



Above: A site map showing the project site in relation to the subway tunnels. At left: The view on the construction site of Avalon Riverview from Gantry Park Pier 4, in Sept 2001. Inset shows completed building.

Queens West Waterfront Development: Avalon Bay Riverview

Queens - Long Island City, New York

Queens West, a large real estate development, is under way on the East River across from Midtown Manhattan. As a part of this development, a 32-story residential tower was constructed over two existing NYCT subway tunnels. Mueser Rutledge Consulting Engineers (MRCE) performed extensive engineering studies to ensure superstructure loading conditions on the subway tunnels. These tunnels, built in the late 19th century, carry one of the busiest subway lines in New York City and extend between Long Island City and Grand Central Station in Manhattan. The twin bore, single track tunnels run parallel approximately 28 feet apart, varying in cross section depending on geology encountered. A horseshoe section with a concrete liner was used in solid rock advances, which includes the alignment portion under the project site.

Although the high rise tower does not have a basement, deep foundations were designed to transfer the superstructure loads onto the underlying bedrock. Based on MRCE's preliminary feasibility studies and discussions with the New York City Transit Authority (NYCT), pile foundations driven to rock were selected over drilled caisson foundations. Structural loads from above the tunnel alignments carry large at-grade transfer girders of reinforced concrete which span the tunnels. MRCE performed subsurface investigations at the site and rigorous engineering studies to evaluate the impact of the pile foundation installation and new superstructure loading conditions on the subway tunnels. These studies included stereonet kinematic analyses, finite element analyses and studies evaluating the effect of the pile driving vibrations on the tunnels. The capacity of the piles, pile installation procedures, and minimum pile distance from the tunnels had to be determined so that the effects of the pile foundation installations and new loading conditions on the subway tunnels were minimized. Prior to construction, a detailed field survey of the tunnel conditions was performed and the tunnels were closely monitored during the construction. MRCE also provided construction services for the project including inspections of pile load tests and production piling, and reviews of subway tunnel monitoring data. The project was successfully completed with no observed effect on the subway tunnels.

NOTE: "Pile Foundations of High-Rise Building above Historic Subway Tunnels" from Soil Rock America 2003: Proceedings of the 12th Panamerican Conference on Soil Mechanics and Geotechnical Engineering, June 2003, by MRCE's George Tamaro and Jan Cermak is about Avalon Bay Riverview.