

November 2011

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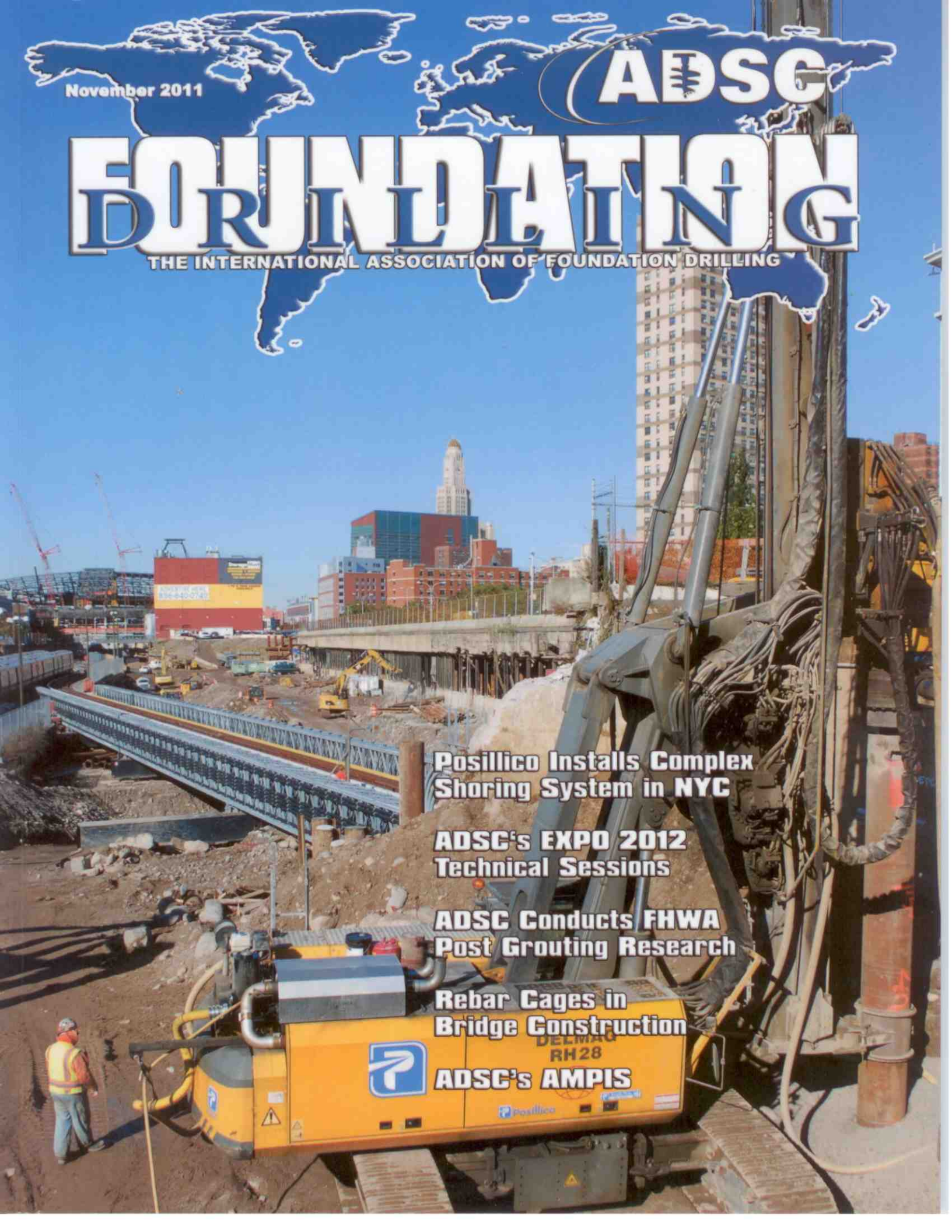
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DELMAG
RH28

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Hub Foundation Works Through Hard Rock and Hurricanes

by Sybil E. Hatch, P.E.

Although not as severe as originally predicted, Hurricane Irene dumped over three inches of rain on Washington DC in a 24-hour period, with sustained winds of 35 to 45 miles per hour. Jim Maxwell and his crew of ADSC Contractor Member, Hub Foundation worked through the crux of the storm, battening down the equipment, digging ditches, and routing rainwater away from their drill rigs at the Marriott Marquis construction site in downtown Washington DC.

