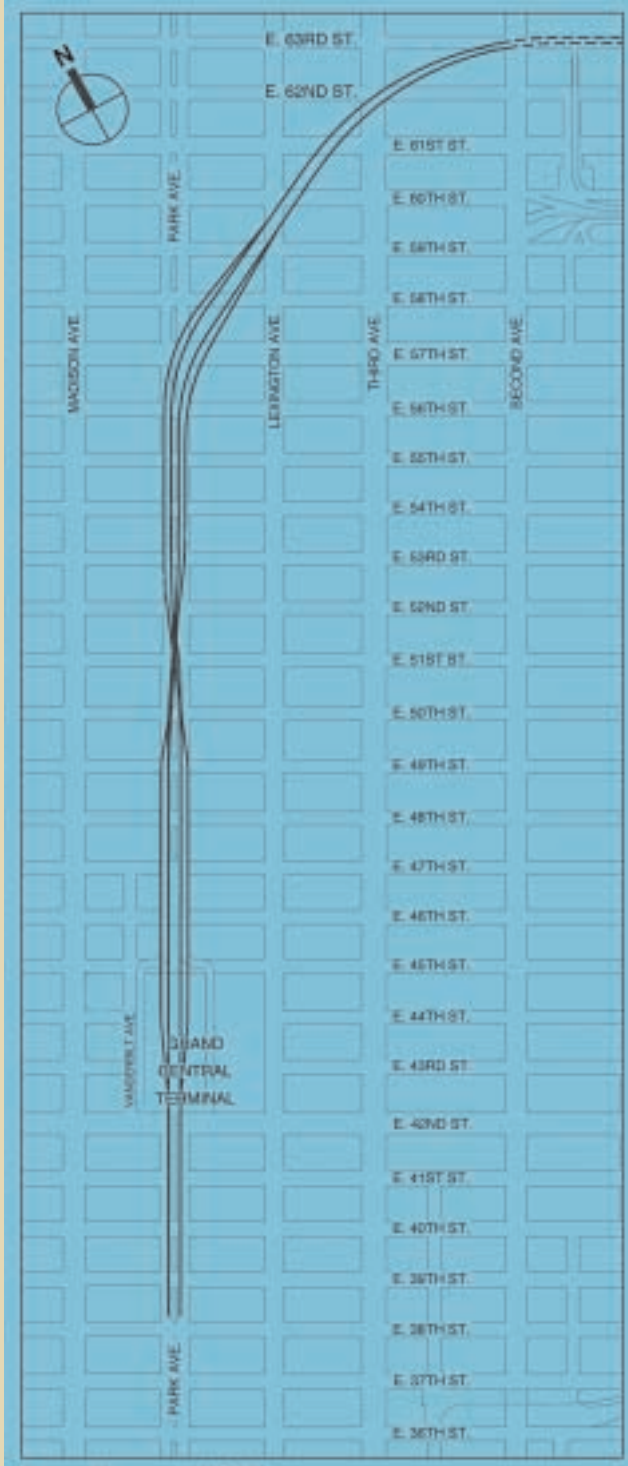


East Side Access

MTA CAPITAL CONSTRUCTION LONG ISLAND RAIL ROAD EAST SIDE ACCESS CONSTRUCTION OF MANHATTAN TUNNELS



The MTA's East Side Access project will bring the Long Island Rail Road (LIRR) to Grand Central Terminal, providing a much needed expansion of the New York metropolitan region's rail network. When the project is completed in 2013, thousands of LIRR passengers who now travel daily to Penn Station on their way to Manhattan's East Side will enjoy a faster, more convenient commute via LIRR into Grand Central Terminal. As a result, Penn Station will be less congested. In addition, with convenient LIRR access to the East Side, auto travel and associated air pollution will be significantly reduced, and the region will benefit significantly from expanded growth and development potential.

East Side Access will route the LIRR through new track connections in Queens and new tunnels under Sunnyside Yard, and through the existing 63rd Street Tunnel under the East River to Second Avenue in Manhattan, where new tunnels will curve south under Park Avenue and enter a new LIRR terminal beneath Grand Central Terminal.

The contract to build the Manhattan tunnels was awarded in July 2006. Inside are answers to frequently asked questions posed by people who live or work near the Manhattan construction route. Also included is information on the types of construction activities that will be used to build the tunnels, the anticipated impacts of the construction, and how to get more information.

Q. What is the route of the tunnel in Manhattan?

A. The Manhattan tunnels will be constructed approximately 120 feet below the surface and extend from the existing 63rd Street Tunnel's terminus at Second Avenue and East 63rd Street, curve south toward Park Avenue, pass below the 60th Street tunnels of the N and R subway, stay deep below the Metro-North tunnels as they approach Grand Central Terminal, enter a new terminal under GCT, and extend along Park Avenue to 38th Street (see map on cover).

