

A. INTRODUCTION

The Federal Transit Administration (FTA) and the Metropolitan Transportation Authority (MTA), in cooperation with the Long Island Rail Road (LIRR), propose the East Side Access Project, to provide direct access for LIRR riders to Grand Central Terminal (GCT). The proposed project is the locally preferred alternative, recommended after careful consideration of a full range of alternatives in the Major Investment Study (MIS) for the Long Island Transportation Corridor (LITC), which was completed in April 1998. The LITC is broadly defined to encompass the majority of origins, destinations, and routes of those traveling between Long Island and New York City, and therefore consists of Manhattan, Queens, Brooklyn, and Nassau and Suffolk Counties.

As shown in Figures S-1 and S-2, the East Side Access Project would bring passengers to GCT by constructing connections from the LIRR Main Line and Port Washington tracks south of Sunnyside Yard (in Queens) through the lower level of the existing 63rd Street Tunnel under the East River and from there to GCT. The new connecting tunnel in Queens would pass beneath Long Island City at approximately 41st Avenue; in Manhattan, the connecting tunnel would curve southward from the existing tunnel at 63rd Street and approximately Second Avenue toward Park Avenue, where it would continue to GCT.

The East Side Access Project would also create a new station to serve customers at Sunnyside and Long Island City, Queens. This station, adjacent to Sunnyside Yard at Queens Boulevard, would offer LIRR service to Penn Station. The station would be constructed to permit future expansion for possible use by Amtrak and/or New Jersey Transit (NJ Transit) trains.

The East Side Access Project is described in more detail below.

B. PURPOSE AND NEED FOR THE PROJECT

Today, there is a strong need for improved transit service between Long Island and Manhattan—especially East Midtown Manhattan—and this need will be still greater in the future. Currently, people who live on Long Island and work in Manhattan are faced with choosing among increasingly congested modes of transportation. The LIRR, the MTA New York City Transit (NYCT) bus and subway system, and the regional highway network are all operating at or near capacity at the busiest times of day. The congestion leads to increased commuting times and greater difficulties in getting to work. These difficulties, in turn, compromise the growth of both New York City's job base and Long Island's residential base.

The cause of these transportation problems lies in the economic and residential development of the region. Although total employment in Manhattan has stayed essentially the same since the early 1970's, white-collar jobs have risen dramatically and consistently, while blue-collar jobs in industries such as manufacturing have declined. As a result, Manhattan has experienced a tremendous growth in new office space in the post World War II period (nearly 213 million square

feet), and East Midtown has seen most (62 percent) of that growth (nearly 132 million square feet). Along with this shift in employment type and location has come a concurrent shift in the residential location of the labor force. In particular, an increasing number of Manhattan workers are living in Nassau and Suffolk County suburbs and commuting to jobs in Manhattan.

Population, employment, and labor force projections prepared by New York Metropolitan Transportation Council (NYMTC) for New York City and Long Island for the years 2010 and 2020 indicate that these trends will continue. Employment in Manhattan is projected to increase 21 percent by 2020, and the size of the labor force in Nassau, Suffolk, and Queens is projected to increase 28 percent by 2020.* These trends indicate that demands on the currently overtaxed transit and traffic systems will increase significantly, as the number of LIRR commuters arriving during the peak 4-hour period is projected to increase by 28 percent at Penn Station between 1995 and 2020 (see Table S-1).

Table S-1

**AM Peak 4-Hour Commuter Rail Ridership
Without the East Side Access Project: 1995, 2010, 2020**

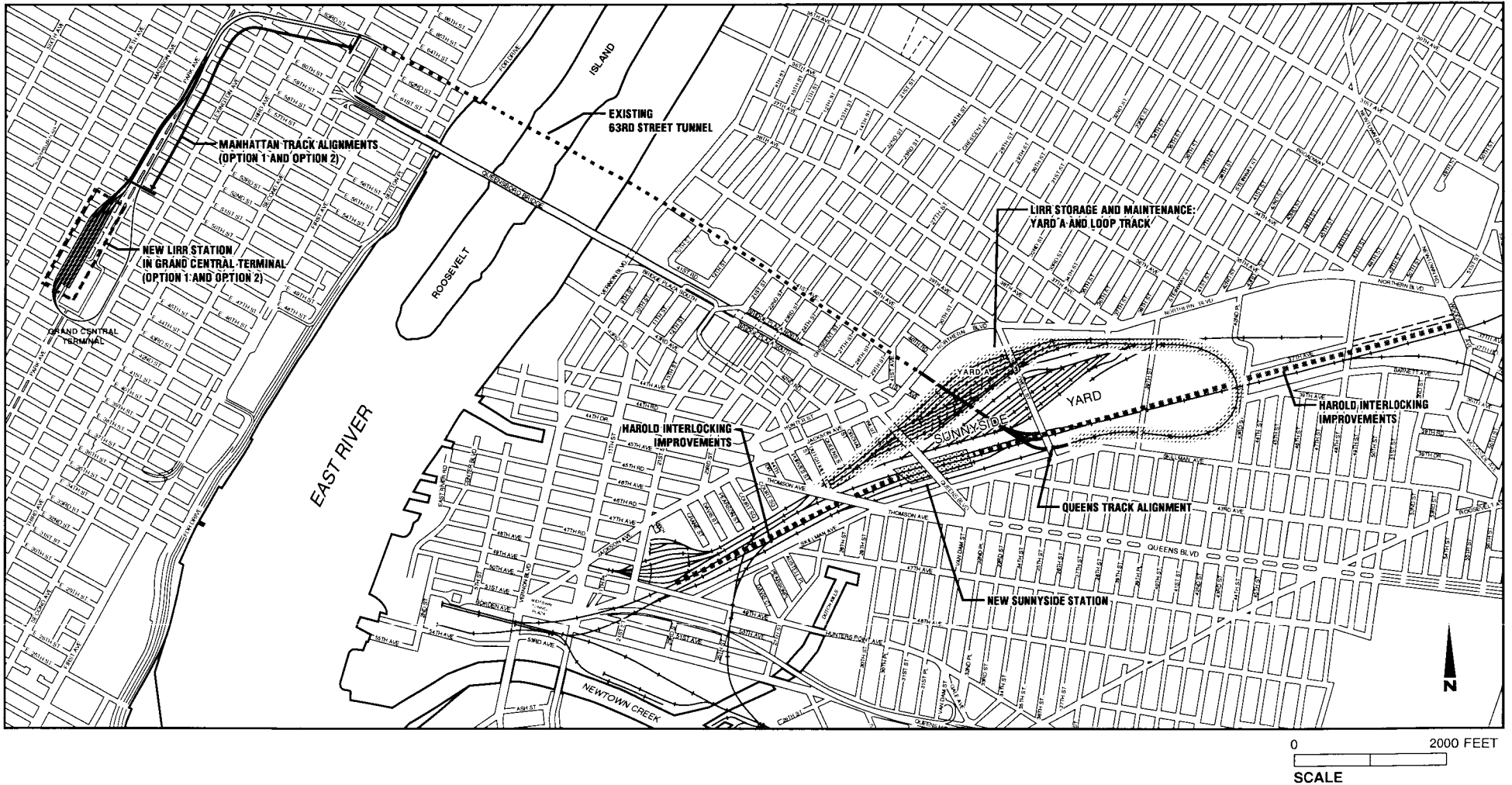
Terminal	1995 Arrivals	2010 Arrivals	Percent Change 1995-2010	2020 Arrivals	Percent Change 1995-2020
LIRR to Penn Station	86,630	103,856	20%	110,522	28%
MNR to GCT	70,169	84,164	20%	88,738	27%
Source: KPMG Peat Marwick, LLP.					

CAPACITY PROBLEMS AND NEEDS

These historical shifts in residential and office locations in the region, combined with projected growth in employment and labor force, have consequences for the capacity of the transportation system. The commuter rail transit capacity problem is most noticeable at Penn Station, the LIRR's only station in Manhattan. Penn Station is now operating at close to maximum capacity. The capacity of the East River Tunnels, the capacity of platforms and storage tracks at Penn Station, and the system's track layout all prevent the LIRR from significantly increasing service into Penn Station. Trains that enter Penn Station currently are overcrowded, and in the future, the situation will worsen. By 2020, at the busiest time of day, LIRR trains into Penn Station are projected to be operating at 127 percent of capacity.

The subway system, too, is operating at capacity during peak periods of the day. Some trains from Queens into Manhattan, including the Queens Boulevard lines (E, F, and R) are extremely crowded during rush hours. Automobile users also face congestion. Major highways like the Long Island Expressway (LIE) and the Grand Central/Northern State Parkway operate at capacity during peak periods of the day, as do major river crossings such as the Triborough and Queensboro Bridges and the Queens-Midtown Tunnel. With the LIRR, subways, and highways operating at or near capacity, delays on all modes of transportation are a common occurrence in the LITC.

* Projections prepared by Urbanomics for NYMTC, February 23, 1996.



TRAVEL TIME PROBLEMS AND NEEDS

In some cases, excessive travel times in the corridor are a direct consequence of capacity constraints, but in the case of access to East Midtown, lengthened travel times are also an issue of “disconnection.” While LIRR trains enter Manhattan on the East Side through the East River Tunnels at 33rd Street, passengers cannot disembark until trains reach the West Side. Commuters who work in East Midtown, or at any location on the East Side, must double-back across town to reach their destinations. It is estimated that doubling-back costs commuters anywhere from 15 to 30 minutes of commuting time each day. Since the train ride is typically 30 minutes to an hour, this in-Manhattan trip adds substantial time to the total trip. To avoid this doubling-back, some LIRR commuters transfer to subway connections in Queens to travel to destinations on the East Side or in Lower Manhattan. The additional travel time to East Midtown for LIRR riders once they leave their commuter trains and the inconvenience of the transfer encourages some commuters to drive to work, adding to highway, local road, and bridge and tunnel congestion.

The congestion and inconvenience associated with the area’s transit system—its increasing lack of capacity, its inaccessibility to many residents, its unreliability and slow speeds, and its inability to cope with change and growth—threatens the vitality of the regional economy and contributes to a decline in community character and quality of life throughout the corridor.

PROJECT NEED

The proposed action is critical for the future of the LITC. Without the project, transportation conditions in the corridor will deteriorate:

- The LIRR will not be able to accommodate demand for service into Manhattan, causing severe overcrowding on peak hour trains.
- Commutes on the LIRR characterized by crowding and delays will continue to be followed by time-consuming trips to East Midtown by many LIRR commuters, causing millions of person-hours of delay each year.
- Inadequate transit service will worsen already serious congestion on the region’s roads and highways, as residents of Long Island and eastern Queens choose to drive to avoid the growing inconvenience of mass transit.
- Commuters in aggregate will travel hundreds of thousands of miles in automobiles each day, worsening already poor air quality conditions.

CURRENT PLANNING CONTEXT

Problems similar to those encountered in the LITC can be found in varying degrees throughout MTA’s vast transportation system. Recognizing the need for system-wide improvement and the interconnections among the system’s many components, MTA has developed the “Long Range Planning Framework” aimed at a unified program of improvements to its subway and commuter rail systems. MTA is examining how its network can be expanded and adapted to meet long-term access and mobility needs via seven coordinated but independent studies. The following MTA projects and studies are intended to alleviate overcrowding, reduce travel time, better connect the rail and subway lines, provide high-quality service, and extend service to underserved areas:

MTA/LIRR East Side Access FEIS

- The *Second Avenue Subway/Manhattan East Side Alternatives Study (MESA)*, which examines NYCT's long-term needs and options for increasing transit capacity on Manhattan's East Side. *The MESA Study is the planning effort for the northern element of a full-length Second Avenue subway that will extend generally along Second Avenue from 125th Street in East Harlem to the Financial District in Lower Manhattan. The MESA Study identifies two possible "build" alternatives, both of which include construction of a new East Side subway line under Second Avenue from 125th Street to 63rd Street, continuing via the unused Broadway line express tracks to West Midtown and Lower Manhattan. A total of \$1.05 billion has been allocated in the MTA's 2000-2004 Capital Program for a full-length Second Avenue subway project.*
- East River Crossing Study, which assesses alternative strategies to improve transit service between Brooklyn and Manhattan;
- La Guardia Subway Access Study, which is evaluating methods to create one-seat rail rapid transit access from Lower and Midtown Manhattan to La Guardia Airport, perhaps via an extension of the Broadway line N train;
- Metro-North Penn Station Access, which considers options for bringing Metro-North Railroad commuter trains into Penn Station via tracks currently used by Amtrak trains for long-distance travel;
- Lower Manhattan Access, which identifies, evaluates, and recommends alternatives for short- and long-term access improvements to Lower Manhattan for New York's suburban commuters using Metro-North Railroad (MNR), the LIRR, or various subway options, including a new subway under Second Avenue; and
- Access to the Region's Core (ARC), which examines long-term transportation initiatives to improve access and mobility from west of the Hudson and Queens/Long Island to Midtown Manhattan's CBD ("the core").

