestment bank to leverage Federal dollars and private investment for projects in energy, transportation and other public works has been around since at least 2007, though the model of the bills that have expired in three Congresses so far have been modeled after the FDIC, and with powers to issue investor bonds and borrow from world credit markets to issue loans to build.

One suspects that everything will be on the table as the finance and funding models are kicked around. Martin Marietta CEO Howard Nye spelled it out in an interview on CNBC[5] — any plan will need to be a blend of both private financing and public funding.

[4] http://www.ecocommerce101.com/invisible-hand-theory.htm

[5] Martin Marietta CEO Howard Nye spelled it out in an interview on CNBC.

Sounds like a fight in Congress unless cooler heads prevail — meaning construction industry stakeholders who know how to build, and need Congress and financial markets to get banking, bond markets and governmental bureaucracies and budgets to harmonize, if only briefly, so ground breaking projects can take shape.

Then, there is also project mix — how much for roads, for flood control against repeats of Katrina, for replacing old 60" water pipelines, for growth sectors such as clean and renewable energy, the impact of the internet-of-things, and even public or lower cost housing to curb the decreasing home ownership rates. A lot of hands out with tin cups.

As is the case with all policy pronouncements, detractors and blogs follow quickly.

Some call it a privatization scam, others in Congress suggest a wait-and-see approach while hot topics such as more health care reforms take center stage.

Some Trump advisors have suggested a one time, 10 percent tax on overseas U.S. corporate profits (e.g., Apple domiciled in Ireland), but, that too, has push back. The knives are being sharpened for this possibly epic and critical battle.

Apparently, no one in Congress has seen Kevin Costner's tour de force, "Field of Dreams" where the motto is, *"if you build it, they will come."*

In this case, if you rebuild American

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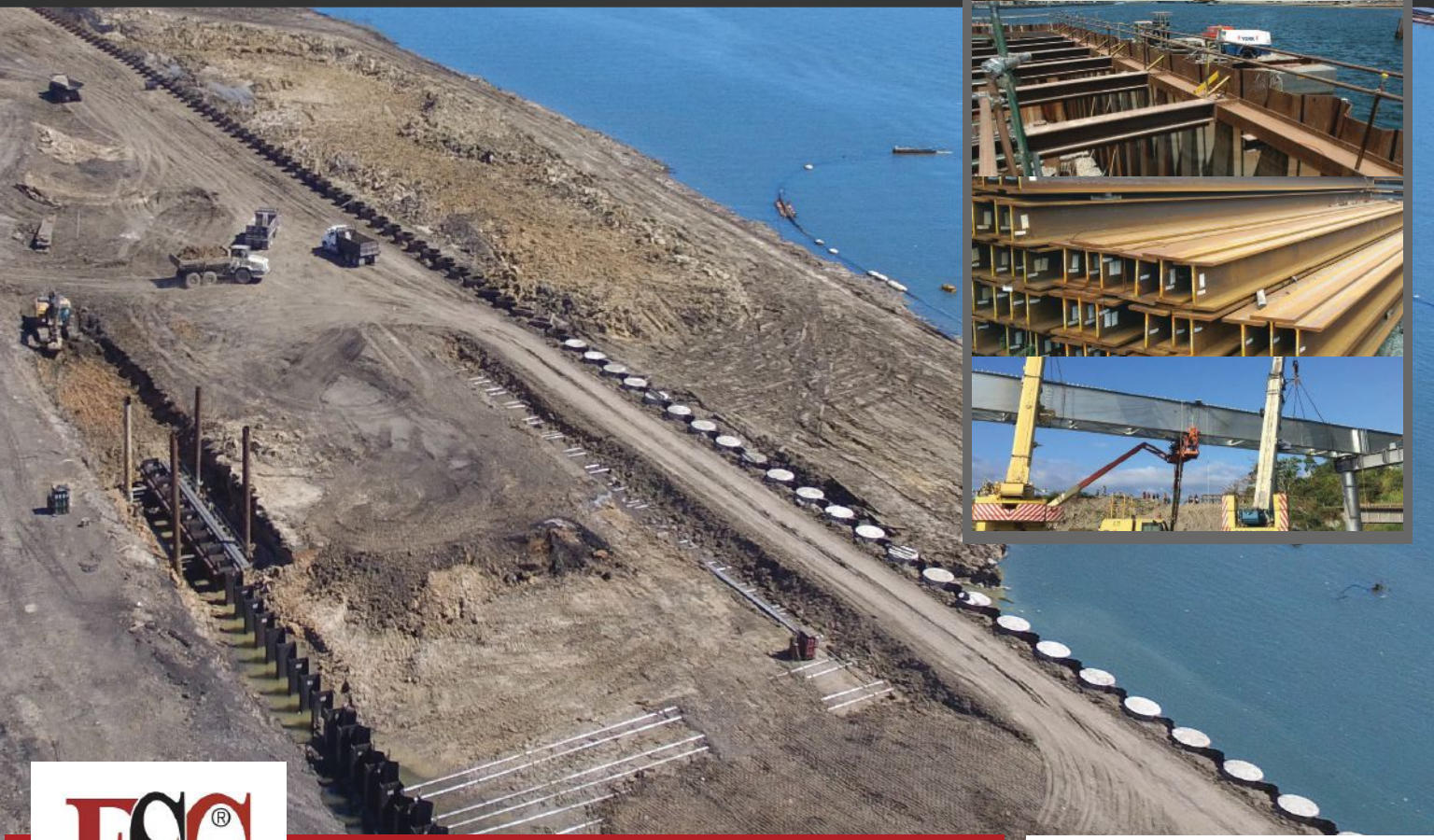

