

Client:

Perini-Kiewit-Cashman J.V.

Location:

Boston, MA

Service Provided:

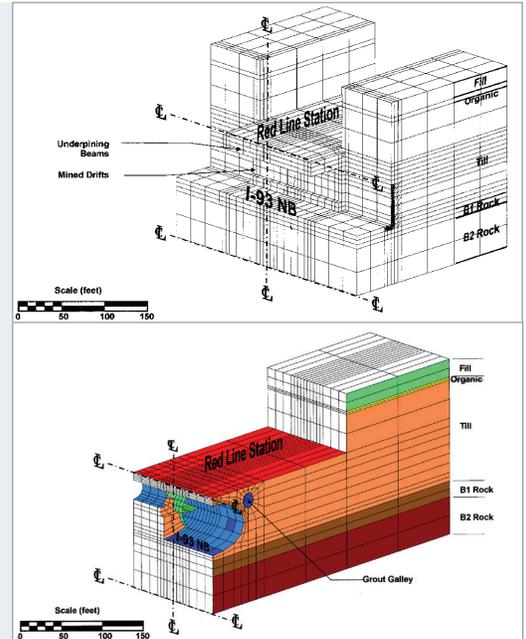
Risk assessment and three-dimensional finite element analysis to evaluate a value engineered alternative.

Value Provided:

Analyses and risk assessment showed NATM (New Austrian Tunneling Method) would produce a better performing project with less risk than contract method.

Background & Project Challenges

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. The contractor wanted to submit a value engineered alternative base on the New Austrian Tunnel Method.



Geocomp Role & Accomplishments

Geocomp was retained by the Contractor, Perini-Kiewit-Cashman J.V, to perform a risk assessment for this method of construction and compare the results with a risk assessment for an alternate approach using NATM.

Geocomp retained Prof. H. Einstein to assist with the work. Dr. G. Sauer and staff provided the SEM design. The effort was managed by Dr. Marr of Geocomp. He and Prof. Einstein developed the approach for the risk assessment and he organized and facilitated several workshops with the principal project experts to develop a risk register and assess the probability and consequence of each significant event.

A principal issue with both methods was 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. Unfortunately, the Owner chose not to accept this cost saving Value Engineered proposal and directed the Contractor to proceed with the Contract method. The Contractor encountered major issues during the work and filed Change Orders. The Owner refused to pay many of these forcing the Contractor to pursue a judicial solution.

The courts recently ordered the Owner to pay the Contractor more than \$60,000,000 to resolve these disputed claims. This outcome would have been avoided if the proposed alternative tunneling method had been approved.