



UNITED STATES

WestEdge Infrastructure Charleston, SC



Owner

City of Charleston

Engineer

S&ME Inc.

General contractor

Trident Construction

Dates of work

2016/07 2017/02

Description

The WestEdge Infrastructure project consisted of the first two phases of roadway construction to accommodate the development of a new retail and residential district in Charleston, SC. To mitigate the risk of flood damage, the new street level was designed eight ft higher than the surrounding areas with gently sloping roads to accommodate this transition.

To support over 1,800 LF of new roadway in a very poor subsurface environment, USW installed Controlled Modulus Column (CMC)[®] rigid inclusions. In addition, USW installed Bi-Modulus Columns (BMC)[®] at the transition zones between the new and existing roads.

Main figures

Controlled Modulus Columns (CMC)[®]
1500 EA.

Bi-modulus columns (BMC)[®]
600 EA.

Ground conditions

The project site lies on a former landfill which contained a five-ft thick layer of municipal solid waste, capped by three ft of sand. Underlying the waste deposits exists a 30-ft thick marsh deposit, consisting of very soft silt and clay. Excessive settlement and potential global stability failures were predicted within this layer due to the proposed embankment fill.

At the base of the marsh deposit, 10-ft of interbedded sand and silt overlaid the Cooper Marl geological group, which is a well-known regional layer consisting of stiff, calcareous clay. This thick deposit serves as the bearing layer for most deep foundations in the Charleston Area.

Solution

During project development, USW teamed with Trident Construction to provide a design-build solution to the potential settlement issues resulting from construction of the new embankments. USW also supported a large box culvert, several other utilities, and multiple retaining walls as part of the ground improvement scope.

For the majority of the site where the new roadway fill exceeded five ft, CMC Rigid Inclusions were installed in a grid pattern to transmit loads below the compressible soil and into the competent Cooper Marl bearing layer. For the locations where the new roads sloped down to meet the existing street level, USW installed BMCs instead.

The BMCs consisted of a CMC rigid inclusion base extended through the very soft marsh soil with a vibro stone column cap on top, which prevented hard points from developing below the pavement. This tailored approach limited differential settlement and reduced the required thickness of Load Transfer Platform at the base of the embankment.

The ground improvement solution allowed the embankments to be constructed immediately following CMC and BMC installation, without a waiting period or surcharging.