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infrastructure, they — greenbacks into the economy, into pocketbooks, recycled into the economy and producing well-paid jobs — will come.

But our already bloated national debt rivals the size of France's military-driven debt in 1789 after its own long years of supporting the Americans and fighting the British and Spanish, leading to internal revolt (sound familiar?).

I suspect, given this terrain, Congress, absent a very hard push, will continue to its tendency to plod — no-risk, and no-way.

Say it ain't so, but, if Washington is a swamp, then infrastructure has sat at its deepest bottom, badly neglected.

The heavy construction industry can follow the lead of the electorate. It can press this issue for the good of the country and those yearning to earn again. That energy is needed to push a plan, maybe any plan, to spend on infrastructure, rather than do more of the same — nothing.

CONGRESS, ABSENT A VERY HARD PUSH, WILL CONTINUE TO ITS TENDENCY TO PLOD – NO-RISK, AND NO-WAY. SAY IT AIN'T SO, BUT, IF WASHINGTON IS A SWAMP, THEN INFRASTRUCTURE HAS SAT AT ITS DEEPEST BOTTOM, BADLY NEGLECTED.

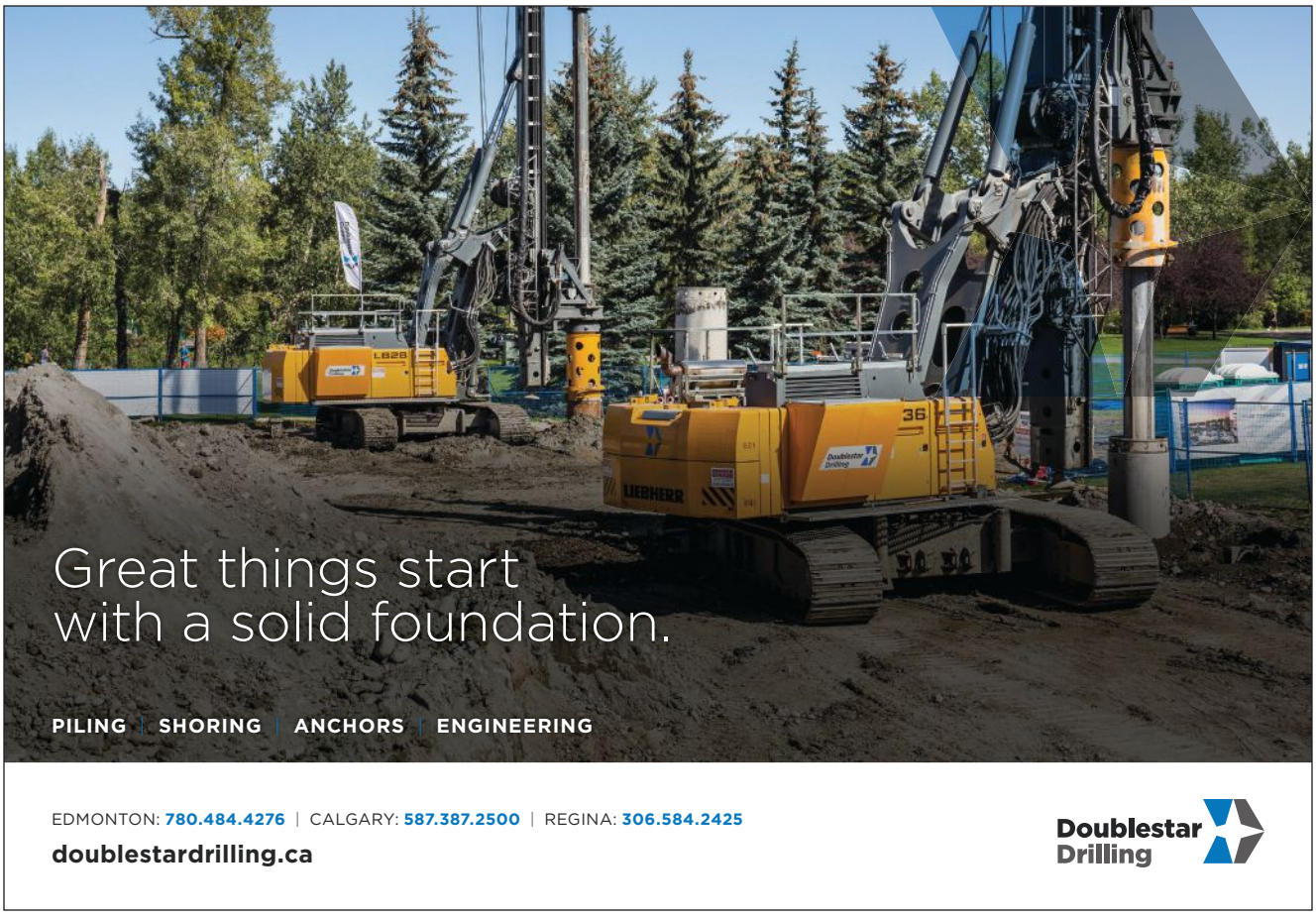
