



PROJECT BRIEF

I-93 South Station MBTA Red Line

PROJECT PROFILE

CLIENT:

Perini
Kiewit
Cashman

LOCATION:

Boston, MA

VALUE:

- Analyses and risk assessment showed NATM (New Austrian Tunneling Method) would produce a better performing project with less risk than contract method - could have saved the owner \$60,000,000 in claims

SERVICES PROVIDED:

- Risk assessment and three dimensional finite analysis to evaluate a value engineered alternative

“Geocomp staff performed a comprehensive three dimensional finite element analysis of both methods of construction and compared the predicted deformations.”



GEOTECHNICAL INSTRUMENTATION AND MONITORING, RISK ASSESSMENT APPROACH

The construction of the I-90 interchange for the Central Artery Tunnel (CA/T) in Boston involved deep excavations, cut and cover tunneling, pipe-jacking through frozen ground, and soil mix techniques for ground improvement, all taking place adjacent to and under seven (7) Massachusetts Bay Transportation Authority (MBTA) and Amtrak tracks leading to Boston’s South Station. Geocomp was responsible for all of the geotechnical monitoring work which included piezometers, observation wells, extensometers, and inclinometers in ground and support-of-excavation walls, as well as structural monitoring including tilt, crack gages and horizontal column deformation in nearby structures. A risk assessment approach was also presented, identifying the amount of ground deformation that might occur and how it might impact the MBTA station. Geocomp staff performed a comprehensive three dimensional finite element analysis of both methods of construction and compared the predicted deformations. The results showed that the tunneling method would produce less displacement of the MBTA station and also create less risk to the contractor and the owner.



BACKGROUND

This project involved the construction of a passageway for the northbound barrel of the new Central Artery-Tunnel project beneath the Massachusetts Bay Transportation Authority’s (MBTA) South Station, which serves the Red Line subway. The work also involved a 110-ft deep excavation immediately adjacent to Amtrak’s South Station terminus. The contract method consisted of the construction of structural slurry walls down the outer limits of the work perpendicular and beneath the MBTA station. Thirteen tunnels were then constructed beneath the station roughly parallel with its orientation one at a time. A large beam would be placed in each tunnel and rested on the structural slurry walls. This would create an underground bridge to support the Red Line Station while soil and rock was excavated below and the new highway tunnel constructed.