

Midtown Tunnel Background Monitoring

Client:

Skanska/ Kiewit / Weeks /
Parsons Brinckerhoff

Location:

Norfolk, VA

Services Provided:

- Monitoring of the existing tunnel to measure potential deformations and vibrations caused by the construction of the new tunnel
- Installation and maintenance of instrumentation and monitoring system and providing web-based real-time reports of measured performance

Value Provided:

- Establish baseline performance of existing tunnel prior to construction so it is not confused with construction effects
- Differentiate seasonal movement versus construction impacts on the existing tunnel
- Provide real-time data to evaluate construction effects on existing tunnel and minimize risk of damage to the old tunnel
- Verify performance assumptions used in the design of the support of excavation system

Background & Project Challenges

The 50-year-old 3,500-ft-long two-lane Midtown Tunnel provides a vital link between Norfolk and Portsmouth, VA.

It is the most heavily traveled two-lane road east of the Mississippi and its usage has increased 600 percent since its construction.

The new Midtown Tunnel consists of a two-lane tolled tunnel under the Elizabeth River, parallel to the existing Midtown Tunnel. This second tunnel will provide redundancy, additional capacity, and reduce congestion to nearby communities. The challenge on this project was to ensure that construction of the new tunnel did not have any adverse effects on the existing tunnel, which must remain operational during all construction activities.



Geocomp Role & Accomplishments

Geocomp was engaged in two major roles. The first was to provide monitoring of the existing tunnel before and during construction. This baseline monitoring was established more than one year before construction of the new tunnel began. It consisted of ten Robotic Total Stations (RTS) installed within the tunnels alignment, thirty tiltmeters, and a series of crack meters. The data collected from this early monitoring was used to model and help engineers understand the existing tunnel's seasonal movement before construction of the new tunnel began.

During construction of the new tunnel, Geocomp's second role includes the installation and maintenance of over forty-five ShapeAccelArray inclinometer strings, forty-five load cells, and over one hundred strain gages to monitor the approach structures for the new tunnel construction. These instruments, along with additional manual survey instruments, are used to confirm design criteria and provide performance monitoring of the support of excavation system during the dredging and tunnel installation phases of the project. The instrumentation and monitoring system is vital to ensuring the stability of the existing tunnel during construction, verifying the design performance assumptions of various components and minimizing the risk of project delay from unexpected performance.