Let's not forget that George Washington, surveyor and horseman, was a rural technocrat. Above the fray, Washington watched as Madison, Jefferson and Hamilton fought bitterly as the new government took shape over what to do with the large debt the former colonies, now States, owed to finance the Revolutionary War (sound familiar?).

What was the solution — the Assumption Act, whereby the Federal government out the chute in 1790 honored and paid for that debt, instantly creating an A++ credit rating on world markets for the new country.

That led to the credit needed for the Louisiana Purchase and many large infrastructure projects. The tradeoff for that Assumption bill was the location of the new capitol in what is now Washington, DC, and the start of that first infrastructure project — the new Federal government buildings themselves.

Read and judge for yourself. And call your Congressman or Congresswomen to get r' done.

Putting America back-to-work is hard but key work. That means infrastructure. That is the guts of the economy, and let's choose not to be stupid — anymore. ■



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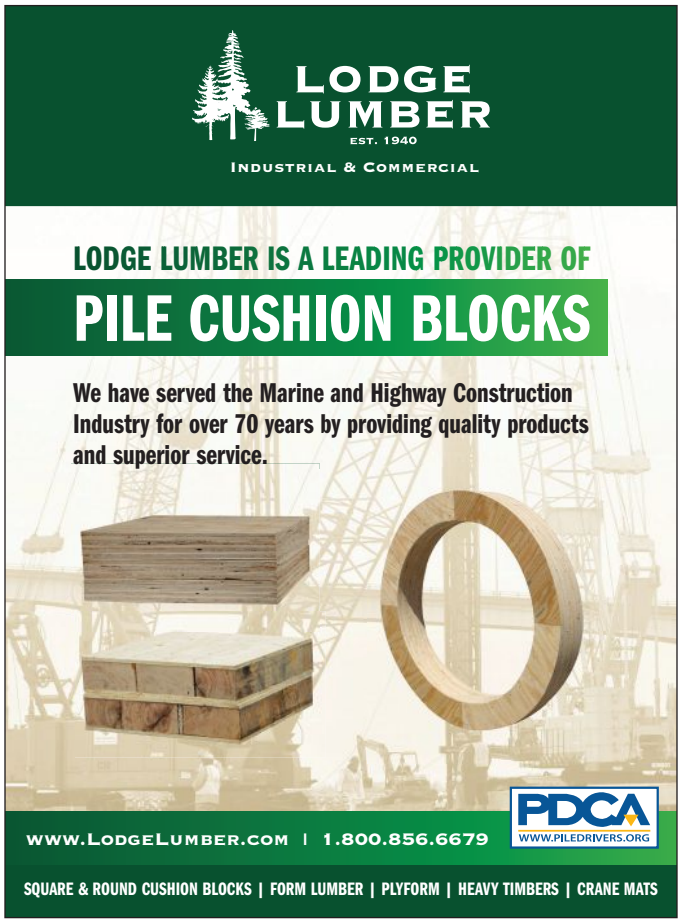