These studies, along with MTA/LIRR East Side Access, are being coordinated through the MTA Long Range Planning Framework Group, which consists of study managers and key staff from MTA and its rail subsidiaries: LIRR, MNR, and NYCT, as well as NYMTC, the Port Authority of New York & New Jersey, and NJ Transit.

C. PROCESS AND DECISION-MAKING TO DATE

The *Final* Environmental Impact Statement (*FEIS*) was prepared in accordance with the regulations of the National Environmental Policy Act of 1969 (NEPA). NEPA requires federal agencies to evaluate the environmental consequences of proposed actions and their alternatives, to identify measures to mitigate any significant adverse impacts, and to conduct the entire process in coordination with other agencies and the public. In compliance with the requirements of NEPA, the FTA cannot approve or fund the East Side Access Project's construction until the environmental review process is complete.

The analysis of the East Side Access Project's environmental effects began in 1995, concurrent with the preparation of the MIS. The Notice of Intent was published and the public scoping process was performed. Three public scoping meetings were held in July 1995 to satisfy NEPA requirements for the MIS/DEIS process. The MIS was conducted pursuant to the transportation planning procedures established under the Intermodal Surface Transportation Efficiency Act of

1991 (ISTEA). That statute required the preparation of an MIS in connection with an application for federal funding of capital projects for mass transportation systems. The MIS was prepared to evaluate the effectiveness of a wide range of alternative investments or strategies to attain the transportation goals for the Long Island Transportation Corridor.

As a result of the MIS process, NYMTC *identified* a locally preferred alternative on June 25, 1998 (Resolution No. 94A). Conceptual engineering was then undertaken for the locally preferred alternative, i.e., the Preferred Alternative evaluated in the *FEIS* that would provide LIRR service through Sunnyside to GCT via the lower level of the 63rd Street Tunnel. As part of the engineering effort, engineering options were developed for the Preferred Alternative and are evaluated in the *FEIS*. In accordance with NEPA, the *FEIS* also evaluates the environmental consequences of the No Action Alternative and a Transportation Systems Management (TSM) Alternative.

The project has included an extensive public outreach program, initiated during the MIS phase and continuing throughout the *DEIS* and *FEIS* phases. The outreach program has included dozens of meetings with community boards, the public, local and regional organizations, a project Technical Advisory Committee (TAC) and Citizens' Advisory Committee (CAC), and interested governmental agencies.

Public review of the DEIS began on May 17, 2000, when it was published and distributed. Notice of the availability of the DEIS and the date of the public hearing was published in the Federal Register on May 26, 2000. The DEIS was circulated to involved and interested agencies and other interested parties, including elected officials and community groups in areas affected by the project. Copies were made available at a wide range of viewing locations throughout the project area. In addition, postcards indicating that the DEIS was available and that the public hearing would be held were circulated to some 5,000 businesses and households along or within the vicinity of the proposed tunnels in Manhattan. The Metropolitan Transportation Authority (MTA) held a public hearing on June 15, 2000 at 347 Madison Avenue, fifth floor boardroom. The public comment period was held open until July 12, 2000; however, comments were accepted following that period through December 1, 2000. To advertise the public hearing, MTA published notices in newspapers of general circulation as well as community and minority newspapers throughout the area. These included Newsday, The Journal News, Connecticut Post, Yankee Trader, The Queens Chronicle, The Amsterdam News, and El Diario-La Prensa. MTA also posted advertisements for the hearing in MTA commuter railroad stations and performed seat drops with notice of the hearing on both LIRR and Metro-North commuter trains.

During the public comment period on the DEIS, more than 300 comments were received from residents and elected officials of municipalities in Nassau and Suffolk Counties, particularly Greenlawn, Babylon, and Riverhead, with respect to the analyses of new night-time storage yards on Long Island that would be required to accommodate the Long Island Rail Road's expanded fleet. These comments were in opposition to selection of yard sites in Greenlawn (Hazeltine), Babylon, and Riverhead. Many commenters also requested greater public review and involvement in the site selection process for new storage yards. The text in the FEIS has been clarified with respect to the yard sites. This is discussed in more detail below in section D ("Project Alternatives").

This FEIS for the proposed action was prepared after receipt and evaluation of comments on the DEIS. In a new chapter, Chapter 28, "Comments and Responses on the Draft Environmental Impact Statement," the FEIS identifies the comments received and provides responses.

A Record of Decision (ROD) will be prepared by FTA after its review of the FEIS, stating its determination on project funding and implementation. Consistent with NEPA requirements, the ROD will be prepared no earlier than 30 days after publication of a Notice of Availability of the FEIS in the Federal Register.

D. PROJECT ALTERNATIVES

Development and evaluation of alternatives for the East Side Access Project began in the MIS phase of the project. The process involved several years of discussions, outreach, scoping meetings, and research geared toward developing scenarios that would improve transit access to East Midtown Manhattan and increase the capacity of the LIRR system. A Technical Advisory Committee of transportation and environmental professionals was formed to review technical data related to the development of the alternatives. A Citizens' Advisory Committee provided a formal mechanism for obtaining a broad base of community input relating to goals and objectives defined for the project. Several new ideas for alternative alignments were a direct outgrowth of these committees.

The alternative screening and evaluation phase considered all options suggested, evaluating each against the project's goals and objectives. Alternatives were first grouped into a "long list of project alternatives" and then subjected to a number of screening criteria, which eliminated alternatives that did not meet project criteria or were operationally or technically infeasible. Remaining alternatives were evaluated in depth and a Preferred Alternative, along with a No Action and a Transportation Systems Management (TSM) Alternative, were selected for analysis in the EIS.

The public outreach efforts that began during the MIS were continued as part of the EIS process. In fact, the effort was expanded to reach MNR customers in Westchester and Connecticut. Outreach targeted to those in the immediate project area in Manhattan and Queens was implemented (and is ongoing) through a series of meetings held along the Park Avenue alignment in Manhattan, discussions with and presentations to Community Boards, and consultations with individual property owners. Conceptual designs developed for the project are closely coordinated with affected rail and transit operators such as LIRR, MNR, NYCT, Amtrak, and New York & Atlantic Railway (NYAR), a freight operator that uses the LIRR system.

NO ACTION ALTERNATIVE

The No Action Alternative consists of improvements that will be implemented by the LIRR by 2010 (the project's analysis year) and 2020 (a forecast year for the project). It includes projects that have been identified in MTA's 2000-2004 Capital Program and the LIRR's long-range plans, as well as projects sponsored by other transportation agencies that have received the same level of consideration. These initiatives include numerous improvements by MNR and NYCT, in addition to the following LIRR projects to be completed by 2010:

- Increase in peak period service in the peak direction. This includes increasing AM peak hour train arrivals at Penn Station from the current 37 to 42 as well as providing additional service on the "shoulders" of the peak hour. Service will also be increased correspondingly

during the PM peak period. Service will be increased on the Port Jefferson, Oyster Bay, Montauk, Main Line/Ronkonkoma, and Port Washington Branches.

- Addition of reverse peak service during the peak period. The LIRR's Main Line Third Track Project will construct an additional track between Bellerose and Hicksville, providing capacity for increased reverse commute service on the Main Line. Additionally, the Main Line Double Track Project will construct an additional track between Farmingdale and Ronkonkoma, allowing additional peak direction service between Penn Station and Ronkonkoma.
- Provision of new dual mode service and bi-level fleet. New dual-mode service will provide a one-seat ride to Manhattan from diesel territory. Further, the entire diesel-hauled fleet has been replaced by a new fleet of bi-level coaches, slightly increasing line capacity.
- Expansion of LIRR storage yard capacity. The LIRR's electric fleet must be expanded by an estimated 180 new cars over the next 20 years to accommodate projected ridership growth. To accommodate those new cars, LIRR will expand existing yards within railroad property and purchase land and construct a new eight-track storage yard on the Port Jefferson Branch. The existing yards to be expanded include Babylon and Port Washington Yards, where tracks would be lengthened within the existing yard boundaries, and Ronkonkoma and Long Beach Yards, where three and two tracks, respectively, would be added within the existing yard boundaries.

In the Draft Environmental Impact Statement (DEIS) for the East Side Access Project, the Hazeltine and Cerro Wire sites were identified as potential sites for a new eight-track yard on the Port Jefferson Branch under the No Action Alternative. That discussion was based on sites identified through a preliminary screening process conducted by the LIRR. That discussion is no longer applicable. Based on community input, the LIRR has determined that it will initiate a new site selection process for any new yards to be developed. This is discussed in more detail later in this chapter, in the description of "Maintenance and Storage" for the Preferred Alternative.

- Substantial improvements to the LIRR's Jamaica Station and Atlantic Terminal at Flatbush Avenue, in Brooklyn.
- The improvement and expansion of parking lots at LIRR stations throughout the system.
- The rehabilitation of the East River Tunnels.
- The systemwide improvement of communications, traction power, and signaling systems. Synchronized with this work, the LIRR will gradually replace its wood ties with new concrete ties.
- In conjunction with the Main Line Third Track Project, an ongoing program to eliminate eight at-grade crossings to improve safety on the Main Line.

TRANSPORTATION SYSTEMS MANAGEMENT (TSM) ALTERNATIVE

The TSM Alternative consists of a number of improvements, not currently planned for construction or operation, to maximize the use of the existing transportation system without major capital expenditures. It contains three major transportation elements:

- Increasing the number of rail cars on LIRR trains by 2 to 4 cars, up to the limit of 12 rail cars, which is the maximum LIRR platform length. This initiative would require lengthening

selected station platforms to accommodate the longer trains, as well as some other minor improvements.

- Increasing LIRR service to the Hunterspoint Avenue and Long Island City stations. This component would add a total of six additional trains from various LIRR branches, terminating at either Hunterspoint Avenue or Long Island City. Pedestrian improvements would be made at both terminal stations and ferry service (privately operated) would be increased between Long Island City and Manhattan.
- Extending the existing westbound morning contra-flow lane on the Long Island Expressway (LIE) that currently operates in the morning peak period between the Queens-Midtown Tunnel toll plaza and Greenpoint Avenue in Queens. The AM-only westbound contra-flow lane would be extended 3.6 miles to the east, to 102nd Street in Corona, Queens near the Grand Central Parkway interchange, and a new flyover and on-ramp to the contra-flow lane would be provided just east of 74th Street. These changes would improve morning peak hour travel time for Queens express bus service to Manhattan by using one lane on the eastbound side of the LIE for westbound bus and taxi service. (However, this alternative would require reconstruction of all the westbound traffic lanes and service ramps and lanes in this area, and substantial reconstruction of the LIRR bridge at 86th Street.)

In addition to these changes, the TSM Alternative, *like the No Action Alternative*, would require a new storage yard on the Port Jefferson Branch for electric rail cars. The additional service operating in diesel territory in this alternative would use available capacity in existing diesel yards.

The TSM Alternative is estimated to cost \$655.6 million (in dollars escalated to the midpoint year of construction).

PREFERRED ALTERNATIVE

The Preferred Alternative would establish a direct link from the LIRR Main Line and Port Washington Branch to GCT. As shown in Figure S-2, the new service would branch away from existing LIRR tracks at Sunnyside Yard in Queens and travel in new tunnels beneath Sunnyside Yard and LIRR's Yard A. It would continue in the currently unused lower level of the existing 63rd Street Tunnel beneath the East River. In Manhattan, the service would continue west from the tunnel's terminus at Second Avenue and 63rd Street, in one of two possible tunnel configurations (referred to as Option 1 and Option 2, and described below). In both options, service would head west toward Park Avenue and then south, beneath the existing MNR tracks under Park Avenue, into GCT. At GCT, the LIRR would have new tracks, platforms, waiting areas, ticket windows, and other services.

