

Indian River Inlet Bridge

Client:

Delaware Department of
Transportation (DelDOT)

Location:

Sussex County, DE

Services Provided:

- Assessment of foundation conditions
- Predictions of overall movement

Value Provided:

- Predicted magnitudes and rates of movement over a 5-7 year period enabling informed decision-making

Background & Project Challenges

The current Indian River Inlet Bridge on SR 1 provides a critical link on the Eastern seaboard between Bethany Beach and Dewey Beach, Delaware.

Due to severe scouring conditions experienced in the inlet adjacent to the bridge foundations, the bridge

is scheduled for replacement with a new structure that will have a main span of approximately 1,000-ft/305-m. This longer main span will allow the bridge to cross the inlet without any piers in the water and provides for the future potential widening of the inlet. The bridge currently carries 16,000 to 18,000 vehicles daily.

The approach embankments and associated MSE walls (max. 40-ft/12-m-high) were constructed during spring 2006 through early 2007. Prior to construction, closely spaced 80-ft/24-m-long prefabricated vertical drains (PVDs) were installed beneath the embankment/MSE wall footprint areas to accelerate consolidation and strength gain of soft clay foundation soils (max. 50-ft/15-m-thick) as the approach embankments and walls were being constructed. The rate of consolidation of the soft clay foundation soil, however, was slower and the settlement projected to be greater than had been anticipated. The challenge was to better understand the rate of settlement/movement.



Geocomp Role & Accomplishments

Geocomp was retained to conduct an independent assessment of foundation conditions and performance of the approach fills, and advise DelDOT on anticipated future performance. Geocomp conducted a detailed field investigation and comprehensive laboratory soil testing program to determine pertinent engineering properties of the soft clay deposit. Engineering analyses were performed to arrive at realistic predictions of consolidation and gain in strength of the soft foundation soils, as a function of time and loading history, in order to properly assess foundation stability. Plastic analysis, using numerical models (Plaxis), was conducted to assess the impact of approach fill loading on the very soft foundation soils with respect to short-term deformation, including lateral squeeze and long term creep.

Geocomp concluded that 40 to 50% of the total observed vertical movements were attributable to undrained deformations in the soft clay. The remainder was consolidation settlement. Geocomp provided DelDOT with predicted magnitudes and rates of continuing vertical and lateral movements over the next 5 to 7 years that were quite large.