Seattle, WA — Global Diving & Salvage, Inc. has surpassed a major industry milestone; performing 10,000 successful dives on a single project at Olmsted Locks & Dam in Illinois. Tom Cameron, a long-time diver with Global, performed the 10,000th dive.

Wade Miller, Marine Construction Manager with AECOM for the Olmsted Dam Project, said, "The Global team has done an exceptional job. This accomplishment is such a strong statement regarding their professionalism and commitment to performing their work safely."

Global has been working at Olmsted since 2009 providing a variety of dive-related services. Olmsted is a significant, ongoing undertaking. The new locks and dam system will replace two outdated locks and dam systems on the Ohio River, greatly reducing tow and barge delays through one of the busiest US inland waterways. Thousands of man hours put in by the United States Army Corps of Engineers (USACE), AECOM, and Global constitute essential work toward the completion of this enterprise; one that will span a quarter of a century and provide efficient passage up and down the Ohio River.

"This is a monumental achievement for everyone involved," said John Graham, Director at Global. "This milestone demonstrates our diligence and commitment to safety in carrying out all of our operations; from a simple tug survey to a long-term project such as this."

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PILE DYNAMICS SUPPORTS RECOMMENDATIONS OF REVISED ASTM STANDARD FOR INTEGRITY TESTING

The American Society for Testing and Materials, ASTM, has revised the Standard Test Method for Low Strain Impact Integrity Testing of Deep Foundations, D5882. This Standard covers both the Pulse Echo and Transient Response Methods of evaluating integrity. Both methods are expedient procedures to investigate the potential existence of major cracks or voids in concrete foundations.

The D5882 Standard now encourages considering the soil profile, construction method, site records and results of tests on other foundations at the same site when evaluating data obtained by these methods. Depending on the type of deep foundation tested, it also suggests examining data from concrete placement automated monitoring, concrete cylinder or core strength tests, crosshole sonic logging (ASTM Standard D6760) and thermal integrity profiling (ASTM Standard D7949).

Pile Dynamics, Inc. (PDI) wholeheartedly supports the recommendations set forth in the revised standard. PDI manufactures and distributes the Pile Integrity Tester (PIT), often the instrument of choice for either pulse echo or transient response integrity testing. PIT is available in several models, with one or 2 channels of data acquisition. The transient response method requires the models with 2 channels. The technical specifications of all current PIT models comply with the requirements of the Apparatus section of the revised Standard.

PDI offers an extensive line of products for quality assurance for deep foundations, including systems for the complementary methods mentioned in D5882: automated monitoring of concrete placement in augered piles (Pile Installation Recorder), crosshole sonic logging (CHAMP) and thermal integrity profiling (Thermal Integrity Profiler).

The American Society for Testing and Materials has more than 12,000 published standards that are used throughout the world and may be obtained from http://www.astm.org/Standard/index.html.

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STATEMENT FROM SKANSKA USA:

With his stated positions on infrastructure, cutting corporate tax rates and using public-private partnerships and other funding mechanisms to build critical projects, a Trump administration is expected to be positive for the construction business.

President-Elect Trump has indicated he would like to see a large investment in US infrastructure. How he plans to finance those investments is still unclear, but we agree that our nation's roads, bridges and transportation networks need to be rebuilt.

