

# PILED RIVER

THE OFFICIAL PUBLICATION OF THE PILE DRIVING CONTRACTORS ASSOCIATION | SUMMER 2003 VOL. 4, NO. 3



## IN THIS ISSUE:

**Project Spotlight:  
Hartsfield Airport –  
Atlanta's Runway Project**

**2003 College  
Professors'  
Piling Institute**

**PDCA Member  
Spotlight:  
Ford Pile Foundation's  
Woody & Trey Ford**



**Project Spotlight:  
Pine Hills Sinkhole  
Remediation Project**



# Pine Hills Sinkhole Project:

## A True Collaborative Team Effort

By Lisa Kopochinski, Piledriver Editor

The Pine Hills sinkhole first occurred on June 11, 2002 around 5 pm. Two hours later the ground had fallen to create a crater the size of half a football field.

Photo courtesy of GEC



**While sinkholes are not an uncommon occurrence in Central Florida, the Pine Hills one was a doozy.**

Central Florida witnessed its largest sinkhole in two decades last year when the Pine Hills Sinkhole saw the ground fall over a two-hour period to the size of half a football field.

Capturing national attention, the sinkhole, which occurred on June 11, 2002 around 5:00 p.m. at the Woodhill Apts. in Pine Hills, just west of Orlando, created a cavity 150 ft. wide by 60 ft. deep and was situated only 10 ft. away from a two-story apartment buildings and its residents.

While sinkholes are not an uncommon occurrence in Central Florida, the Pine Hills one was a doozy.

The sunken area was deep enough to fit a six-story building. Two 30 ft.-tall

oak trees were swallowed along with a sidewalk, exercise equipment and park benches. Sewer and water lines were severed and nearly 100 apartment dwellers had to be relocated for two months.

The catastrophe called for immediate action and brought together several Central Florida companies to rectify the situation and avoid future damage to the apartment structures.

The Wilson Company of Tampa, owners of the apartment complex, hired Orlando-based Geotechnical and Environmental Consultants (GEC) to step up to the plate. GEC then enlisted Giken American Corp.

“Because the rim of the sinkhole was only feet from the apartment building shallow foundations, the stability of

the structures was threatened,” explains Gary Huhns, project engineer with GEC. “Protecting the buildings was a race against time that called for extraordinary measures.”

Upon arriving at the site, GEC recommended evacuation of a second apartment building that was threatened, rerouting of roof drainage away from the sinkhole and placement of a thick plastic liner over the sinkhole slope adjacent to the buildings to prevent saturation of the soil and potential foundation failure due to impending heavy rain.

A technical team of experts was assembled within 12 hours to evaluate the unstable conditions at the site and

formulate an action plan for the temporary and permanent support of the structures.

The first line of defense was pumping a chemical grout mixture into the very loose sands under the structure footings. The chemical grout solidified the loose sands below the foundations to prevent them, at least temporarily, from shearing off into the sinkhole, says Kuhns.

“GEC then devised a plan for permanent stabilization of the buildings by installing a steel wall 50 ft. deep into the ground to effectively separate the buildings from the adjacent sinkhole,” he explains. “In order to install such a wall without damaging the buildings, or causing a failure of the steep sided sink-

hole, a unique technology, only used once in the U.S., would be needed.”

Giken America Corporation, a specialty foundation contractor, installed a unique 200-ft. linear wall of 50-ft. deep interlocking pipe piles between the apartments and the sinkhole using an unconventional method of pressing piles.

Corpac Steel Products of North Miami supplied custom made, 36 in. o/d x 0.500 in. w/t x 50 ft. P-T Interlock Tubular sheet pile in record time to the site.

This was also the first-time use of Giken technology in remedying a sinkhole of this nature and size.

The unique feature, Kuhns added, was that the pile installation equipment



(the "Silent Piler") was non-vibratory and silent, as well as extremely compact. It can maneuver along the edge of the sinkhole, within a five ft. apron.

Giken's "Silent Piler" installed 200 linear ft. of pipe pile wall with seven-

in piles with a reaction-based system.

"The most unusual and innovative technique that was utilized on the project was our integral continuous flight auger called the "Crush Piler," explains John Santos, marketing manager for

slabs and walls within a few days after the sinkhole appeared. Daily rains were causing groundwater levels to rise and further eroding and destabilizing the steep slope of the sinkhole adjacent to the buildings. The solution had to occur



Protecting the adjacent apartment buildings was a race against time.

Photo courtesy of GEC

Photo: Giken America Corp.

inch diameter P-T interlocks. A total of 56 pipe piles 50 ft. long were "pressed in" with the assistance of an integral auguring system on the slope nearest the buildings. The Silent Piler literally presses pipe piles up to 60 inches in diameter into the ground using a hydraulic jacking system.