As described below, the Preferred Alternative would require construction of new tunnel connections beneath Sunnyside Yard and approximately 3 miles of new tunnel in Manhattan. Altogether, the project's multiple tunnels would total approximately 9.5 miles of new tunnels, with approximately 13 miles of tracks. The project would also involve construction of numerous new structures, including new tracks, platforms, and below-grade ventilation and substation facilities in GCT; a new ventilation structure on East 44th Street between Vanderbilt and Madison Avenues; five new off-street entrances to GCT between 44th and 49th Streets; new below-grade substations and ventilation facilities along the project alignment; a new LIRR passenger station in Sunnyside, Queens; new LIRR storage and maintenance facilities at Yard A and the adjacent Arch Street Yard in Sunnyside; new facilities in Queens at Blissville or Maspeth and Fresh Pond

for use by New York & Atlantic Railway (NYAR) to replace those displaced by the project from Yard A; and new facilities at Highbridge Yard in the Bronx for use by MNR to replace those displaced by the project from GCT.

MANHATTAN ALIGNMENT

Two engineering options were considered in the DEIS for the Preferred Alternative's Manhattan alignment, with different terminals at GCT. Option 1 is a refined version of the locally preferred alternative identified in the MIS, which uses the lower level of GCT for a new LIRR terminal. Option 2 emerged during conceptual engineering of Option 1—resulting from a need to reduce complex construction methods associated with building tunnels in close proximity to Metro-North tunnels and buildings along Park Avenue.

As described below, Option 1 would require underpinning of four buildings on the west side of Park Avenue between 52nd and 55th Streets and underpinning of portions of the Metro-North tunnel structures. Option 2 would remain deep after leaving the 63rd Street Tunnel and would construct a new LIRR station beneath the lower level of GCT. This would eliminate the need to underpin buildings and tunnel structures. Option 2 could be constructed with minimal impact to Metro-North operations during construction.

Option 2 has been identified as the preferred engineering option for East Side Access because it has substantial advantages in terms of cost, constructability, and operations, and significantly fewer impacts on MNR and risks during construction. Specifically, Option 2 is preferable to Option 1 for the following reasons, among others (also see Table S-2):

- *Option 2 would cost less to construct than Option 1.*
- *Option 2 would perform better under “perturbed” or emergency conditions, because it would provide a large public concourse level that could serve as a new waiting area for passengers delayed by service outages at GCT.*
- *Option 2 would not require lengthy track outages for MNR during construction, and therefore would not result in significant impacts to MNR, as would Option 1.*
- *Option 2 would not require underpinning of buildings along Park Avenue or MNR tunnels and, overall, would have significantly less construction risk than Option 1. Option 2 would allow the use of different tunneling techniques and would isolate the construction work from existing railroad and subway tunnels and building foundations.*

Furthermore, public and agency comments received prior to and during the public comment period were overwhelmingly supportive of the project with Option 2 for its Manhattan alignment (see Chapter 23, “Process and Public Participation”). In addition, Metro-North and NYCT have expressed a strong preference for Option 2.

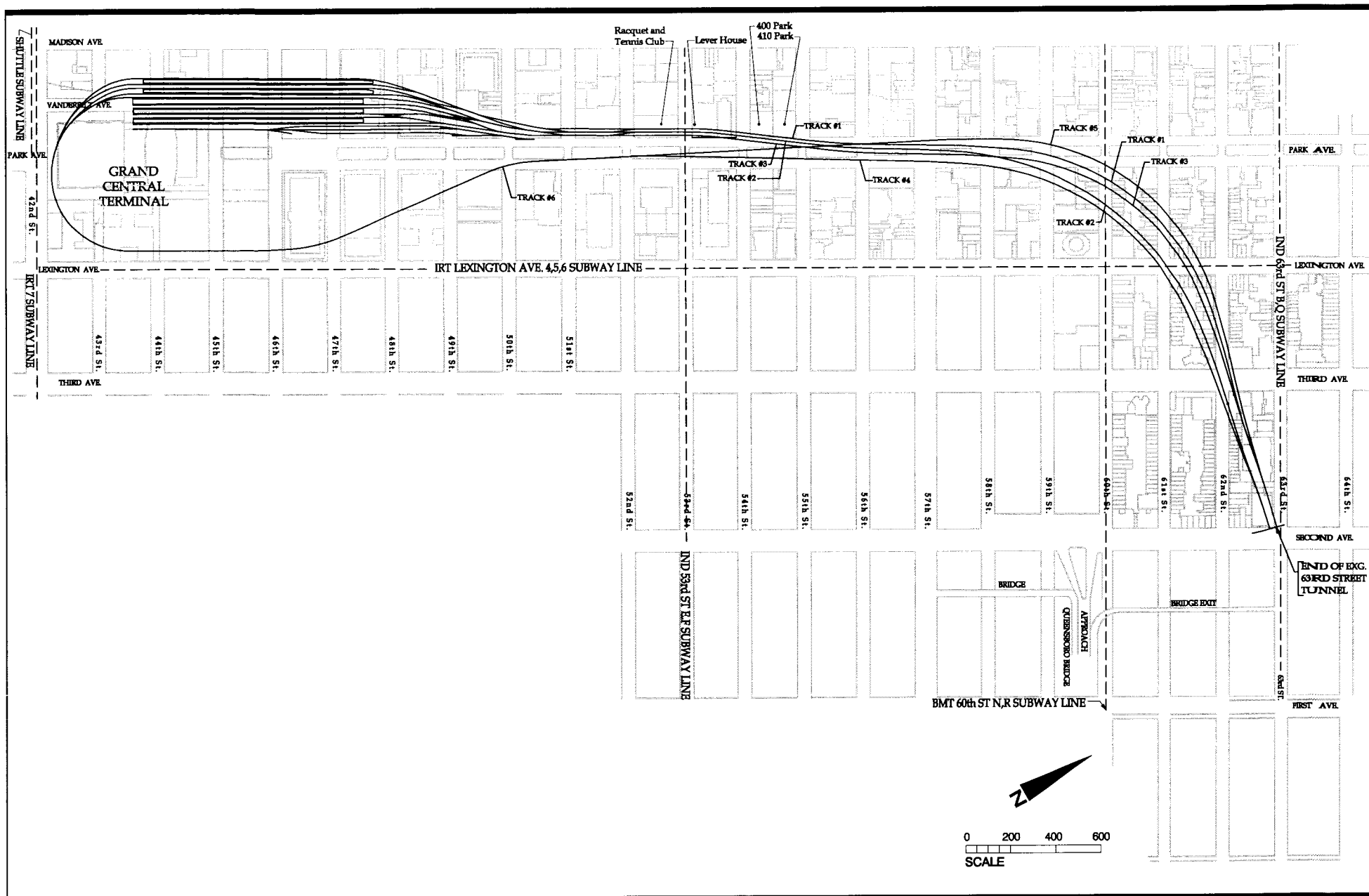
Option 1 is retained in this FEIS for comparison purposes. Both options are described in more detail below and illustrated in Figures S-3 and S-4.

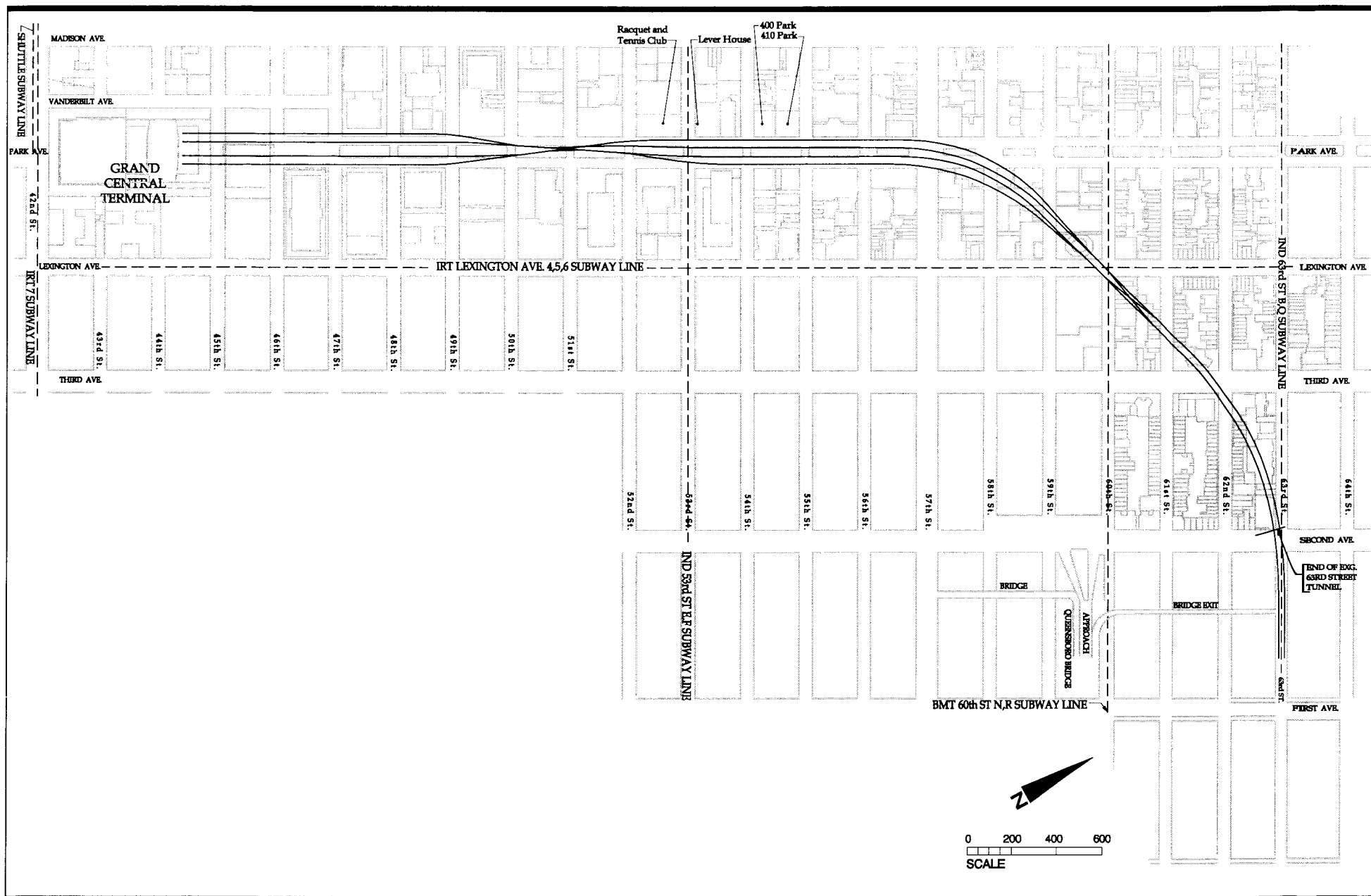
Option 1: Station in Existing Lower Level of GCT

This option of the Preferred Alternative would create a 10-track, five-platform LIRR terminal in the existing lower-level track area of GCT, in an area currently occupied by Metro-North