Skanska has been a leader in utilizing the public-private partnership (P3) model to get critical infrastructure projects built — such as the Elizabeth River Tunnels in Virginia, the I-4 Ultimate in Central Florida and LaGuardia Airport in New York — and we'd like to see the use of P3s expanded to address the mobility needs of our country.

We are likewise encouraged by the success of local ballot initiatives to raise money for transportation projects, especially Measure M in Los Angeles, which will raise about $120 billion over four decades through a sales tax increase; Measure RR, a $3.5 billion Bay Area bond measure; and Sound Transit 3 in Seattle, which will raise $54 billion over 25 years.

Through cooperation and vision, the new administration and the incoming 115th Congress has the opportunity to chart a path toward growth and economic strength for all of us. ■

Richard Cavallaro, President & CEO, Skanska USA Inc.

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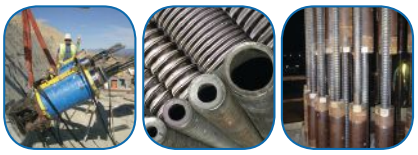
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Construction Equipment Exchange
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LINKBELT HC 108C CRANE
Used. 1973. WI. 50 Ton. 150 ft. Main Boom (Hi-lite tubular). 40 ft. Jib. One Owner. Newer Tires on Carrier. Detroit Motors. PLL both Drums-rear 2 speed. 45 Ton Block w/ ball. Single Stage Torque Converter. FOB: WI. **$22,500.**

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KOBELCO 200 SR LC
USED. 2001. ON. Equipped with thumb, quick attach and dual hydraulics with Only 6000 hours on machine the Undercarriage is 75% with a Isuzu motor, this Excavator is a consignment sale for a client who is motivated to sell asking $64,500.00 or best offer, machine is located at our client's yard please contact us to arrange viewing the machine. **$64,500.**

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2008 JUNTTAN PM20L
USED. 2008. CANADA. S/N: 1505. Cummins 6.7 liter engine. One owner. 4/5S Hammer. Isuzu 8KW generator that heats the engine, provides 120volt power and charges the batteries. 10,200 hours. Capable of installing a 60 foot pile. Major rebuild in 2015, with over $200,000 in paint and repairs. **$695,000.**

780-466-5237

BAUER BG20H
Used. 2008. PA. Bauer BG20H #1652 mounted on BT60 Base Machine. Hours: 4950. Kelly Bar BK20/368/3/27 – Maximum Drilling Depth – 88'. Engine – Cat 3126 B, 280 HP, 2100 RPM. Undercarriage UW75. KDK 203S First Gear 149,000 ft. lbs. **$425,000.**

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Marine Bulkheading Inc.
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2003 IMT AF80 DRILL RIG W TOOLING, CAT ENGINE
USED. 2003. NY. With tooling (5) rock and dirt augers (4) core barrels and (2) Kelly bar drive adapters. Max drilling torque 60000 ft lbs. Rotary Head, CAT engine 3046T. 114 HP, CAT Lower. 2747 Hours. Serial # NXL1075. **$212,000.**

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» **2013 KLEMM 806-3D**
USED. 2013. TX. S/N: 66310. Double Rotary Head: KH20 / KH9. Water Pump. Clamp & Break Type H 10" (254mm). Diesel Engine: Deutz TCD 2012 L06 2V. 147 kw @ 2300 rpm. Tier III. Oscillating Tracks. 16.5t. **CONTACT.**

» **2006 KLEMM KR 806-2**
USED. 2006. TX. S/N: 64020. Double Rotary Heads: KH16 / KH9. Water Pump. Clamp & Break Type H 10" (254mm). Diesel Engine: CAT 3056 EATACC. 129 kw @ 2300 rpm. Tier II. Winch. Oscillating Tracks. 15.5t. **CONTACT.**

» **2012 KLEMM KR 702-2**
USED. 2006. TX. S/N: 19152. Rotary Head: KH20. Telescopic Mast. Clamp & Break Type EF 14" (356mm). Diesel Engine: Deutz TCD 2012 L04 2V. 95 kw @ 2300 rpm. Tier III. 5.2t. **CONTACT.**

