



UNITED STATES

Confidential Client
Confidential

CONFIDENTIAL CLIENT

Owner

Confidential Client

Engineer

Confidential Client

General contractor

Confidential Client

Dates of work

July 2020 August 2020

Description

At a confidential U.S. Department of Energy facility, a riverbank failure occurred adjacent to a lake. The riverbank provided support for an existing roadway and other structures such as pipe racks and plant facilities. Much of the structures were within the potential failure plane of the slide. The failure was a result of the weakening sediments at the toe of the slope.

Given its experience and expertise in remediating soils with similar characteristics, Menard Group USA was contracted to provide ground improvement. Menard proposed the design and installation of Deep Soil Mix (DSM) shear panels to increase the factor of safety against global instability to acceptable levels.

Main figures

Deep soil mixing

185 EA. Deep Soil Mix Columns

Ground conditions

The soil at the site generally consists of interbedded layers of soft clay and silt to approximately elevation -55 ft, which corresponds to a depth of approximately 65 feet from the roadway surface. The soft clay and silt are underlain by loose to medium-dense silty sand.

Solution

Traditional piling and tiebacks were considered for ground improvement. However, it was determined that these techniques could potentially accelerate slope movements due to vibrations. Menard's solution, alternatively, caused minimal disturbance to the failing slope – and provided an efficient way to increase stability factors of safety.

DSM shear panels were installed perpendicular to the bank, and extended through the soft, in-situ clay soils to the underlying medium dense sands. Menard's design considered the following: External stability of shear panels; moment equilibrium; horizontal force equilibrium; bearing capacity at the toe of the shear panels; internal stability of shear panels; crushing at toe of shear panels; vertical shearing through shear panel zone; soil extrusion between shear panels. A total of 185 DSM columns were installed to an average depth of 70 ft.

The site was not without its challenges. Given work was performed at a Department of Energy facility, security was strict. Also, access was limited due to the bank geometry and existing plant structures. From a technical standpoint, the slope was still actively moving toward the lake while work was being performed.

Notwithstanding these challenges, Menard successfully installed DSM shear panels to increase the factor of safety against global instability to acceptable levels for a failing riverbank.