

# Garden State Parkway Bridge - over Mullica River

UNITED STATES Port Republic, NJ



**Owner**  
New Jersey Turnpike Authority  
(NJTA)

**Engineer**  
GEI Consultants, Inc.

**General contractor**  
Agate Construction Co., Inc.

**Dates of work**  
2010/03 2010/10

## Description

When the New Jersey Turnpike Authority (NJTA) widened the roadway from two to three lanes for the approaches to the Garden State Parkway Bridge over the Mullica River, a two-stage Mechanically Stabilized Earth (MSE) retaining wall was designed to support the embankment and minimize encroachment on columns to provide ground improvement to support the MSE walls.

Menard proposed a “value engineered” alternative using Controlled Modulus Column (CMC)<sup>™</sup> rigid inclusions instead of stone columns which would allow the construction of a one-stage MSE wall rather than a two-stage wall. The NJTA, along with the general contractor, selected the Menard alternative ground improvement solution.

## Main figures

Controlled Modulus Columns (CMC)<sup>™</sup>  
2129 EA.

The CMC rigid inclusion design was done using a large-scale 3-D finite element model, with several supporting 2-D finite element models. These advanced computational methods helped to optimize the design and meet the target performance requirements for the project.

## Ground conditions

The site had a variable soil profile, with varying depths of controlled embankment fill in the upper layers, underlain by organics and sand below. The CMC rigid inclusions were installed at depths varying from 25 to 50 ft through the organics and were founded in the dense sand.

## Solution

Menard used CMC rigid inclusions for ground improvement of 1,400 LF of MSE wall on the south approach and 2,600 linear ft on the north approach with a total treatment area of 126,000 sq. ft.

A total of 2,129 CMC rigid inclusions were installed for the Mullica River Bridge Project in two phases. During phase one, installation took place at a lower elevation in the strip zone of the MSE walls. After the wall was partially constructed, the Menard crew remobilized and installed the remaining CMC rigid inclusions from a higher elevation for the embankment support.

The MSE retaining walls were designed by Reinforced Earth Company, an affiliate company of Menard and member of the Soletanche Freyssinet Group. The CMC rigid inclusion ground improvement was completed on schedule in the summer of 2010.