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» **HPSI 1600 FOR SALE**
USED. 1998. CANADA. 16,000 in-lb Exciter. Caisson clamp for driving up to 120" liners. 150' Hose Bundle. (2015) Repaired Rexroth piston Fixed Motors (15,000.00 USD Value). (2015) Repaired 5 Stage Commercial Pump (4,000.00 USD Value). **$425,000.**

» **BAUER BG-36V HYDRAULIC DRILL RIG**
USED. 2002. CANADA. S/N: 506. Hours: 14043. Includes: Air Compressor -- Kelly Guide -- Hydraulic Mast Foot -- Automatic Central Lubrication -- Kelly Bar KB 36/470/3/36-200 -- Diesel Fired Heater Kit -- Hydraulic Casing Gate. **$595,000.**

» **HUTTE HBR605 FOR SALE**
USED. 2007. CANADA. S/N: H605ZX0141. Hours: 4230. Includes: T1200 High Speed Rod Head -- HG12 Rotary Head -- BW 1500 Winch -- Extended Swivel Mast has Head Sheave -- HG19 Casing Head -- Beka Lube Auto Greaser System -- Attached Articulating Boom Crane for Handling Casing. **$161,500.**

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» **KUBOTA SVL75-2**
USED. 2015. KY. Enclosed Cab, Air Conditioner, Heater, Auxiliary Hydraulic Plumbing, Two Speed, 15\" Tracks, Hydraulic Coupler, 74\" GP Bucket w/ Teeth. **$52,000.**

» **HYUNDAI ROBEX 140 LC-9A**
USED. 2014. KY. 9'10" Long Arm, 15'1" Mono Boom, Transparent Cabin Roof-Cover, Full Auto AC & Heater, Radio/USB, Air Suspension Seat w/ Heat, Remote Mgmt. System, Rear View Camera, 24" Triple Grouser, Pattern Selector Valve, Double Acting Pipe w/o Accumulator, Additional Counterweight, Bucket Linkage, 24V to 12V DC Converter, 43.3" Bucket. **CONTACT.**

» **HYUNDAI ROBEX 380 LC-9A**
USED. 2014. KY. 3Yr/3000Hr Warranty! Cummins QSL9 Engine! Kawasaki Pump, 12 10 Long Arm, 56 Bucket, 32 Triple Grouser Shoes, Transparent Cabin Roof-Cover, Full AC and Heater, 21 4 Boom, Bkt Linkage, Back Up Camera, 2.12 yd Bucket Breakout Force 49,300lbs. 86,000 lbs. **$219,000.**

» **KOMATSU D65EX-17**
USED. 2012. KY. Enclosed Cab, Air Conditioner, Heater, 11' 2" Wide Sigma Blade w/ Single Cylinder Tilt, Multi-Shank Ripper (Not included in price), Sweeps, Screens, Pre-Wired for Grade Control, Rear View Camera, Powershift Transmission, 24" Single Grouser Track Shoes. **$159,000.**

FEATURED LISTINGS

» **LIUGONG 612HIII**
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» **HAMM 3410P**
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» **IR T4 DUAL ROTARY CRAWLER RIG**
USED. NJ. T4 IR CR-16 Dual Rotary. Upper: Cat 6.6 Tier 3 Engine w/ Tilting Head – No Air. Dual Motors – Spur Gear Head – Crawler Mounted – 25' Rod. 3-1/2" – 8-5/8" Thread. Tier III Compliant. 10,000 ft lbs of Torque. 12'9" Travel height. 11'4" Wide – 36'6" mast up height. Equipped with CR-16 (6"-16") Casing Advancement System. **CONTACT.**

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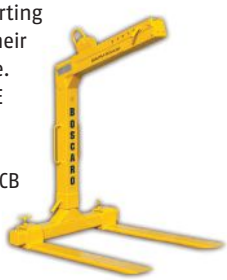

» **KOENIG K28-S SELF ERECTING TOWER CRANE**
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» **SAN MARCO SMT 550 CITY CRANE**
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» **KOENIG K72 SELF ERECTING TOWER CRANE**
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» **KOENIG K-70 SELF ERECTING TOWER CRANE**
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» **POTAIN GTMR 331C**
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» **POTAIN GTMR 336A**
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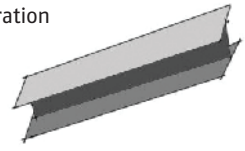