Their efforts paid off. It was back to work as usual on Monday morning, drilling foundations for the new 1,125-guestroom luxury hotel near the DC Convention Center. Except that broad swaths of the region were out of power, including Hub's concrete supplier, who couldn't deliver concrete that day. Minor inconvenience.

Hub Foundation rolls with the punches. Just five days earlier, the job site was rocked by a rare 5.8 magnitude earthquake centered near Richmond, Virginia, and felt up and down the East

Jim's biggest challenge at the site, though, is not hurricanes and earthquakes. It's one of Mother Nature's strongest foes to foundation drilling: unexpected hard rock.

Coast. "There was no damage or injuries at the site – and none of our open holes collapsed – but the workers at the site were definitely thrown around," says Jim.

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A New Hotel

For the Marriott project, Hub Foundation is a subcontractor to DC Slurry Partners, a joint venture between ADSC Contractor Member, Treviicos and East Coast Slurry Company. DC Slurry Partners is a subcontractor to Hensel Phelps Construction Co., the general contractor for the project.

DC Slurry Partners installed a perimeter slurry wall around the site. Hub Foundation installed 142 drilled shafts under the new hotel, an additional four shafts for an adjacent tower crane support, and tie-backs for the slurry wall. ADSC Associate Member, Soilmec* equipment was on the site, being used to construct the wall, foundations, and tie-backs.

The subsurface conditions at the site generally consist of about 20 feet of fill, over around 20 feet of silty sand, over about 80 feet of marine clay of the "Potomac Group." Then comes about five feet of decomposed rock and hard amphibolite bedrock below that. The RQD (rock quality designation) is 100 percent, and the



Each drilled shaft generates about 100 cubic yards of spoil that is dried using a hot lime mixture and then transported offsite.

measured strength is over 20,000 psi (pounds per square inch). Rock solid.

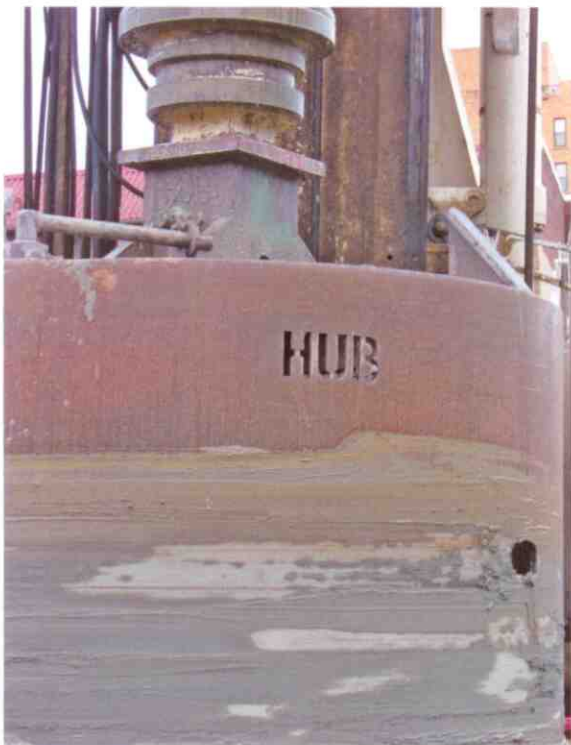
Top-Down Construction

All buildings in Washington DC (except the Washington monument) have height limitations, which drive designs to utilize below-grade space. The Marriott's ballroom, meeting rooms, and several stories of parking are all underground.

The drilled shafts vary in diameter: five, six, and seven feet. They are 140 feet deep, so that most of them are being drilled up to 15 feet into bedrock. The building design calls for the lower 90 feet of the shafts to be concreted, with a 30-foot deep reinforcing cage and a structural steel column embedded about 10-20 feet into the concrete. The tolerance for the column placement is very tight. Angle irons to support below grade floors were welded to the steel columns before they were placed.