Table S-2
Comparative Features of Manhattan Alignment Options

Component	Option 1	Option 2
Customer Operations: Waiting and Services	<ul style="list-style-type: none"> • Uses Biltmore Room and new space created adjacent to Dining Concourse • Escalators and elevators to Biltmore Room • May replace retail space at Shuttle Passageway for ticketing and waiting • Platforms 17 feet to 22 feet wide 	<ul style="list-style-type: none"> • Madison Yard area as concourse provides for large waiting areas, passenger services • Elevators and escalators to Biltmore Room • Possible use of retail space at Shuttle Passageway for ticketing • Platforms 28 feet wide
Customer Operations: Vertical Circulation	<ul style="list-style-type: none"> • One rise from platform to cross passage, then to street • Platforms 65 feet below street 	<ul style="list-style-type: none"> • Three rises from platform to street level; long rise from cross passage to <i>concourse</i> • Platforms 140-160 feet below street
Customer Operations: Horizontal Circulation	<ul style="list-style-type: none"> • Restricted to three cross passages 	<ul style="list-style-type: none"> • Madison Yard mezzanine provides for direct exits to street, improved passenger circulation
Train Operations	<ul style="list-style-type: none"> • Loop track for return moves • Existing structure constrains throughput in "throat" at GCT • Maximum grade 3.25 percent 	<ul style="list-style-type: none"> • Stub end terminal • Throat area designed to suit throughput needs • Maximum grade 3.0 percent
Construction Cost	<ul style="list-style-type: none"> • Up to \$400 million higher than Option 2 	<ul style="list-style-type: none"> • Up to \$400 million lower than Option 1
Operating Costs	<ul style="list-style-type: none"> • Comparable 	<ul style="list-style-type: none"> • Comparable
Construction	<ul style="list-style-type: none"> • Requires underpinning of four buildings along Park Avenue • Requires underpinning of train shed in GCT • Minimal rock cover over tunnels, mixed face tunneling 	<ul style="list-style-type: none"> • Entire alignment in deep rock • No underpinning required
Impact on MNR	<ul style="list-style-type: none"> • Uses Madison Yard for platforms/tracks • Requires underpinning of MNR Park Avenue tunnel • Requires significant track outages during construction for up to 4 years • Under delay conditions, creates overcrowding in the 47th Street cross passageway 	<ul style="list-style-type: none"> • Uses Madison Yard for passenger concourse • No underpinning required, minimal track outages during construction • Performs better than Option 1 under delay conditions; provides additional waiting area for MNR customers
Construction Issues	<ul style="list-style-type: none"> • Impact to private buildings to be underpinned and related sidewalk and lane closings for 2 years on 52nd Street • Sidewalk and lane closings for 4 years on 53rd Street for reconstruction of NYCT vent plant • Sidewalk and lane closings for 3 years on 54th Street for construction of vent plants • Construction work for 2 years for 44th Street vent facility • Minor disturbances for entrances and vents at other locations • Use of shaft site in Queens for 10 years 	<ul style="list-style-type: none"> • No need for underpinning; minimal impact to 52nd Street for access to vent plant and construction of gratings • No need to rebuild NYCT 53rd Street vent plant • No impact to 54th Street • Sidewalk and lane closings for 2½ years on 55th Street for construction of vent plant • Construction work for 2 years for 44th Street vent facility • Minor disturbances for entrances and vents at other locations • Use of shaft site in Queens for 10 years





platform and storage tracks and known as “Madison Yard.” Five of the tracks would be stub-ended and the other five would connect on their southern ends to the existing GCT lower-level loop track, which curves beneath GCT and around to the north, and would be connected to new Queens-bound LIRR tracks. Option 1 would also create new passenger areas on a number of levels within GCT, including a new passenger concourse in GCT’s Dining Concourse level (the lower level), *possible* new escalators and elevators into a passenger space in the Biltmore Room on GCT’s Main Concourse level, and new street entrances to the LIRR platforms between 45th and 48th Streets, similar to those recently opened for Metro-North customers as Grand Central North. *(Design and construction of new escalators to the Biltmore Room is subject to review and approval by the New York State Historic Preservation Office [SHPO] at the New York State Office of Parks, Recreation and Historic Preservation.)* The new entrance locations were chosen based on a set of objective siting criteria that included a review of structural and architectural drawings for affected buildings. However, for some buildings these drawings were not up-to-date or even available, *so the list of potential new entrances was preliminary.*

The five entrance locations considered for Option 1 are as follows:

- At the southeast corner of Vanderbilt Avenue and East 45th Street (outside the Met Life Building);
- Within 347 Madison Avenue (at 45th Street);
- At 245 Park Avenue on the south side of East 47th Street between Park and Lexington Avenues (to serve both LIRR and MNR customers);
- At 270 Park Avenue on the southwest corner of East 48th Street and Park Avenue; and
- Within the building at 280 Park Avenue on the north side of East 48th Street between Madison and Park Avenues.

In addition, within the new building being constructed at 383 Madison Avenue, a new entrance is being created in support of the Preferred Alternative on the south side of East 47th Street between Park and Madison Avenues. Additionally, two of the access points constructed as part of the Grand Central North project and in use by MNR customers would be shared with LIRR customers:

- At the northeast corner of East 48th Street and Park Avenue; and
- On the north side of East 47th Street between Park and Madison Avenues.

Leaving GCT to the north, the 10 LIRR tracks would join to form three main tracks that gradually descend in new tunnels. Between 52nd and 55th Streets, the main LIRR tracks would be west of MNR’s tracks, in a new tunnel beneath the buildings on the west side of Park Avenue. The project would also use the existing lower-level loop track at GCT, which runs below buildings on the east side of Park Avenue. At 53rd Street, the main tracks would pass above the E and F subway lines, while two loop tracks on the east side of Park Avenue would pass below the subway. From 55th Street northward, the new LIRR tracks would travel in five tunnels beneath MNR’s tracks under Park Avenue. The tracks would gradually curve eastward at approximately 59th Street and continue eastward, passing beneath the N and R and Nos. 4, 5, and 6 subway lines to meet the lower level of the existing 63rd Street Tunnel at Second Avenue, approximately 140 feet below the street (see Figure S-3).

Option 2: New Deeper Station in GCT

For Option 2, the DEIS analyzed a new terminal beneath GCT's lower level with 10 tracks and five platforms. Since publication of the DEIS, the design for Option 2 has been advanced. Currently, two design concepts are being considered for the Option 2 terminal, both of which would require fewer tracks and one less platform than presented in the DEIS. To ensure that the terminal station and approach tunnels optimize constructability and operational performance, the design will continue to be refined throughout preliminary engineering.

Under Option 2, a new passenger concourse would occupy the westernmost track area of GCT's lower level—the area that would be used for LIRR's new tracks and platforms under Option 1. As described above, that area is currently occupied by four tracks used for MNR service (tracks 114-117) and the tracks of MNR's Madison Yard. The new finished concourse space would be separated from MNR's track area to the east, and would be well lit and climate-controlled. It would include passenger amenities, such as ticketing booths, information booths, waiting room seating, retail elements (newsstands, etc.), and required LIRR administrative and operational support spaces.

New LIRR tracks and platforms would be located beneath the concourse area. The two design concepts being considered vary in the layout of the tracks and platforms under Option 2: one concept would have eight tracks served by four platforms on one new lower level, approximately 90 feet below the new concourse and existing lower level at GCT, while the other concept would have eight tracks served by four platforms on two new levels, approximately 90 feet and 110 feet below the concourse level.

To access the new concourse from the platforms, LIRR customers would use one of several escalator banks. The main bank would have five escalators, four of which would operate in the peak direction of travel. Most other banks would have two escalators and a staircase. Elevators from the platform would also be available. Escalator connections to the Biltmore Room are also being considered for Option 2 under both design concepts. The design and construction of escalators to the Biltmore Room is subject to review and approval by the SHPO.

For either design concept of Option 2, the practicality of using the same five locations for new off-street entrances as in Option 1 was explored. Some basic differences in the design schemes for each option warranted a closer look at certain off-street entrance locations. For example, the elimination of cross passageways at 45th and 48th Streets as a means of egress to the street in Option 2 changed the vertical circulation requirements to satisfy emergency egress codes. The study determined that four of the five new off-street entrances proposed for Option 1 meet the siting criteria and are recommended under Option 2. (As information becomes available through structural and architectural surveys performed during preliminary engineering, the locations chosen will continue to be reviewed and assessed against the siting criteria. Any change in the location of an entrance to GCT is likely to be a minor one, with potential shifts within the same building or block, or to a nearby street, which would not significantly affect the environmental analyses presented in this document.) These sites are as follows:

- Within 347 Madison Avenue (at East 45th Street);
- On the south side of East 47th Street between Park and Lexington Avenues (outside of the American Brands Building at 245 Park Avenue);
- On the southwest corner of East 48th Street and Park Avenue (outside of the Chase building at 270 Park Avenue); and
- Within Bankers Trust at 280 Park Avenue, on the north side of East 48th Street between Madison and Park Avenues or on the south side of 49th Street between Madison and Park Avenues.

The proposed fifth off-street entrance is on the southeast corner of 44th Street at 335 Madison Avenue (Bank of America). In addition, like Option 1, Option 2 would also use three of the access points constructed as part of the Grand Central North Project.

Moving north from GCT, between 52nd and 59th Streets, the new tracks would join together and continue north in four tunnels approximately 120 feet deep below Park Avenue (see Figure S-4). At 53rd Street, all the tracks would pass well below the E and F subway tunnels. At approximately 58th Street, the tunnels would gradually curve eastward, passing beneath the N and R and Nos. 4, 5, and 6 subway lines, combining into two tunnels at 61st Street and Lexington Avenue, and joining the existing 63rd Street Tunnel at Second Avenue.

63RD STREET TUNNEL

The Preferred Alternative would use the currently unused lower level of the existing 63rd Street Tunnel, which runs from Second Avenue at 63rd Street in Manhattan to approximately Northern Boulevard at 41st Avenue in Queens. The tunnel was built with two levels, for subway service on the upper level and LIRR service below. The B and Q subway lines use the upper level of the 63rd Street Tunnel.

QUEENS TUNNELS

In Queens, the Preferred Alternative would continue from the 63rd Street Tunnel to meet the LIRR's Main Line and Port Washington tracks in Harold Interlocking, just south of Sunnyside Yard (see Figure S-5). Harold Interlocking is the 1.5-mile stretch of track—and the associated switches and crossovers—shared by LIRR and Amtrak at Sunnyside. The interlocking provides access to and from the East River Tunnels, Sunnyside Yard, LIRR's Main Line and Port Washington Branch tracks, and Amtrak's route to and from New England over the Hell Gate Bridge. Two new LIRR tracks would continue from the existing 63rd Street Tunnel, run under Northern Boulevard (and beneath the E, F, G, and R subway lines that run under Northern Boulevard as well as the elevated N subway line above Northern Boulevard), and then fan out under Yard A and Sunnyside Yard into five separate tunnels. After crossing beneath the railroad yards, the tracks would ascend, emerging from the five tunnels to join the tracks at Harold Interlocking and a new loop track into the yard that provides access to storage tracks at Sunnyside Yard and Yard A. LIRR's Yard A and Arch Street Yard, which are adjacent to and north of Sunnyside Yard in the large railroad complex at Sunnyside, would be used for maintenance and midday storage of LIRR East Side Access trains.

NEW SUNNYSIDE STATION

In addition to the new service to GCT, East Side Access would also create a new station in Sunnyside, Queens. Selected LIRR trains bound to and from Penn Station would stop at this

new station located at Queens Boulevard (which crosses over the LIRR Main Line tracks and Sunnyside Yard). In the future, this station could also be used for Amtrak and/or NJ Transit service. The station's main entrance would be on the west side of the Queens Boulevard bridge near its Skillman Avenue end. Stairs and elevators would provide access to the platforms below. The station building and platforms would also be connected to a new passenger drop-off and pick-up area on the north side of Skillman Avenue, west of Queens Boulevard. *In addition, MTA has allocated \$2 million in its 2000-2004 Capital Program to study improving pedestrian connections between the proposed East Side Access Sunnyside station and transit stations at Queens Plaza and Queensboro Plaza. This study will be conducted by MTA, outside the scope of the East Side Access Project.*

