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Engineering News-Record



**DGI-MENARD, Inc.**  
Ground Improvement Specialists

## FOUNDATIONS

# Lateral Soil Displacement Gains Ground on U.S. Projects

**A** low-impact, low-cost composite ground improvement system developed in France is now taking hold in the U.S. Controlled Modulus Columns densify and reinforce soft ground without causing vibration or generating spoils.

“CMCs fit a very wide niche between doing nothing and a heavy deep foundation solution such as piling or drilled shafts,” says Seth L. Pearlman, president of Pittsburgh-based DGI-Menard Inc.—the sole U.S. licensee of the patented technique—and current president of the Deep Foundations Institute. “Traditional practice dictates that when settlements are not acceptable, then deep foundations are required. That may not be the most cost efficient nor environmentally sustainable technique because of materials requirements. CMCs minimize concrete usage and don’t generate off-site disposal, which is critical on brownfield sites.”

CMC was developed in 1994 by Menard Soltraitement, a division of Freyssinet Group. CMCs are grouted columns that are installed using a large-torque, high-thrust auger that displaces soil laterally, which increases density and load bearing capacity with minimal topsoil disturbance. As the auger is extracted the void is pressure grouted to create a column that further stiffens the soil, creating the composite ground improvement system.

CMCs also limit ground liquefaction potential and total and differential settlement. The columns do not need to be rock-socketed nor do they need pile caps because they support footings or slabs on



▲ **Ground Improvement.** Henley on Hudson residential development relies heavily on CMCs for foundation soil consolidation.

grade without a direct connection. Typically, 3-ft-to-15-ft of gravel or granular platform is laid below the slab to distribute load between the CMCs and the structural elements. CMCs can be used for buildings, highway embankments, bridge abutments and large commercial/industrial applications where the slab weighs more than the structure. CMCs range from 12 in. to 18 in. in diameter and have been placed 90 ft deep. Savings can be 30% over a deep-pile foundation.

CMCs have been used on over 1,000 projects globally but only 30 in the U.S. It currently is being used at The Moor-

ings at Squantum Gardens, an elder housing project in Quincy, Mass.

“The cost savings from ground improvement over pile foundations made it possible for the project to go forward,” says Michael P. Walker, vice president at GEI Consultants Inc., Woburn. “The site consisted of miscellaneous fill over organic soils and peat underlain by clay, which around here typically is supported by piles, pile caps and structural slabs. Twenty-to-30-ft long CMCs allowed construction of two buildings on spread footings and slab-on-grade.”

GEI is designer for ground improvement contractor DGI-Menard. GEI also has teamed with DGI to peer review European design methods and adopt final designs for the U.S. “Every job is double designed. They do their own independent design using proprietary technology while we perform an independent check acting as engineer of record for our projects,” says Walker.

One project due for April completion is the \$120-million, 180,000-sq-ft Henley on Hudson site, in Weehawken, N.J., just north of the Lincoln Tunnel. It involves installing 2,100 CMCs 75-ft to 90-ft down in soft clay and organics to support roads, parking decks and foundations for four townhouse clusters. The original plan had all elements supported on piles but now only four mid-rise condominium buildings will be pile supported, saving over \$1.5 million.

“We were looking for alternatives to conventional steel piles,” says Michael D. Greene, director, Roseland Property Co., Short Hills, N.J. “DGI-Menard met with our consultant, M.G. McLaren, and they bought into it because CMCs provided the stability and bearing capacity we needed.” Roseland also is considering CMCs for another project in New York. ■

*By William J. Angelo*

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