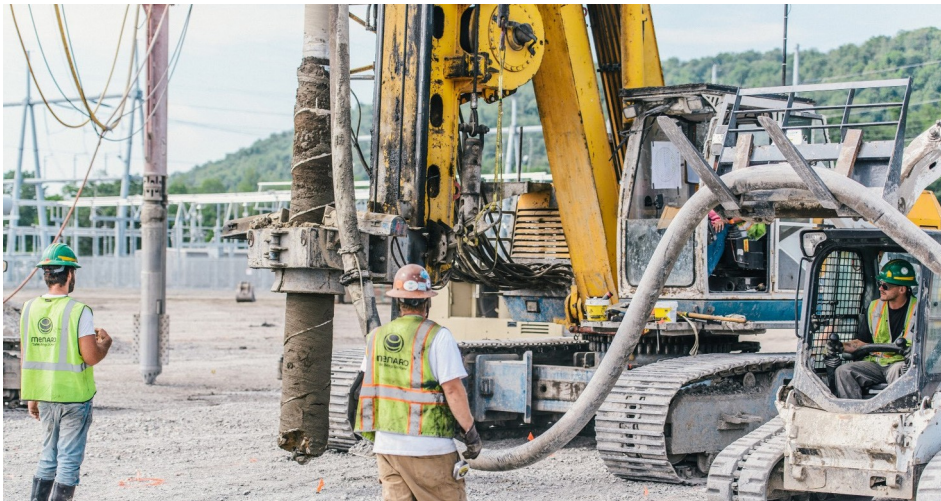




Plains Utica Toronto, OH

UNITED STATES



Owner
Plains All American Pipeline, LP

Engineer
PSI Inc.

General contractor
Kelley Construction, Inc.

Dates of work
2015/04 2015/06

Main figures

Bi-Modulus Columns (BMC)TM and vibro stone columns (700 EA combined)



Description

Plains All American Pipeline selected a site in eastern Ohio along the Ohio River to construct a storage and transfer facility, which included a marine docking station for barges transporting Utica formation gas down the Ohio River. A subsurface site analysis concluded that the soil conditions were not adequate to support the weight of the two new gas storage tanks to be built as part of the new facility.

To support the foundation and ringwall of these two new storage terminals, Menard proposed a ground improvement solution of Bi-Modulus Columns (BMC)TM underneath the tank floors, and vibro stone columns directly below the ringwall. The use of these techniques eliminated the need for a Load Transfer Platform (LTP), resulting in cost- and time-savings for the client.

Ground conditions

Built on a former coal fired power generating facility, subsurface conditions consisted of loose fill, debris, concrete foundations and slag. A soil layer approximately 3 to 20 ft thick consisted of a soft silty-sand fill with buried foundations and slag. Directly beneath the fill was approximately 20 to 30 ft of lean clay that transitioned into dense sand around 40 ft. This dense sand was mixed with gravel and extended to approximately 50 ft below ground surface.



Solution

To support the foundation and ringwall of the two new storage tanks, Menard implemented an innovative solution of BMCs and vibro stone columns. This eliminated the need for an LTP, saving the client time and money.

A total combination of approximately 700 BMCs and vibro stone columns were installed up to a maximum depth of approximately 62 ft. Two single-element static load tests were performed on the test elements to confirm the design bearing capacity. The concrete foundations were removed prior to installation of the BMC elements; however, slag and debris in the subsurface resulted in difficult drilling conditions.

To keep production on schedule, Menard pre-drilled prior to the installation of the ground improvement elements. As part of the initial agreement with the client, post-construction hydrotest was performed by the client on the completed storage tanks and no settlement was observed.

By using a BMC and vibro stone column solution, Menard was able to save the client time and money while meeting the design requirements for bearing capacity and settlement. In summary, to support two new gas storage tanks, Menard proposed an innovative solution of BMCs and vibro stone columns to save the client time and money.