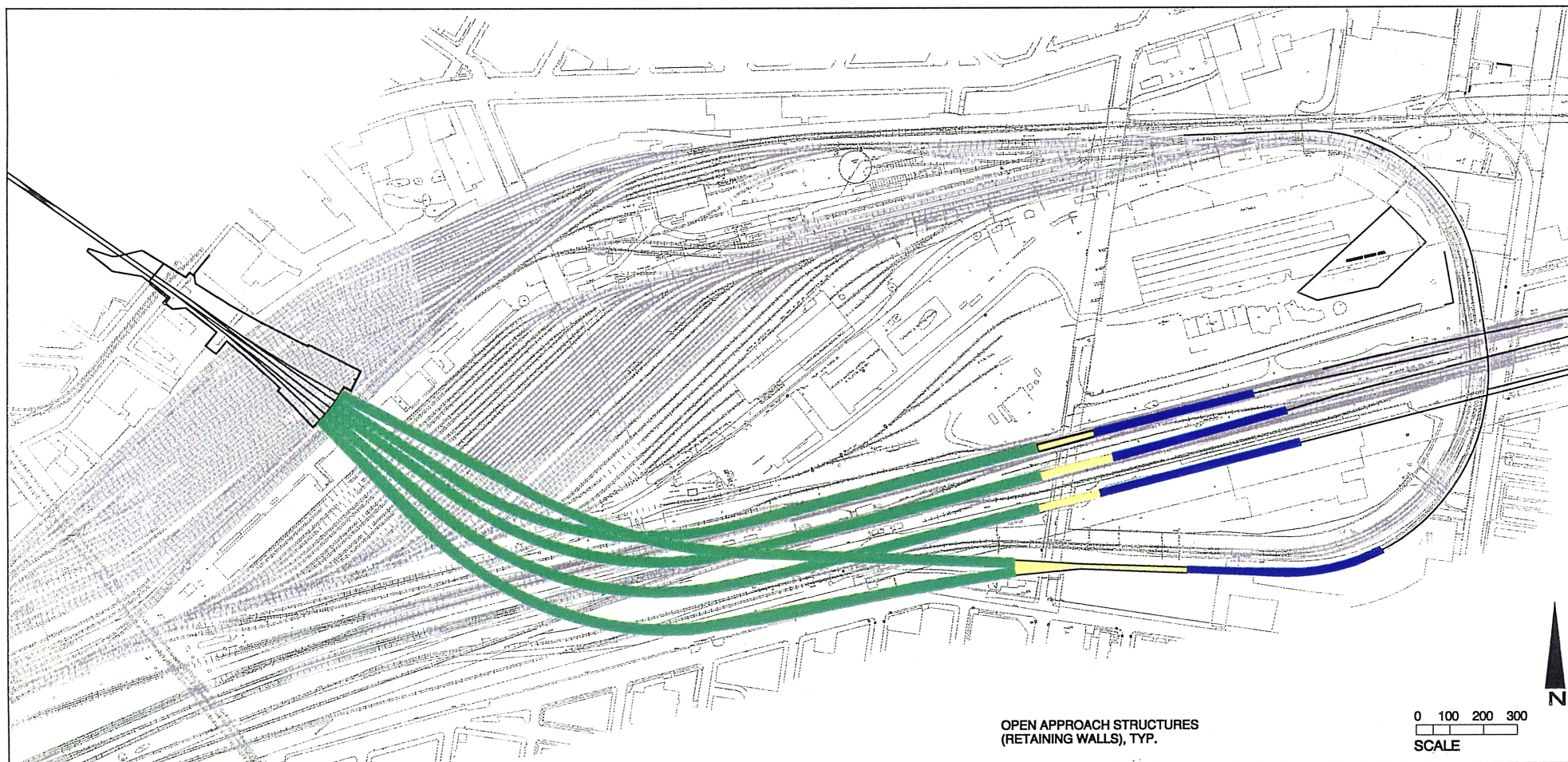
ROLLING STOCK

Approximately 220 new electric train cars over the No Action condition would be required to operate the new East Side Access service to GCT. The costs for this rolling stock are included in the total cost of the East Side Access Project.

OTHER PROJECT ELEMENTS

In addition to the main LIRR train route from Harold Interlocking to GCT, the Preferred Alternative would include a number of related improvements and changes, as follows:

- *Harold Interlocking Improvements.* East Side Access would make modifications to Harold Interlocking that would create added capacity and flexibility and reduce existing operational conflicts between the LIRR, Amtrak, and NJ Transit. The proposed work at Harold Interlocking would essentially separate the tracks used by Amtrak and the LIRR.
- *Replacement Facilities for Metro-North.* To replace the MNR train storage yard (Madison Yard) in the western portion of the lower level of GCT, which is to be used for LIRR facilities, the Preferred Alternative would create new storage tracks and maintenance facilities for Metro-North trains at Highbridge Yard, in the Bronx. *MNR's overall plan for Highbridge Yard also includes additional components for servicing dual-mode (diesel-electric) equipment. These components would not be constructed as part of the East Side Access Project, but the effects of the additional train activity associated with those elements are analyzed in the FEIS.*
- *Replacement Facilities for New York & Atlantic Railway (NYAR).* LIRR's Yard A, in Sunnyside, is currently used by NYAR, a rail freight service, as a rail car storage and maintenance facility. *As part of the East Side Access Project, NYAR would create replacement rail storage tracks and a maintenance facility to replace NYAR facilities that would be displaced from Yard A for storage of LIRR trains. New storage tracks would be created in Queens, at Blissville Yard, and a new maintenance facility, at Fresh Pond Yard, also in Queens. The DEIS also included analyses of potential new rail storage tracks at Maspeth Yard; although NYAR is no longer considering using Maspeth Yard for that purpose, the analyses are retained in the FEIS for comparison purposes.*
- *Substations.* Six electric substations, connected to local utilities, would be constructed to supply electric power to LIRR trains serving GCT. Each substation would be located in an existing structure and/or underground.



LEGEND

- TBM Tunnels
- Cut and Cover Tunnels
- Open Approach Structures
(Retaining Walls)

- ***Ventilation.*** Ventilation plants would provide fresh air to East Side Access's tunnels and underground spaces, including passenger areas, and would remove smoke in the event of a fire. Options 1 and 2 would have different vent plants to serve their differing station layouts and track alignments in Manhattan. Most would be under the street, with gratings and maintenance/exit hatches in the sidewalk.

Option 1 would create four ventilation plants in Manhattan: in a new building at 47 East 44th Street that would ventilate the LIRR portion of the GCT trainshed and which would replace an existing 5-story building; under East 54th Street between Park and Madison Avenues; under East 54th Street between Park and Lexington Avenues; and within the existing 63rd Street Tunnel ventilation plant at Second Avenue and 63rd Street. Option 1 would also reconstruct the existing NYC ventilation facility beneath 53rd Street between Park and Madison Avenues.

Option 2 would also have four ventilation plants in Manhattan: in a new building at 47 East 44th Street, which under Option 2 would also provide climate control for the new lower-level *concourse* and part of the new platform and track area; within the lower level of GCT from 48th to 49th Street; under 55th Street between Park and Madison Avenues; and in the existing structure at Second Avenue and 63rd Street. Option 2 would also require a number of additional air shafts to ventilate the new cross passageways and *concourse*. These would be provided through gratings in the street or sidewalk; vents on the roofs, or grills or louvers on the facades, of existing buildings above the trainshed; and/or kiosk-type pylons in open plazas or sidewalks above the trainshed.

The Preferred Alternative would use the existing 63rd Street Tunnel ventilation facilities on Roosevelt Island and along the tunnel route in Queens, and would create one new ventilation facility beneath the LIRR's Yard A, on top of the new tunnel structure.

OPERATIONAL ASPECTS

The Preferred Alternative would create new LIRR service to GCT. This service would be provided on electric trains. By adding 24 new trains to GCT in the peak hour and reverting to the current service level of 37 trains to Penn Station, the Preferred Alternative would increase peak hour service to Manhattan by approximately 45 percent over No Action conditions. Three to six trains each in the peak hour would be added on the electric portions of LIRR's Babylon, Port Washington, and Ronkonkoma Branches, and one or two trains each would be added on the Hempstead, Long Beach, and Far Rockaway Branches. In addition, the Preferred Alternative would allow LIRR to increase reverse commute service compared to future levels in the No Action Alternative.

MAINTENANCE AND STORAGE

As discussed in the description of the No Action Alternative (see page S-7), LIRR will pursue a future long-term plan for new rail storage yards. By adding some 220 new electric vehicles to the LIRR's fleet, the East Side Access Project would increase the total number of electric trains in operation in the LIRR system. It would therefore cause an incremental expansion of the amount of additional storage space required to meet LIRR's future needs. With the East Side Access Project, there would be a need for additional electric rail storage space for the 220 new vehicles for nighttime storage and related

servicing activities—overnight cleaning, ordinary servicing (toilets, etc.), and visual inspection.

As part of the LIRR's long-term capital planning process, LIRR will identify potential sites for new rail storage yards for its future electric fleet on a branch-by-branch basis. To allow an efficient operating plan for the LIRR overall and to enhance the operations of the new East Side Access service, it is anticipated that two new yards would be developed to meet the LIRR's need for six storage tracks on the Babylon/Central Branch and five tracks on the Main Line/Ronkonkoma Branch and that the projected new Port Jefferson Branch yard would be twice as large as in the No Action scenario (16 tracks rather than 8 tracks).

The process of identifying potentially appropriate sites for the new yards and selecting preferred alternatives for those sites will be conducted by the LIRR. Planning for the storage yards is currently at a very early stage. At present, no site on any LIRR branch has the status of a preferred yard location. The discussion of potential storage yards that was provided in the DEIS is no longer applicable. That discussion was based on eight potential yard sites identified by the LIRR through preliminary screening analyses. Since that time, however, the LIRR has continued to explore the possible alternatives for developing new yard space and has determined that it will initiate a new site selection process for any new yards to be developed.

The decision whether to go forward with one or more additional storage yards, where the yard or yards should be located, and the details concerning expansion of the existing yards will be the subject of a tiered environmental review. Under a tiered NEPA EIS approach, the lead agency focuses on the issues that are ripe for decision in the first-tier document and prepares further environmental analyses as elements of the subsequent actions become adequately defined. The steps that will be followed in the storage yard development process, to be conducted through a comprehensive public outreach process, are as follows:

- 1. Develop site selection evaluation criteria*
- 2. Identify a list of potential sites*
- 3. Perform screening analyses*
- 4. Identify potential environmental impacts*
- 5. Develop mitigation measures.*

As the new storage yards would not be developed for a number of years, the public outreach and environmental review process for these yards has not yet begun. Therefore, at this time, it is not possible to identify the specific locations of new yards to be developed to meet the LIRR's future needs.

Because the increased need for storage yards is one of the foreseeable environmental impacts of the East Side Access Project, this FEIS includes an analysis of that impact. The FEIS identifies seven sites in Nassau and Suffolk Counties to illustrate the types of impacts that could occur with development of new yard facilities on Long Island. As noted above, this is a change from the DEIS, which described those sites as part of the site selection process for new LIRR storage yards. It should also be noted that an eighth site, at Hazeltine in the Town of Huntington, Suffolk County, was also described in the DEIS but is not included in this FEIS. This site has been eliminated because the DEIS identified significant adverse impacts associated with the site's proximity to residential

neighborhoods and because of community input received during the public comment period for the East Side Access Project's DEIS.

The seven illustrative sites are as follows:

- *Cerro Wire.* The Cerro Wire site is a vacant former industrial site on Robbins Lane between the Hicksville and Syosset stations in the village of Syosset, Town of Oyster Bay, Nassau County. The analysis assumed development of a 16-track yard with 75 employee parking spaces. This is twice the size of the eight-track yard that would be required on the Port Jefferson Branch without the East Side Access Project.* The yard could be configured to diverge south of the LIRR right-of-way and occupy just the Cerro Wire property, or it could instead run parallel to the LIRR tracks and occupy a portion of the Cerro Wire property and a portion of the former Syosset Landfill. Construction under the layout involving the landfill would entail some special construction techniques to protect the landfill cap. (It should be noted that the Cerro Wire property is currently being considered for development of a regional shopping mall, the Mall at Oyster Bay. On June 13, 2000, the Town Board of the Town of Oyster Bay passed a resolution accepting as complete the FEIS for the Mall at Oyster Bay, dated May 2000, prepared pursuant to SEQRA.)
- *Babylon.* The site on the Babylon Branch is located just south of the existing Babylon Yard (east of Babylon station) in West Islip, Town of Islip, Suffolk County. It is east of the Babylon LIRR station and south of the existing Babylon Yard between NYS Route 231 on the west, Higbie Street on the east, the LIRR right-of-way on the north, and Union Boulevard on the south. This site is currently occupied by a mix of commercial, industrial, and residential properties, which would have to be acquired by the LIRR. The analysis assumed development of a six-track yard at this site with approximately 15 parking spaces for employees. In addition, to avoid potential adverse effects, it was assumed that a visual barrier would run along the southern boundary of the yard.
- *Yaphank East.* This site on the Main Line/Ronkonkoma Branch is just east of the existing Yaphank station and north of the LIRR right-of-way in Yaphank, Town of Brookhaven, Suffolk County. This site is currently occupied by a portion of a Suffolk County Department of Public Works facility and a portion of a privately owned tree farm. The analysis assumed that up to five stub-ended tracks and approximately 15 employee parking spaces would be provided.
- *Yaphank West.* This site, also in Yaphank on the Main Line/Ronkonkoma Branch, is an undeveloped parcel just west of Yaphank Avenue and south of the LIRR right-of-way. The analysis assumed that development of this site would include a double-ended yard with up to five tracks and employee parking.
- *Ronkonkoma.* This site is located just south of the existing Ronkonkoma Yard in Ronkonkoma, the Town of Islip, Suffolk County. The analysis assumed that three electrified tracks and approximately 15 employee parking spaces would be constructed to the south of the yard on a largely vacant parcel of land.

* See page S-6 for a discussion of the No Action Alternative.

