NCDOT Nash County Bridge B-5980

UNITED STATES

Nash County, NC

Owner
North Carolina Department of Transportation

Engineer
NCDOT Geotechnical Engineering Unit

General contractor
Barnhill Contracting Company

Dates of work
November 2021 December 2021

Main figures

Wick drains
5,746 EA. --- 174,357 LF

Description

Described as “reaching the end of their useful life,” two bridges in Nash County, NC were earmarked for replacement with new, longer bridges. The improvements would accommodate the future widening of Interstate-95. When complete, I-95 would be widened from four to eight lanes; interchanges would be updated to meet modern design standards; service roads would be realigned; roundabouts would be added at some interchanges to minimize impacts to nearby properties; bicycle and/or pedestrian accommodations would be added to some overpass bridges.

Due to the compressible nature of the soils at the site, Menard USA was contracted to provide ground improvement for two roadway embankments and two bridge approach embankments in a total treatment area of 93,500 sq. ft. The selected ground improvement technique was wick drains.

Ground conditions

The site consisted of interbedded layers of Coastal Plain silty/clayey sand, sandy silt, clayey silt, and silty clay (Coastal Plain) underlain by weathered rock. Medium dense sands and/or very stiff to hard silt/clay was encountered in the upper 15 ft of the borings. Very soft to stiff clay/silt was then encountered to the top of the weathered rock. The weathered rock was encountered at depths ranging from approximately 25 to 40 ft.

Solution

The geotechnical Engineer of Record – NCDOT Geotechnical Engineering Unit – recommended wick drains for embankments where very soft to stiff clay/silt was encountered. Due to upper medium dense sands and very stiff to hard clay/silt, approximately half of the designated wick drain locations required up to 15 ft of pre-auger to facilitate installation. To address pre-drilling, Menard used a new, experimental variable displacement drill. The drill was selected for its ability to act as both a high-speed, low-torque drill and as a high-torque, low-speed drill. The unique feature of the drill is that torque and speed of the drill is dictated by the resistance of the soil conditions. The drill features a 2-in-1 predrilling motor, capable of performing the services of predrill setups typically done with the EX-12 and the EX-25 drills used by Menard.

Menard installed 5,746 wick drains totaling 174,357 LF to an average depth of 22 ft and a maximum depth of 40 ft. The drains were installed using 4-ft triangular spacing. A challenge Menard faced was working within proximity of busy I-95. At mobilization, wick drain locations had been laid out within 6 ft of the highway. By collaborating with Barnhill Contracting and the NCDOT, Menard created 15 ft of clearance to avoid working so closely to the highway. A crash truck was also mobilized by Barnhill and traffic barriers were installed at the site by to ensure safety of the crew.

For a major expansion of I-95 in North Carolina, Menard successfully installed wick drains to support two roadway embankments and two bridge approach embankments.

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