

Transport - Road



ODOT I-75 Reconstruction and DiSalle Bridge Replacement Toledo, OH/Northwood, OH

UNITED STATES



Owner

Ohio Department of Transportation Engineer AECOM General contractor Kokosing Construction Company Dates of work August 2019 June 2022

Main figures

Controlled Modulus Columns 2,915 EA. Wick drains 10,833 EA.



Description

Designated a "Major Reconstruction" project by ODOT, the DiSalle Bridge Replacement and associated works along the I-75 corridor through Toledo was expected to cost upwards of \$350 million. The existing infrastructure, including the previous DiSalle bridge over the Maumee River, was constructed in the 1960s. In addition to roadway widening, the reconstruction efforts were done to raise the roadways to current standards, while reducing curves, elongating on-ramps, and improving stopping-sight distances.

The design of the DiSalle Bridge Replacement called for a reduction in the overall structure length. Overland portions on the north and south banks would be constructed as embankments supported with Mechanically Stabilized Earth (MSE) walls -- rather than elevated bridges. Upwards of 35 ft of fill was placed on either side of the bridge, to be retained by the MSE walls. The walls would extend 500 ft to the south and 1,000 ft to the north. A series of embankments, on-ramps, and shorter-span bridges were constructed alongside the main river bridge to feed into I-75. To achieve all of this, judicious navigation was required throughout the construction phase due to existing property lines, railroad tracks, utilities, and other obstacles.

Because many of the proposed structures, walls, and embankments were to be built over soft, lacustrine deposits and man-placed fills, the concerns for global stability and settlement were raised by the engineer of record. To mitigate this, Menard USA was contracted to provide ground improvement. The selected techniques were wick drains and Controlled Modulus Column (CMC)® rigid inclusions.

Ground conditions

The site soils consisted of deep, soft deposits of lacustrine silts. These conditions were expected to contribute to excessive settlement during -- and beyond -- the construction timeline. To the north of the river, significant amounts of fill were found, much of it containing concrete and concrete washout of varying hardness depending on the proximity to a batching plant, which was the source of the concrete. To the south, large deposits of "rouge" were present; a relic of Toledo's glassmaking history. Rouge is an industrial waste product which was placed in impoundments along the south bank of the river. The material exhibits a relatively high compressive strength but is known to turn into a semi-liquid state when disturbed.

Solution

Wick drains, designed by the owner's engineer, were recommended for embankments and walls where bearing capacity was not a concern. This was done to accelerate settlement created by the new fill placement and construction.

For the north and south bridge approaches along I-75, a more robust solution was required. The rationale was





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the stability calculations showed the proposed MSE walls could not be supported on the existing ground without excessive settlement. Initially, the recommended solution was large-diameter, grouted aggregate piers for the north approach, and deep soil-mix columns and panels for the south. Due to constructability and schedule concerns voiced during the bid phase, ODOT revised the specification to permit various forms of design-build, column-supported embankment solutions.

Menard elected to design -- and install -- CMC ground improvement elements for both the north and south approaches. The robust grid-array of CMCs, some reinforced and often in conjunction with geogrids, met the performance requirements for the walls. To assist in the installation and ultimately improve efficiency and schedule a significant pre-drilling program was employed on the north and south approaches. Menard performed upwards of 10 load tests, and the fill was monitored for settlement and pore pressure to ensure the stability of the wall.

Coordinating closely with Kokosing, which provided earthwork and monitoring assistance, Menard successfully designed and installed an effective ground improvement system for the ODOT I-75 Reconstruction and DiSalle Bridge Replacement project in Ohio.

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