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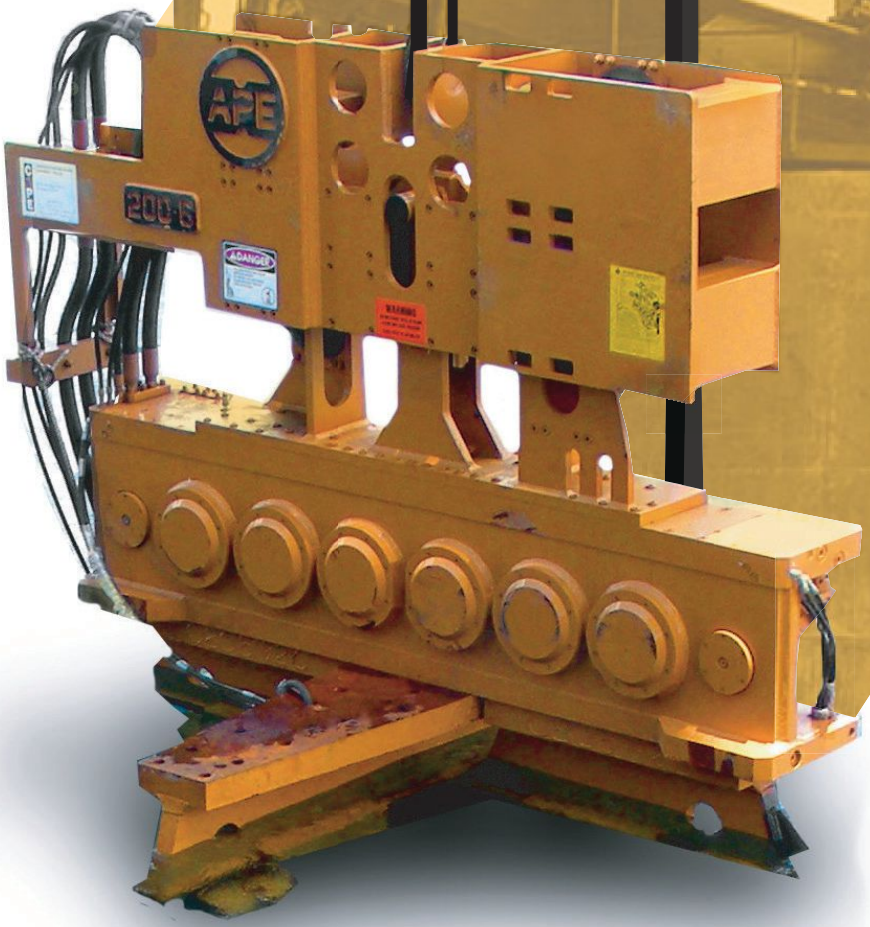

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255.1 tons
Max Line Pull:
185 tons
Max Bare Hammer Weight:
18,900 lb

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APE QUALITY

APE vibros outperform other vibros in their class.

Patented breakthrough suppressor cuts down weight while increasing line pull.

Hydraulic motors are recessed which eliminates the need for bolted on guards. Less parts - less problems.

More pulling ability than other comparable vibros.

Giant spherical bearings are five times larger than those found on other machines.

APE vibros are used by more contractors than any other. Why?

