

# Henley on the Hudson

Weehawken, NJ

Controlled Modulus Columns

**Before the multi-million dollar, urban redevelopment of waterfront condominiums, penthouses and townhouses could get underway, soft soil needed to be improved. Menard installed Controlled Modulus Columns™ (CMCs) to strengthen the soil, prevent settlement and reduce the time and cost of the project.**



View of Menard's CMC operation showing grout delivery, pumping and drilling — directly across the Hudson River from midtown Manhattan.

**Client / Owner:** Roseland Property Company

**General Contractor:** EIC Associates, Inc.

**Owner's Geotechnical Engineer:** McLaren Engineering Group

**Ground Improvement Contractor:** Menard

## Project Summary

This project involves the construction of 68 individual 3-story townhouses and condominium subdivision on the former site of a 136,000 square-foot warehouse at Banana Pier along the banks of the Hudson River. Soil investigations revealed a thick layer of very soft organic clays underlying an upper layer of heterogeneous fills with large obstructions. Due to the presence of these compressible soils, the initial proposed solution was to support all structures and site infrastructure on driven steel piles with large pile caps, and pile-supported structural concrete relieving platforms upon which about 6 feet of fill was to be placed. However, the cost and time to implement this option put the project in jeopardy, and the removal of potentially contaminated soil from the pile cap excavations would have added even more cost to the project.

## Ground Conditions

The proposed building site had very poor soil conditions with miscellaneous heterogeneous fills over a thick layer of soft, highly compressible organic clay. The top of a relatively dense sand bearing layer is present between approximately 60 to 92 feet below the ground surface. Before the start of the project, extensive demolition work was performed to remove the existing buildings.

## Ground Improvement Solution

The design-build alternative to support the entire site, infrastructure and buildings was a ground improvement design based on Controlled Modulus Columns (CMCs). Load tests were performed on deep elements founded in the lower sands and on short elements in the fill to estimate the side shear that was developed around the tops of the CMC elements when the fill and building loads were applied. All of the testing information was used to calibrate and verify the finite-element modeling assumptions.

The CMC installation, at approximately 92 feet, is the deepest in the world at this time.



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Ground Improvement Specialists

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