Hensel Phelps chose a "top-down" construction sequence for this steel-framed building: after all the drilled shafts are complete, the overburden is excavated, floor-by-floor, as each floor slab is built. The floor joists are bolted onto the angle irons; then the concrete floor slab is poured. The slab then acts as a brace for the

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Hub fabricates its own drilling buckets, but is using rock augers fabricated by Champion Equipment.

slurry wall.

Once a floor is complete, the soil underneath the slab is removed down to the next level – and the next floor is built. At the same time, the above-ground floors are being constructed. It's a common construction technique in dense urban areas.

Handling Rock Solid

Hub Foundation has five pieces of Soilmecc equipment working onsite: an SR-100, two R-930's, an 825, and a 1350 (now called the PSM-20). Drilling production ranges from about 30 feet per hour in the soil to around five feet per hour in the weathered rock, to around two inches per hour in the hard rock.

"We didn't originally anticipate the rock being this hard," says Jim Maxwell. "Even though we did a number of strength tests on the rock to verify its high strength, we were still required to drill to the originally-specified depth."

Hub makes its own drilling buckets, and is using them to drill as deep as they can – well into the weathered rock. From there, a rock auger fabricated by ADSC Associate Member, Champion Equipment is fitted onto the bar to grind through the rock.

The SR-100 is Hub's powerhouse drill rig. Hub Foundation tried several techniques to make drilling through the rock easier. For example, for some of the shafts, Hub drilled several cores into the rock and then followed up with the rock auger. This gave the rock a place to break up and move when the rock auger attacked it.

In the 6-foot-diameter holes, Hub first drilled the hole with a 5-foot rock auger, and then came back with a 6-foot auger to ream out the hole. Using a 5-foot auger allowed the SR-100 to apply more force to a smaller area.

"The GC asked us why we couldn't use a 4-foot auger instead,

and really tear through the rock," says Jim. "Well, to be honest, smaller augers just can't handle the power that the SR-100 delivers. The only thing worse than slow drilling is breaking an auger and having to drill through that, too."

Long History with Soilmecc

Hub Foundation knows its equipment. Jim Maxwell was the first in North America to buy a Soilmecc drill rig. In the late 1980s, Jim received a valuable tip from Nino Catalano, a colleague that worked with Icos in Boston. "Nino previously worked with Trevi (a sister company to Soilmecc under the Trevi Group corporate umbrella) and talked about how great the Soilmecc equipment was."

Jim contacted Gil Peel of ADSC Associate Member, American Equipment and Fabricating*, who was just considering adding the brand to its equipment line. Jim and Gil traveled to Italy to meet with Soilmecc, and history was made. Gil began selling the equipment and Jim was his first customer. Jim also bought the 100th Soilmecc rig sold in North America.

Hub Foundation now has 11 of these machines in its fleet. The SR-100 on the Marriott site is Jim's latest acquisition: it had only 700 hours of use on it when he mobilized it to DC. The 825 at the Marriott site, however, is Jim's oldest rig. "With close to 13,000 hours of usage, it's still super-reliable after 10 years of operation," says Jim. Hub Foundation deploys its equipment and expertise throughout the northeast U.S.

Making Good Equipment Great

Good equipment is essential, but the managers, operators, and mechanics are what make good equipment great. Hub Foundation attributes a lot of its success to good people and good training.

In 1997, Trevi bought Icos, creating Treviicos. Shortly thereafter, Treviicos asked Hub Foundation to joint venture on the Gilmore Bridge bypass project, an early Central Artery/Big Dig job. "Trevi sent two of its best drilled shaft superintendents from Italy to the U.S. to work with us on the project," says Jim. "We spent two years learning world class techniques the best from the best. We went from beginners to experts in a very short period of time."

Hub Foundation has sent several of its employees to Italy to take Soilmecc's master mechanic and master engineer courses. It has also tapped into – and strongly supported – ADSC's training programs. Hub employees have attended many, if not all of the association's workshops and schools for field personnel supervisory, and management levels. Jim served on ADSC's Board of Directors for two terms, and many of Hub Foundation's employees are ADSC individual contractor members. The association has witnessed the firm's significant growth over the years. Jim Maxwell's contribution to the ADSC board during his terms of service stands as a model to the benefits of active involvement in the association.

"We're all ambassadors for the drilled shaft industry," says Jim. "Good equipment and good training really pay off."

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