Q. What construction techniques will be used to build the tunnel in Manhattan?

A. Two major tunneling techniques will be used:

Tunnel boring machines. From East 63rd Street and Second Avenue, twin rock tunnels will be mined using tunnel boring machines (TBMs) curving southwest to Park Avenue. At around East 58th Street and Park Avenue, each of the approach tunnels will split into upper and lower tunnels stacked in a two-above-two configuration, extending to about East 38th Street and Park Avenue.

Controlled drill and blasting. Excavation for the new terminal, caverns, crossovers, ventilation facilities, entrances and chambers to launch the TBM will require controlled drill and blasting.



Tunnel boring machines (TBMs) will be used in the construction of the twin rock tunnels.

Q. Have these construction techniques been used before?

A. The construction techniques that will be used for the Manhattan tunnels have been successfully used on hundreds of projects worldwide. The recently completed Con Edison Steam Tunnel on First Avenue in Manhattan and NYCDEP's Third Water Tunnel are examples of successful tunneling beneath New York City's densely developed neighborhoods.

Q. Will there be noise and vibration effects during construction?

A. At any one location, construction effects will be of short duration—typically between two weeks and two months. Noise and vibration from construction could be perceptible at locations up to 200 feet away from the activity and barely perceptible beyond 300 feet. Noise and vibration will be monitored constantly during construction.



Noise and vibration levels will be carefully monitored during construction.

TBM construction. Noise and vibration from the TBM are not expected to be readily apparent at the ground surface. However, the experience of noise and vibration is subjective. Some people may hear a low-level rumbling noise as the TBM passes directly beneath their building. The TBM will operate 24 hours per day, five days per week, but should not affect a person's ability to sleep. The TBM advances at about 50 feet per day and thus may be perceptible for four days per pass-by. Depending on the location, there will be up to four TBM pass-bys.

Controlled drill and blast construction. The locations where controlled drill and blasting will be required are indicated on the table below. In these areas, people can expect to feel several controlled blasts of short duration during certain

times of the day. Where perceptible, the noise and vibration may be similar to the muffled thud of a box of books being dropped on the floor in another room. Prior to and during tunnel construction, MTA will provide controlled blasting updates to residents and the business community as part of a comprehensive public information and notification program. Controlled drill and blasting, which advances at a rate of 10 feet per day, will not be permitted during nighttime hours in residential areas.

Q. Will there be any ground settlement as a result of tunneling?

A. A negligible amount of settlement of the ground surface is expected to occur as a result of tunneling in Manhattan. Potential settlements on the order of small fractions of an inch (one millimeter) are anticipated due to elastic deformation of the bedrock. By way of comparison, for most projects in New York City, settlements of 1/4 to 1/2 inch are acceptable and do not cause structural or cosmetic damage to buildings. (Since 1/4 inch equals approximately 6 millimeters, settlement expected from the new tunnels is six times less than the minimum allowable settlement for routine construction projects in New York City.)

The predicted settlement value was based on an extensive geotechnical boring program that included more than 300 borings, spaced between 50 and 100 feet apart. The program included measurements to determine the physical characteristics of the rock, extensive laboratory testing on the rock samples for strength and hardness, and computer modeling of rock movement.

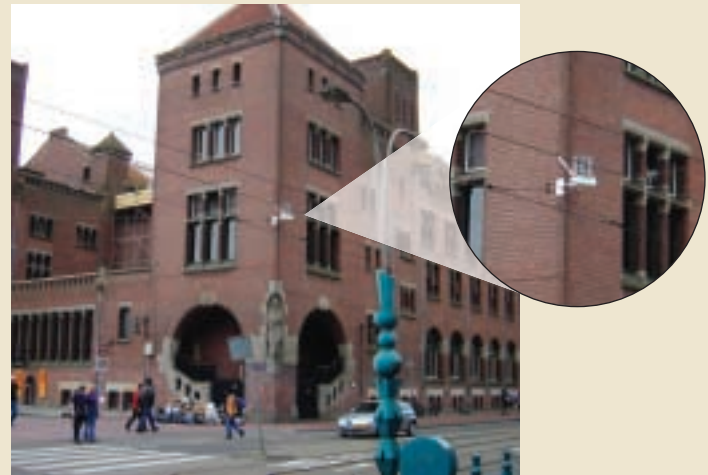
Q. How will ground settlement be monitored?

A. Monitoring of ground movement will take place in an area extending 100 feet from the edge of excavation. Pre-established monitoring criteria will provide advance indication of any settlements approaching threshold values, allowing adequate time to stop and modify the operations as necessary. Monitoring above the surface will comprise:

- Building facade monitoring, consisting of a system of prisms and both robotic and manually read total stations. This system monitors movement on a continuous, real-time basis and transmits the data electronically for review by geotechnical engineers.