- *Pilgrim Hospital.* The Pilgrim Hospital site is a former service/infrastructure area in the southern portion of the Pilgrim State Psychiatric Hospital complex (near Deer Park station in the Town of Brentwood, Suffolk County), where the New York State Department of Transportation is considering development of an intermodal rail facility. The analysis assumed that three electrified stub-ended storage tracks would be constructed on the site, perpendicular to the LIRR right-of-way. An existing, approximately mile-long, unused track that leads from the LIRR right-of-way to the location of the proposed yard would be replaced and restored for use as a lead track.
- *Riverhead.* This undeveloped parcel in the Town of Riverhead, Suffolk County, is approximately 1½ miles east of the Riverhead station between Saw Mill Creek and Indian Island County Park, at the former Hubbard duck farm. The analysis assumed that three double-ended, non-electrified tracks would be constructed on the site, adjacent to the LIRR right-of-way. These tracks would serve dual-mode locomotive trainsets formerly stored at other yards (especially Ronkonkoma Yard) on the Ronkonkoma Branch, freeing up storage space at those yards for electric trains. The analysis did not assume that tracks between Riverhead and Ronkonkoma would be electrified, because of the prohibitive cost of electrifying the nearly 25 miles of track from Ronkonkoma. In addition to the tracks, 15 employee parking spaces would be constructed. The analysis also assumed that, to mitigate visual and noise effects, walls would be constructed around the yard and on the north side of the LIRR right-of-way.

The conclusions of the assessment conducted for those illustrative sites is provided in section G at the end of this Executive Summary (see page S-57).

CONSTRUCTION METHODS

For many of its components, the Preferred Alternative would require construction of underground spaces in the form of tunnels and caverns. Most of this work would be done underground, with limited disruption at the surface. The Preferred Alternative would select among a variety of methods to construct these spaces: tunnel boring machines (TBMs) could construct some tunnels in both rock and soft ground for train routes deep underground, and drill-and-controlled-blasting could be used to excavate both single-track tunnels and larger underground spaces. Limited areas of cut-and-cover excavation would also be required.

Manhattan Tunnels

The two options in Manhattan would be at different depths below existing tunnels and structures and would require different construction techniques. As described earlier, Option 2 was developed to avoid the difficult construction and street-level disruption that would be required for Option 1. As a result, Option 2 is the preferred option for construction in Manhattan.

In either option, tunnels in Manhattan may be excavated in one of two ways: with a TBM or via drill-and-controlled-blast methods. TBMs are large-diameter drills that excavate circular tunnel sections. TBMs are custom-designed and built for project-specific geologic conditions and other project requirements. The TBMs for the Manhattan tunnels would have a diameter of approximately 22 feet, the size required to excavate the single-track tunnels for the LIRR. If TBMs are used, they would be transported as preassembled elements from the Queens end of the existing 63rd Street Tunnel to its existing terminus at Second Avenue in Manhattan, where they would be assembled in an underground cavern and begin to bore the new tunnels. All TBM work would occur entirely underground, with no disruption at the street level. As the TBM excavates

the tunnel, rock supports would be installed behind the TBM cutter head. Excavated material (called “spoil”) would be transported by a combination of rail cars and conveyor belts back through the tunnel to Queens.

Drill-and-controlled blasting involves judicious use of explosives to excavate openings underground with the least possible disturbance of the remaining rock and with low potential ground vibration and air blast at nearby structures. For the drill-and-controlled-blast method, a large number of small-diameter holes are drilled into the rock face and loaded with explosives. The explosives are then detonated sequentially, fragmenting the rock. During the course of a typical day, a very small number of blasts would take place. After the tunnel is excavated by TBM or drill-and-controlled blast, a final tunnel lining would be installed. *The tunnels in Manhattan from Second Avenue to GCT would be within bedrock and the amount of settlement of earth or structures above the tunnel is expected to be insignificant.*

Option 1. Under Option 1, the new tunnels would rise and move westward to run beside MNR’s lower-level tracks south of 55th Street. Consequently, as they rise, the tunnels would pass closely beneath NYCT subway tunnels, MNR’s Park Avenue tunnel, and then just beneath the basements of four buildings on the west side of Park Avenue between 52nd and 55th Street. The MNR tunnels and the four buildings along Park Avenue would need to be underpinned prior to construction of the new tunnels. Underpinning is a common construction technique that involves placing new foundations under existing buildings to allow construction to occur in the area close to the previous foundation. Underpinning for Option 1 would require track outages for MNR for up to 4 years and displacement of uses in the four buildings’ basements for 2 years at each building. In addition, East 52nd, 53rd, and 54th Streets on the west side of Park Avenue and 54th Street on the east side of Park Avenue would need to be opened using cut-and-cover construction to facilitate underpinning work and construction of ventilation facilities that connect to street-level grates.

Cut-and-cover construction involves excavating down from the street level and installing temporary decking above the excavation area to permit traffic and/or pedestrians to use the street and sidewalk above while construction continues underneath. At each of the affected locations, portions of the curb lane and sidewalk would remain closed for the duration of construction. Construction activities would last 2 years on East 52nd Street, 4 years on 53rd Street, and 3 years on 54th Street. In addition, construction work for the new ventilation structure on East 44th Street west of Vanderbilt Avenue would last about 2 years and would require curb lane and sidewalk closures for about 1½ years, and small areas on other streets between 44th and 51st Streets would be subject to cut-and-cover for new entrances and substations. On all affected streets, moving lanes would be maintained for traffic, except for short periods (i.e., 15 minutes) for deliveries. Access to adjacent properties would be maintained at all times during construction.

Option 2. Option 2 would eliminate the need for substantial cut-and-cover construction in Manhattan. By creating tunnels at a much lower depth than in Option 1, Option 2 would eliminate the need to underpin Park Avenue buildings and MNR tunnels. Option 2 would also potentially use TBMs more extensively to construct the new tunnels. Small areas of cut-and-cover construction would still be required for entrances and vent facilities.

Like Option 1, Option 2 would construct a new ventilation structure on East 44th Street, with street disruptions lasting about 1½ years. This option would also require limited cut-and-cover construction for its new ventilation facility beneath East 55th Street west of Park Avenue. Construction activities for this structure would last about 2½ years. Most of this facility would be

constructed by mining from the tunnels below. Cut-and-cover work would follow to complete the structure and provide the necessary sidewalk grating. There would be intermittent street-level disruptions for about 8 months.

Queens Tunnels

Two types of construction would be used to construct the tunnels that would extend from the existing 63rd Street Tunnel beneath Yard A and Sunnyside Yard. From the existing 63rd Street Tunnel to the buildings at the northern edge of Sunnyside Yard, tunnels would be excavated from the surface using the cut-and-cover method. At Yard A, the excavation area would be enclosed with virtually watertight walls, allowing work on the tunnels within the construction area to proceed without the need for dewatering.

The excavation work beneath Northern Boulevard would proceed in stages so that traffic lanes could remain open. It would involve digging trenches from the street to beneath the existing subway tunnels below Northern Boulevard. The existing below-grade and elevated subway structures would be underpinned, and new LIRR tunnels would be constructed below.

Beneath Sunnyside Yard, tunnels would be constructed using a TBM. The varied subsurface conditions beneath Sunnyside Yard (a mixture of rock and soft soils) would require the use of one of two types of TBMs: either an earth pressure balance TBM or a slurry shield TBM. Both types of TBM use pressure at the tunnel face to prevent soil settlement and groundwater seepage. As the tunnels rise to meet the existing tracks, cut-and-cover and open-cut excavation would be used. An industrial building at 39-15 Skillman Avenue close to an open-cut area may require underpinning. *Tunneling in soil would be performed using methods to control ground loss and thus minimize settlement. Areas where tunneling occurs would be monitored for settlement and, should settlement occur, action would be taken to minimize such settlement, as described in Chapter 17.*

In addition to the tunnels beneath Yard A and Sunnyside Yard, work in Queens would also include extensive work on Harold Interlocking as well as construction of the new station at Queens Boulevard. The improvements at Harold Interlocking would be constructed in five stages, to minimize disruptions to LIRR and Amtrak. Trains using the interlocking would be detoured onto new tracks so the various tracks and tunnels associated with the improvements could be completed. A new viaduct structure would be created east of Sunnyside Yard, between 43rd and 48th Street, adjacent to the existing tracks. While the Harold Interlocking work is under way, a fourth loop track at the east end of Sunnyside Yard would be constructed for use by LIRR trains traveling to and from Yard A. These project elements would require demolition of a portion or all of the structure at 3856-3864 43rd Street, relocation of the access bridge to the General Motors facility adjacent to Sunnyside Yard between 39th and 43rd Streets, and possible use of a small portion of the GM facility's parking lot as a staging area. *The General Motors access bridge would be relocated to a site adjacent to the existing bridge.*

For construction of the new Sunnyside station at Queens Boulevard, some truck access for delivery of materials would be required at Skillman Avenue, and the sidewalk and one traffic lane on the Queens Boulevard bridge would have to be closed for limited periods during off-peak hours.

Yards

At the replacement yards for NYAR *and at* Highbridge Yard, limited construction work would be required to clear the sites and install new tracks and, at some locations, small structures.

Spoil Disposal

Under Option 1, the hard rock excavated from the tunnels in Manhattan would be removed by a combination of rail and conveyor systems through the tunnels to a shaft in Queens at 41st Street and Northern Boulevard. From there, spoil would be removed by one of two options. Preferably, it would be transported from the shaft site over Northern Boulevard to Yard A by a conveyor system beneath the elevated subway structure. Once in Yard A, the spoil would be removed the same way as the materials removed from the Queens tunnels (see below). Alternatively, if that does not prove feasible, materials could be removed from the access shaft by truck, along designated truck routes in Queens (see below). The materials excavated in the GCT trainshed (south of 52nd Street) would be taken by rail along MNR tracks to points north (most likely Metro-North's BN Yard in the Bronx). The areas of cut-and-cover excavation work in Manhattan under Option 1 (more extensive than in Option 2) would not be connected to rail tunnels, however, so excavated materials would be lifted to the street by crane and removed by truck along truck routes in Manhattan.

Under Option 2, materials excavated from the tunnels in Manhattan and caverns at GCT would be transported through the tunnels either to Queens, as in Option 1, or through the lower level of GCT to be hauled out along MNR tracks to points north. The excavated materials from the limited areas of cut-and-cover construction would be removed by truck, similar to Option 1.

In Queens, excavated materials would be stockpiled in Yard A (together with materials removed from Manhattan tunnels, as discussed above). The spoil would then *most likely* be removed by rail, in the same fashion that rock from the city's Third Water Tunnel is being transported. A far less desirable option would be to remove the spoil from Yard A and the Manhattan access shaft site via truck. This would generate some 124 truck trips per day during peak periods of tunneling work, and a total of some 94,000 truck trips over the 8-year construction period. Trucks would use designated truck routes in Queens and would be expected to avoid the Queensboro Bridge and Manhattan, because of congestion there. Likely routes include Northern Boulevard, Roosevelt Avenue, and 39th, 21st, 31st, and Steinway Streets. Using rail to remove the spoil in Queens is strongly preferred. *All spoil disposal from Sunnyside Yard would be coordinated with Amtrak.*

Some of the excavated material would be used as fill in Yard A and other project construction areas. Some fill could also be used for embankments to be constructed as part of the Harold Interlocking improvements. Further, other large construction projects, such as landfills and large-scale waterfront projects, might require fill materials from East Side Access. However, the specific locations where the fill would be used cannot yet be determined, because the specific sequence, duration, and timing of construction, as well as the specific construction methodologies, are not yet finalized, making it difficult to know what reuse sites might be available at the same time. Only such material as would qualify as "clean fill" would be used for such purposes.

PREFERRED ALTERNATIVE COSTS

Capital costs for the Preferred Alternative are estimated at \$4.7 billion for Option 1 and \$4.3 billion for Option 2 (in midpoint of construction dollars). Total capital costs include costs of construction, costs for engineering and management, costs to purchase additional rolling stock (220 new M-7 rail cars), and costs for property acquisitions and easements required for the project. New storage yards on Long Island are being funded by the LIRR's capital program and so are not included as part of the costs of the Preferred Alternative.

E. SUMMARY OF POTENTIAL IMPACTS

The No Action Alternative would not benefit users of the regional transportation network. Without substantial improvements to the transportation system, it would aggravate already poor conditions on all modes of transportation. As a result, the No Action Alternative would result in adverse impacts on land use, social conditions, and economic conditions throughout the Long Island Transportation Corridor, or LITC (which includes Manhattan, Brooklyn, Queens, and Nassau and Suffolk Counties). It would also result in adverse impacts in terms of transportation service and regional air quality. With a potential for increasing demands on rail transit service under the No Action Alternative, access throughout the region would become more difficult and the expected population and employment growth would likely occur with difficulty. On Long Island, where use of the LIRR is greatest, the decrease in quality of LIRR service would be felt most strongly and would support a trend toward increased dependence on the automobile. In addition, without improvements to mass transit service, traffic congestion and regional air pollution would increase.