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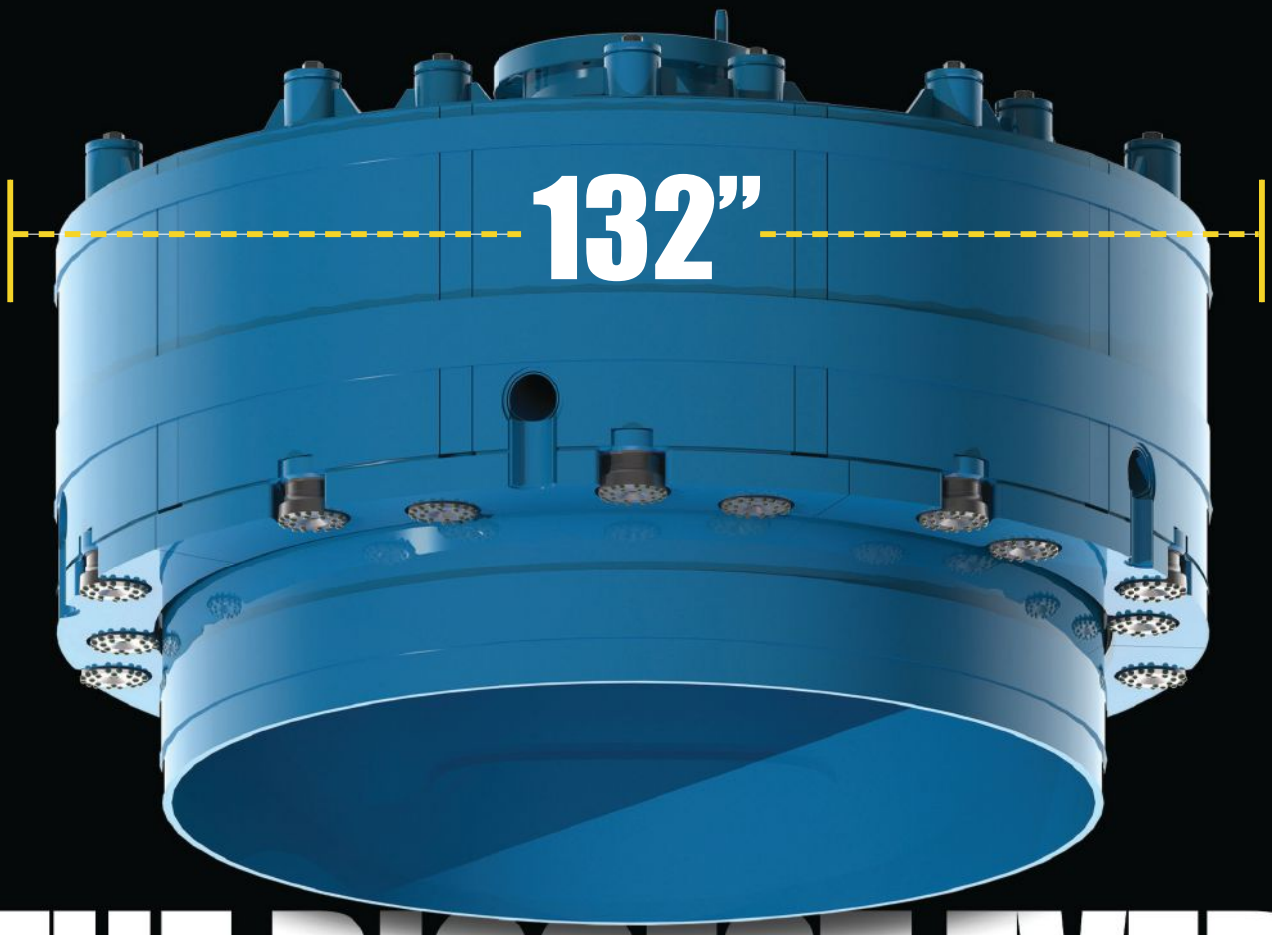

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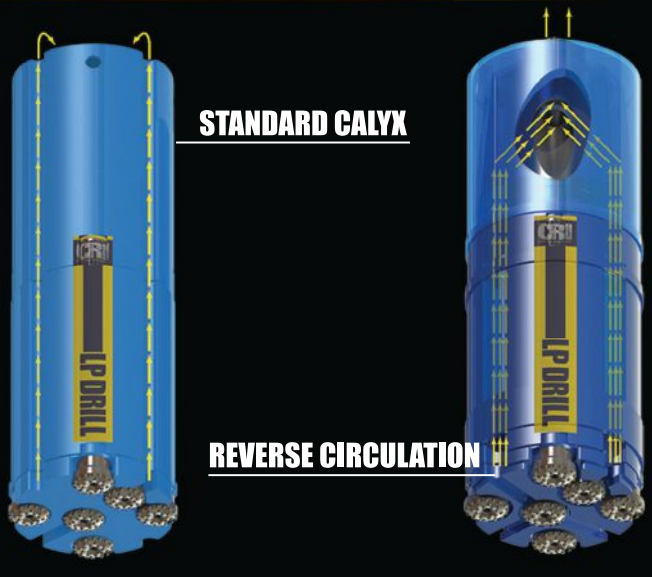
- Reverse circulation return inlets are directly above bits for maximum flushing.



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