"This strategic wall had to be installed quickly and without disrupting fragile foundation conditions. The pipe piles had to be lifted over the tops of the apartment buildings to the sinkhole using a 300-ton [Demag] crane," continues Kuhns. The crane was rented from Beyel Brothers Crane and Rigging in West Palm Beach, specifically for this project.

The "Giken wall" was used for soil stabilization and shoring of two apartment buildings with its untraditional piling method of hydraulically pressing

Giken America Corp. "The auger is an integral pre-augering system that is used in conjunction with our Press-In piling procedure. Unlike conventional piling, when the pre-augering takes place first and then the piledriving, Giken performs both actions at the same time, which is a great time and money saver."

As for challenges, there were plenty. "Our biggest obstacle," remarks Santos, "was the tight space of only 10 ft. to work in between the building and the sinkhole and the fact that there was no access to the back of the apartments. We had to have all our machines and material pitched completely blind over the three-story building using only radio voice commands."

Adds GEC's Kuhns: "The greatest obstacles were time and weather. The buildings had begun to settle with noticeable cracking occurring in floor

quickly and without causing further stability that could lead to foundation failure."

Soil conditions also proved to be torturous.

The soils beneath the building foundations were very loose to a depth of about 15 to 20 ft. At that depth, says Kuhns, a five to 10 ft. thick layer of medium dense sand was encountered that was underlain by loose silty sand. "At a depth of 40 to 50 ft., the silty sands became medium-dense to dense, and a firm limestone was encountered at about 60 ft."

However, the surface of the limestone layer dropped quickly to deeper than 200 ft. progressing away from the structures across the width of the sinkhole. Groundwater within the sinkhole throat was deeper than 60 ft. at the time of collapse. The water level began to rise

quickly over the next few days and weeks to within 20 ft. of the ground surface.

As for logistical problems, there were plenty.

Torrential summer rains were a daily occurrence making site conditions, particularly the steep side slopes of the sinkhole, very fragile. Access was limited, with sometimes less than 10 ft. between the sinkhole and the apartment structures.

In the end, Giken was successful in completing the wall on July 11, 30 days after the sinkhole first appeared. The apartments were saved without any structural damage. Minor settlement caused some cosmetic cracking that was easily repaired. Apartment residents were able to move back into their homes.

Says Giken America's Santos: "This is the first time in the company's history that our system was used for a "rescue" emergency project. We are proud that



we performed our job without incident or injury considering the tight confined spaces and inability to see the crane operations."

Concurs Corpac President Jorge Woldenberg: "It usually takes months to plan a project like this. We [were proud] to be able to supply the materials in record time, as well as being involved with a

team of professionals who saw the benefits of implementing a Tubular Pile solution."

Adds Kuhns, "The sinkhole has now been turned into a landscaped green space with terraced wooden bulkheads overlooking a small pond. A potential disaster was turned into a community benefit with timely team work and highly innovative technology." ▼

### Giken America Earns PDCA Project of the Year Award

Giken America Corp. was a runner-up for PDCA Project of the Year Award for its pile-driving efforts on the Pine Hills Sinkhole Remediation Project.

This project used a driven pile in which no other pile would meet the requirements and no other system would be able to install them on this particular site.

The mandatory elements for this project included quick decisions and actions, strong piles and quiet solutions. It had to be a pre-fabricated driven pile, as no other pile type would suffice.

Giken's innovative method of the hydraulic "Press-In" piling operates on a reaction-based system that utilized the reaction of the previously driven piles. The model PP260 piling machine, used on this project, uses a pair of hydraulic rams to advance the 36-in. O.D. 50 ft.-long pipe piles to final grade at ground level. A total of 56 piles were installed equaling approximately 200 wall ft.

To increase production and assist in penetrating a dense sand layer in the lower strata, Giken also utilized an integral auguring system. The continuous flight auger

was installed inside the Tubular sheet piles. Together with the Silent Piler, the Tubular sheet piles were driven to final grades.

#### Design considerations for the use of driven piles

The tight confines of the site did not allow for insitu-cast piling. In addition, the retaining wall needed to be designed and installed quickly. The steel pipe used for the retaining wall provided sufficient support. Pre-fabricated materials were also a must due to loose rav-eled soil conditions. Driven piles could be delivered to the site quickly and installed to protect the apartment structures.

Conventional piling systems were impossible due to limited workspace, strict restrictions on vibratory and impact piling and restrictions on the use of water jetting to advance piles. The narrow profile Giken system that operated on a reaction-based hydraulic "Press-In" method was perfectly suited for this project. Giken also utilized its integral continuous flight auger system that assisted with the installation of the 36 in. O.D. Tubular Sheet piles.

The benefit to the public was that their residence was saved from destruction. Giken was able to save the three apartment structures valued at \$1.5 million each.