The TSM Alternative would have small benefits for LIRR riders who work in East Midtown Manhattan or Long Island City, in Queens, by offering additional service to western Queens and some additional capacity on LIRR trains into Penn Station. Like the No Action Alternative, without substantial improvements to the regional transportation system, the TSM Alternative would also have adverse effects on land use, social conditions, and economic conditions, although these would be less severe than with the No Action Alternative. Again, the predicted increases in population and employment would likely occur only with difficulty. In Manhattan, the existing disconnect between the location of jobs and commuter terminals would not be corrected, and improvements would not be sufficient to avoid the overcrowding and delays that are likely to occur in the future.

In contrast, the Preferred Alternative would greatly improve transportation service in the LITC, and would therefore support improvements in land use patterns, social conditions, and economic conditions. It would provide a substantial benefit to LIRR passengers, including not only those who use the new service to GCT, but also those who continue to travel to Penn Station and new commuters who currently use other modes of transportation. The population and employment predicted to occur throughout the region would be supported by this improvement, resulting in significant beneficial impacts to the region's economy. Regional vehicle miles traveled (VMT) would decrease overall, resulting in improvements to air quality as well. At the same time, the Preferred Alternative would result in some localized impacts related to the provision of new service. Most of these would occur during construction of the project, and therefore would be temporary, although some would occur as a result of project operations.

While the No Action and TSM Alternatives would avoid some adverse impacts that could result from the Preferred Alternative, they would not bring the related benefits associated with the

Preferred Alternative either, and they would not meet project goals. The Preferred Alternative's effects on the full range of environmental impacts are summarized below and presented in Table S-3. A full analysis of the environmental impacts of the No Action and TSM Alternatives is provided in the EIS. *The mitigation measures to be implemented for project impacts are described in the section that follows this one, section F, "Summary of Mitigation Measures."*

LAND USE, ZONING, AND PUBLIC POLICY

Transit access is often a powerful determinant of land use trends. The project could affect land use locally by bringing more people to an area, or by introducing rail use to a neighborhood by creating new yards or changing the way certain train yards are used. Construction of the project could physically alter local land use, influence neighborhood or regional land use patterns, or support or contradict land use plans and policies.

The effects of the project alternatives on land use, zoning and public policy were examined by considering several different study areas:

- A regional study area—the Long Island Transportation Corridor (LITC)—consisting of the LIRR service area, namely Manhattan, Queens, Brooklyn, and Nassau and Suffolk Counties.
- Manhattan, south of West 70th and East 79th Streets, to address the compatibility of the proposed service changes and new LIRR terminal at GCT on established and future development. The potential for induced growth was also examined by assessing the area's development potential and local effects on land use near GCT and Penn Station.
- Queens, a ½-mile radius around the proposed new station in Sunnyside—which is the area where the new station could have the greatest influence—to address the effects of the new station on surrounding established and future development.

The Preferred Alternative would support local and regional plans to reduce reliance on automobiles, minimize automobile travel into Manhattan during peak hours, and provide transportation infrastructure to support the region's projected economic growth. It would benefit the LITC by attracting patrons to the LIRR, thereby reducing congestion on the region's highways and improving access to land uses. This alternative would support land use policies in Long Island that seek to concentrate future growth in established areas, make efficient use of the existing transportation network, and revitalize existing town centers.

The project would not have major effects on land use in Manhattan. Both GCT and Penn Station lie within the Midtown commercial center, surrounded by dense, predominantly commercial uses. The new service would bring commuters closer to their destinations, supporting existing land use patterns in Midtown. At Penn Station, the diversion of LIRR riders to GCT would have only minor localized effects.

The new station at Sunnyside would support the city's plans to create a CBD in Long Island City. The new station would be located about ¼ mile from an area where substantial new office development is anticipated, and thus would serve workers in the new CBD. The No Action and TSM Alternatives would offer no beneficial secondary effect in Long Island City.

The Preferred Alternative would not affect land use, zoning, or public policy in the vicinity of Yard A/Arch Street Yard, Sunnyside Yard, or Maspeth, Blissville, Fresh Pond, or Highbridge Yard.

Table S-3
Summary of Adverse Effects and Mitigation for the Preferred Alternative

Analysis Area	Adverse Effects	Differences Between Option 1 and Option 2		Mitigation	Unmitigated Impacts
		Option 1	Option 2		
Land Use, Zoning, and Public Policy	None.	No difference.	No difference.	None.	None.
Social Conditions	None.	No difference.	No difference.	None.	None.
Property Acquisitions	<p>Permanent acquisition of up to 14 businesses and 5 residences, requiring the displacement of up to 200 employees.</p> <p>Properties to be acquired include:</p> <ul style="list-style-type: none"> • 47 E.44th Street for vent plant • Space for off-street entrances (see Option 1 vs. Option 2) • 38-64 43rd Street in Queens for Harold interlocking work • Subsurface easements for the tunnel structure in Manhattan and Queens. 	<p>Permanent acquisition of space for new entrances:</p> <ul style="list-style-type: none"> • 347 Madison Ave ground-floor retail space; • 245 Park Avenue sidewalk space; • 270 Park Avenue sidewalk space; • 280 Park Avenue ground-floor restaurant space; • 200 Park Avenue ground-floor restaurant space. 	<p>Permanent acquisition of space for new entrances:</p> <ul style="list-style-type: none"> • 347 Madison Ave ground-floor retail space; • 245 Park Avenue sidewalk space; • 270 Park Avenue sidewalk space; • 280 Park Avenue ground-floor restaurant space; • 335 Madison Avenue ground-floor retail space. 	<p>The properties would be acquired following the requirements of the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.</p>	None.
Visual Quality	None.	No difference.	No difference.	None.	None.
Historic Resources	<p>Changes to historic features of Grand Central Terminal.</p> <p>Potential changes to the context of historic resources near new entrances and new vent structures.</p> <p>Potential impacts during construction to historic resources near the construction work in Manhattan (see Option 1 vs. Option 2) and in Queens (in Sunnyside Yard).</p>	<p>In GCT, changes to Biltmore Room, Biltmore Passage, and portion of Dining Concourse; new ticket windows.</p> <p>Outside GCT, contextual issues at vent building on 44th St adjacent to Yale Club.</p> <p>Construction work in GCT, near Vanderbilt Concourse building and Yale Club, and beneath Racquet & Tennis Club and Lever House.</p>	<p>In GCT, changes to Biltmore Room, new LIRR concourse on lower track level, possible extension of western grand staircase down to new LIRR concourse.</p> <p>Outside GCT, contextual issues at vent building on 44th St adjacent to Yale Club and for vent structures above trainshed.</p> <p>Construction work in GCT, near Vanderbilt Concourse building and Yale Club; possibly near other resources (for vent structures). No underpinning of Racquet & Tennis Club or Lever House.</p>	<p>Ongoing consultation with SHPO regarding design features and development of construction protection plans work as detailed in a Programmatic Agreement.</p>	None.

Table S-3 (Continued)
Summary of Adverse Effects for the Preferred Alternative

Analysis Area	Effects	Differences Between Option 1 and Option 2		Mitigation	Unmitigated Impacts
		Option 1	Option 2		
Archaeological Resources	Impacts would occur if significant archaeological resources exist in construction areas. Locations where that potential exists are in Manhattan (see Option 1 vs. Option 2) and Yard A/ Sunnyside Yard.	Archaeological resources may remain beneath 53rd St west of Park Ave and 54th St east of Park Ave.	Archaeological resources may remain beneath 55th St west of Park Ave.	Ongoing consultation with SHPO as detailed in a Programmatic Agreement regarding further analysis (e.g., review of boring logs, detailed research at certain locations, possible subsurface testing) and design of mitigative measures (e.g., excavation).	None.
Transportation	Addition of approximately 2,000 customers to the overcrowded south-bound Lexington Ave subway. Addition of up to 4 buses in the peak hour to Madison and Lexington Aves. Impact to pedestrian condition at locations near GCT and in public spaces in GCT (see Option 1 vs. Option 2). Peak-hour traffic impacts at 12 intersections in Manhattan and 13 of the 39 intersections studied on Long Island. Parking shortfalls at Long Island LIRR stations. Displacement of NYAR and MNR yard facilities.	No difference.	No difference.	Improvements to NYCT station elements within GCT (e.g. new turnstiles, stairs, wider corridor) and improving throughput of trains would partially mitigate impact. Crosswalk widening and other measures to improve pedestrian flow. Standard traffic improvement measures (see Table S-4). LIRR's ongoing parking improvement program. Replacement train storage yard(s) and maintenance facilities.	Impacts to subway would be only partially mitigated.
Air Quality	No exceedence of the NAAQS would occur. Significant increase in carbon monoxide levels at Madison Ave/48th St in Manhattan.	No difference.	No difference.	Standard traffic improvement measures.	None.
Noise	Increased LIRR service would result in noise levels above FTA criteria along segments of the LIRR system: • Woodside to Hicksville • Jamaica to Valley Stream • Huntington to Port Jefferson	No difference.	No difference.	While the installation of sound barriers would be effective, it would not be practical due to the extensive wall length required.	Wayside noise impacts would be unmitigated.
Vibration	Potential ground-borne noise impacts in Manhattan (see Option 1 vs. Option 2). Potential ground-borne noise impacts in Queens at 45 residential and 37 nonresidential buildings.	Ground-borne noise impacts at 237 residential and 234 nonresidential properties.	Ground-borne noise impacts at six residential and two nonresidential buildings.	Installation of resilient ties and/or floating slabs under Option 1. Installation of resilient ties under Option 2.	None.
Energy	None.	No difference.	No difference.	None.	None.

Table S-3 (Continued)
Summary of Adverse Effects for the Preferred Alternative

Analysis Area	Effects	Differences Between Option 1 and Option 2		Mitigation	Unmitigated Impacts
		Option 1	Option 2		
Utilities	Potential conflicts with existing utilities in Manhattan (see Option 1 vs Option 2). Potential conflicts with existing utilities in Queens.	Option 1 would have more potential conflicts than Option 2.	Option 2 would have fewer potential conflicts than Option 1.	Temporary or permanent relocation; maintain service.	None.
Contaminated Materials	Potential for exposure to contaminated materials during construction.	No difference.	No difference.	Sampling, analysis, delineation and quantification of contamination prior to construction; development of site-specific CCMPs based on findings of the sampling program.	None.
Natural Resources	Increased runoff at Yard A and High-bridge could potentially affect Newtown Creek and Hudson River. Some yard sites in 100-year floodplain.	No difference.	No difference.	Reconstruction or creation of stormwater systems. Raise elevation of yards above floodplain.	None.
Safety and Security	None.	No difference.	No difference.	None.	None.
Construction Impacts: Property Acquisitions	Temporary use of: space within buildings in Manhattan (see Option 1 vs. Option 2) and space on General Motors property in Sunnyside, Queens.	Temporary property taking for underpinning: <ul style="list-style-type: none"> • Racquet & Tennis Club basement (locker room and tenant space); • Lever House basement (200-car garage); • 400 Park Avenue basement (retail storage space); • 410 Park Avenue basement (elevator machine room). 	No temporary property takings.	Acquisitions would follow federal acquisition and relocation procedures.	None.
Construction Impacts: Land Use and Social Conditions	Temporary impacts on neighborhood character during construction at locations in Manhattan where cut-and-cover construction would occur (see Option 1 vs. Option 2) and at Newcomers High School in Queens.	Substantial disruptions at 52nd St (2 years), 53rd St (4 years), and 54th St (3 years). Other areas of disturbance near GCT of 1-1½ years each.	Small area of disruption on 55th St (2½ years). Other areas of disturbance near GCT of 1-1½ years each.	Partial mitigation in Manhattan through maintenance and protection of traffic plan. In Queens, the school would be shielded from construction activities as much as possible, and the project would work with the high school to resolve problems.	Unavoidable construction disruptions would remain partially unmitigated.