The prisms are approximately two inches in diameter and will be mounted to a building's facade. Depending on the size of the building, a minimum of two prisms on two separate levels will be installed.



The robotic total station is slightly larger than the prism and will be mounted on a bracket on selected buildings. Depending on the line of sight, there will be approximately one total station per city block.

- Surface settlement monitors installed on sidewalks along the alignment, and crack monitors installed on existing cracks found in buildings. Both types of monitors, which are accessible from the street level, will be read manually on a regular basis.

Q. How will the excavated tunnel rock be removed?

A. Rock excavated from the tunnel will be transported either through the tunnels to Queens or removed by Metro-North trains to the Bronx. From there it will be moved by rail car or truck to final destinations.

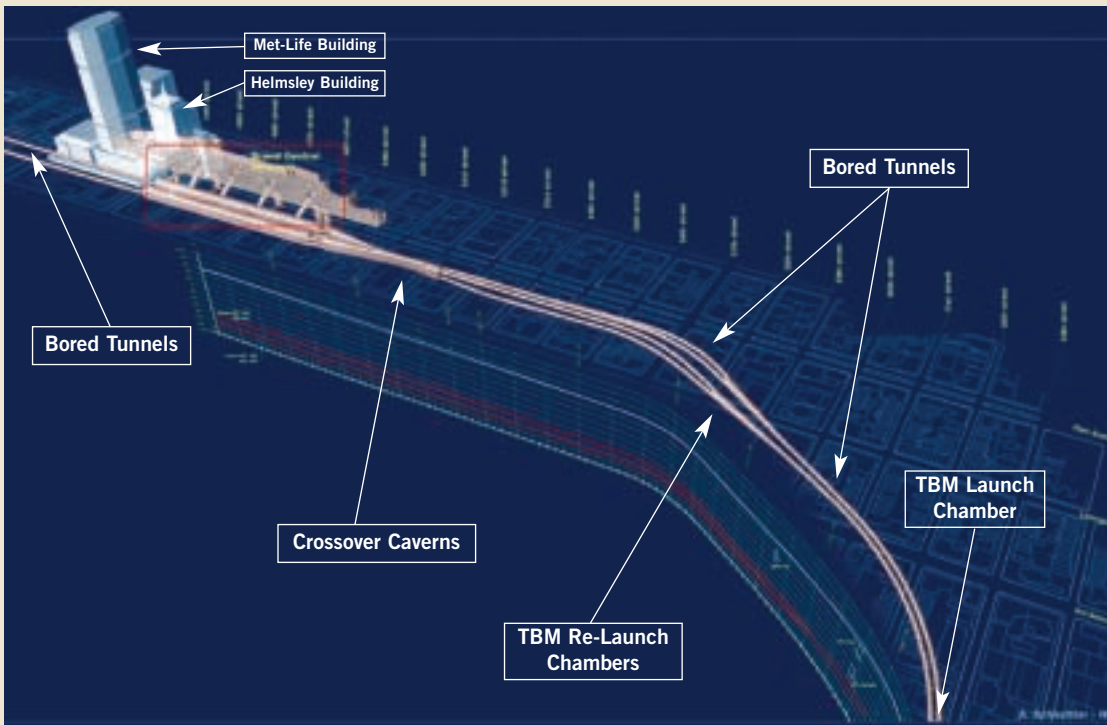
Q. What about noise and vibration from operation of the completed East Side Access project?

A. As noted, the tunnels will be approximately 120 feet below street level, beneath the Metro-North Railroad tunnels and the subway lines already in the area. Noise and vibration levels are not expected to increase significantly as a result of the trains operating in the new tunnel. Furthermore, ambient conditions likely will mask any project-generated effects, making them imperceptible. The project has been designed to incorporate special resilient fasteners and other vibration dampening measures to absorb the vibrations caused by train wheels on the tracks.

Q. What is the planned sequence and schedule of Manhattan tunnel construction?

A. Construction of the Manhattan tunnels is scheduled to begin in late 2006. Letters will be sent to businesses and residents in the vicinity of the Manhattan tunnels alignment to provide notification prior to the start-up of construction activities in their area.

Location (Vicinity)	Activity	Construction Method	Approx. Duration
63rd St./Second Ave.	Excavate TBM launch chamber	Controlled Drill and Blast	3.5 months
63rd St. to 38th St.	Bore first & second tunnels	TBM	10 months
59th St./Lexington Ave.	Excavate re-launch chambers	Controlled Drill and Blast	6 months
59th St. to 38th St.	Bore third & fourth tunnels	TBM	8 months
50th-52nd Sts./Park Avenue	Crossover chamber (upper)	Controlled Drill and Blast	6 months



Manhattan tunnels and structures for the MTA's East Side Access project

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