Table S-3 (Continued)
Summary of Adverse Effects for the Preferred Alternative

Analysis Area	Effects	Differences Between Option 1 and Option 2		Mitigation	Unmitigated Impacts
		Option 1	Option 2		
Construction Impacts: Transportation	Disruptions to traffic in Manhattan from cut-and-cover construction activities (see Option 1 vs. Option 2) and along Northern Boulevard in Queens. New truck trips to remove spoil and deliver materials in Manhattan and Queens. Impacts on MNR operations within GCT (see Option 1 vs. Option 2).	Greater disruption to traffic in Manhattan for Option 1. Greater number of trucks to remove spoil. Potential for substantial impacts to MNR operations during construction as a result of required track outages.	Limited disruption to traffic in Manhattan for Option 2. Fewer trucks required for spoil removal. Very limited effect on MNR operations during construction.	Maintenance and protection of traffic plan. Coordinate required track outages with MNR and using a rail simulation model.	Unavoidable impacts on MNR operations for Option 1 would remain partially unmitigated.
Construction Impacts: Air Quality, Noise, and Vibration	Increased noise, vibration, and dust near vent plant construction in Manhattan (see Option 1 vs. Option 2) and near shaft site in Queens (near Newcomers High School).	More traffic disturbance and excavation required under Option 1	Limited traffic disturbance and excavation required under Option 2	Maintenance and protection of traffic plans. Shield school from construction activities and work with school to resolve problems. <i>Mitigation could potentially include noise barriers, double-pane windows, installation of air conditioning.</i>	None.
Construction Impacts: Natural Resources	Potential increased erosion and stormwater runoff during construction.	No difference.	No difference.	Preparation of soil and sedimentation control Plan and other SPDES permitting requirements.	None.

SOCIAL CONDITIONS

Social conditions could be affected by the project if a change to neighborhood character, community facilities, or the local population would occur. The assessment of social conditions considers the same study areas identified for the land use analysis.

The LITC, encompassing Manhattan and all of Long Island, is a large varied metropolitan sub-region, stretching for approximately 122 miles from east to west. At the western end of this area is Manhattan, with a dense core of activity. Brooklyn and Queens, across the East River, are home to an extraordinarily varied mix of ethnic groups in established urban neighborhoods. The character of the LITC becomes progressively more suburban moving eastward into Nassau County, although urbanized town centers exist. Suffolk County is strongly suburban to the west, giving way to farms, wineries, fishing ports, and vacation homes on the eastern end of the island.

The Preferred Alternative would support and enhance existing social conditions in the LITC. The LIRR is a key transportation element capturing approximately $\frac{3}{4}$ of the Manhattan-bound commuters residing in the LITC. By increasing service to Manhattan and improving service to the East Side, the Preferred Alternative would benefit all corridor residents. Access to community facilities would improve, since the railroad serves many of the region's community organizations. In addition, the Preferred Alternative would support transit-centered development and help to shift the trends toward automobile dependence and suburban sprawl.

Development of the replacement yards for NYAR and Metro-North would not adversely affect social conditions in the areas surrounding the yards.

ECONOMIC CONDITIONS

Changes to the regional transportation system have the potential to affect the overall economic health of the LITC. Since the evaluation of economic conditions is closely related to land use and social conditions, the analysis considered the same study areas as those analyses. It considered the key economic factors that are typically served and supported by the region's transportation system, focusing on employment and related real estate trends that illustrate the health of the economy. In addition, localized effects of a project include displacement of businesses or specific effects on business activities near a project location.

The Preferred Alternative would require the permanent acquisition of a 5-story building in Manhattan for the new ventilation structure on East 44th Street and up to five different retail spaces for new entrances to the platforms, affecting up to 100 employees. It would also require acquisition of all or part of two properties in Queens to allow construction of the Harold Interlocking improvements, potentially affecting up to 60 employees. The Preferred Alternative would also require permanent easements for the tunnel structure in Queens and Manhattan.

The project would be required to follow the FTA's acquisition and relocation regulations, and the rights of affected owners and tenants would be protected under the Federal Uniform Relocation Assistance and Real Property Acquisition Policies Act. That law provides for equitable treatment of people displaced from their homes, businesses, or farms by federal and federally assisted programs. It also establishes uniform and equitable land acquisition procedures, requiring just compensation for property, relocation services and payments for expenses, assistance in reestablishing businesses, and assistance in residential relocation.

The Preferred Alternative's improvements to transportation service would eliminate the existing disconnect between the location of jobs and locations of terminals, and provide relief from the currently overcrowded conditions on many LIRR peak hour trains. The project would support the projections for increases in employment within the Manhattan Central Business District and, in particular, on the East Side of Manhattan. In addition, the travel time savings for LIRR commuters would have a clear positive impact on productivity within the LITC. Non-LIRR users would also benefit, since the diversion of auto commuters to the train would reduce congestion on the major Long Island roadways and overcrowded East River crossings to Manhattan.

The location of a new LIRR station in Sunnyside would increase accessibility to the area for the Long Island workforce and enhance opportunities for future growth in Long Island City, where up to 5 million square feet of office space is planned. Expanding direct links to the work force in a wider region would make Long Island City a more attractive location for the growing service industries in the area, particularly business services, since a larger labor pool with a broader range of skills would be more readily accessible.

Long Island would also benefit from the Preferred Alternative. The attraction of an area as a business location is not only based on the transportation infrastructure, but also on the availability of the workforce. Since transportation on Long Island is a problem in every mode, investing in LIRR infrastructure is likely to improve the quality of life on Long Island for users and non-users of the system.

VISUAL AND AESTHETIC CONSIDERATIONS

The project could affect the visual context of areas in the immediate vicinity of the proposed alignment. Study areas for the assessment of visual changes were defined based on where elements of the project would be visible to the public. Although the majority of the proposed work for the Preferred Alternative would be underground, visible elements would include work within GCT, proposed off-street entrances, an above-ground ventilation facility in Manhattan, construction of tracks within existing yards in Queens and the Bronx, the new Sunnyside station, and new yards in Long Island.

Under both project options, the Preferred Alternative's elements within GCT would change the appearance of the areas of the terminal described above. However, none of the changes proposed would constitute significant visual impacts that would adversely affect the existing visual character of the terminal. Both options *could* install new *escalators* in a portion of the Biltmore Room on the Main Concourse level, permanently changing the room's appearance by altering its symmetrical classical proportions. (*Changes to the Biltmore Room are subject to review and approval by SHPO.*) At the same time, however, removal of the large newsstand currently in the center of that room, which is a separate modern amenity, would likely open up the room and would have a positive visual effect. Since the room is at the edge of the terminal and only visible from the immediate vicinity of the Biltmore Concourse and the 45th Street Passage, the proposed work would not adversely affect the terminal's overall visual character. Both project options would also create a new public area in MNR's Madison Yard area—new tracks and platforms under Option 1, and a new *concourse* under Option 2—as well as a new connection between that area and the existing public areas of the Dining Concourse. These changes also would not have an adverse effect on the terminal's overall visual character.

The Preferred Alternative would also not adversely affect the visual quality in the area surrounding GCT. Proposed work near GCT under both options, including the construction of a

new above-ground ventilation facility and new off-street entrances, would not alter the context of the study area, which is a densely developed part of Midtown with a mix of new and old buildings.

Most of the work within Queens would occur within the existing Sunnyside Yard/Yard A/Arch Street Yard complex, and would not significantly alter the visual character of the surrounding areas. The new, more active Yard A would be visible to pedestrians in the area north of the yard, where new office buildings are expected to be developed in the future. The new Sunnyside station would be visually prominent from Queens Boulevard as well as from Skillman Avenue.

The proposed work within the replacement yards—Blissville or Maspeth, Fresh Pond, and Highbridge Yards—would not represent a significant visual change, as all of those yards are currently or have been in use as yards. Furthermore, Blissville, Maspeth, and Fresh Pond Yards are surrounded by predominantly industrial uses, and Highbridge Yard is not visually prominent to surrounding uses.

HISTORIC RESOURCES

Potential impacts to historic resources can include both direct physical impacts—demolition, alteration, or damage from construction on nearby sites—and indirect or contextual impacts, such as the isolation of a property from its surrounding environment, or the introduction of visual, audible, or atmospheric elements that are out of character with a property and would alter its setting. The effects of the project alternatives on historic resources were assessed in accordance with the National Historic Preservation Act of 1966, following a multi-step process. Study areas or Areas of Potential Effect (APEs) were identified in consultation with SHPO, and historic resources were identified within each APE. Then the potential adverse effects of the project on those resources were assessed and measures to mitigate the potential effects of the project were developed. These measures are detailed in full in a Programmatic Agreement between the FTA, MTA, the Advisory Council on Historic Preservation, and SHPO, which is presented in an appendix to *the FEIS*.

A total of 22 historic resources were identified in the APEs for the Preferred Alternative, including 17 in Manhattan, 3 in Queens, and 2 on Long Island. Two additional historic resources are located just outside the boundaries of the APE in the Bronx.

GCT is a National Historic Landmark, listed on the State and National Registers of Historic Places, and a New York City Landmark. For the Preferred Alternative, under Option 1, visible elements constructed in GCT such as the LIRR passenger area, new escalators and elevators in the Biltmore Room, and proposed LIRR ticketing operations would constitute minor visual changes within the context of the entire terminal—they would not be out of character with the other public areas in the terminal and no adverse contextual impacts would be expected to occur. As described earlier, the changes to the Biltmore Room would alter its classical proportions, but they would be offset by the positive benefit of removing the large modern newsstand currently in the center of the room, and the changes would not affect the overall character of the terminal. Option 2 would require fewer vertical circulation elements in the Biltmore Room and the Biltmore Concourse and would create a larger passenger concourse where the lower-level tracks are currently located. For all project elements—those within the public spaces of the terminal as well as those in other areas—design specifications would be developed in consultation with, *and subject to review and approval by* SHPO to ensure that no adverse physical or visual effects would occur to the building. To avoid potential contextual effects for work in GCT, any

significant architectural or design features in areas subject to construction would be retained, and project plans would be submitted to SHPO for review and approval. A construction protection plan would be implemented during construction to minimize the effects of construction on the historic features of the building, so that construction would not result in any structural or architectural impacts to these features. The plan would be developed in consultation with SHPO and approved by SHPO prior to start of construction. Similarly, the design review and construction protection plan would also include the Yale Club, a historic building located adjacent to the site of the project's new vent building on 44th Street; additional ventilation features required by Option 2; and any other project elements located within close proximity to a historic resource.

Option 1 would require underpinning the Racquet & Tennis Club and Lever House. The underpinning would be completed below the surface and proper care would be given to minimize any potential to adversely affect the building fabric. A SHPO-approved construction protection plan would be implemented.

In Queens, two historic railroad structures are located in Sunnyside Yard near the project alignment. While no adverse effects would occur as a result of the operation of the new service, these resources would be included in the construction protection plan developed in consultation with SHPO.

ARCHAEOLOGICAL RESOURCES

At any location where a project would disturb the ground, it has the potential to affect archaeological resources. Archaeological resources are physical remains, usually buried, of past activities on a site. In the Long Island Transportation Corridor, they can include remains from prehistoric (Native American) people who used or occupied a site—including tools, refuse from tool-making activities, habitation sites, etc. They can also include remains from activities that occurred during the historic period (beginning with European colonization), such as battle sites, foundations, and cisterns, wells, and privies, which can hold refuse deposited during the time of their use in an effective "time capsule." For East Side Access, an assessment of the project's potential for impacts on archaeological resources was undertaken, following the procedures of the National Historic Preservation Act of 1966.

Study areas (referred to as Areas of Potential Effect, or APEs) were defined in consultation with SHPO, and each of those APEs was assessed through documentary research and review of available soil borings to identify areas where there is a potential for archaeological resources to exist. For each APE, the research identified whether any archaeological resources might have been deposited there and whether those resources could still remain in place.

Some of the APEs for the Preferred Alternative have the potential to contain archaeological resources. The project would result in significant adverse impacts to any such resources, if they are present. In Manhattan, small areas beneath 53rd Street west of Park Avenue and 54th Street east of Park Avenue (where excavation would occur in Option 1). In Queens, some of the Yard A/Sunnyside Yard area to be affected by the project has the potential to contain archaeological resources from the prehistoric period and historic period.

As part of the project's ongoing consultation with SHPO, the future steps to be taken and any mitigation measures to be developed for archaeological resources will be developed with SHPO. The continuing work consists first of investigative measures using borings to further understand the filling and grading that have occurred at project areas in Queens. For any sites that still appear to have the potential to contain significant archaeological resources (that have the potential

to be eligible for the State and National Registers), mitigation would likely consist of subsurface investigation to identify whether resources are actually present and their potential eligibility for the Registers. If resources are present and they are determined eligible for the Registers, mitigation in the form of a full-scale excavation would be employed (except in any locations where resources could be avoided). These measures are detailed in full in a Programmatic Agreement executed by SHPO, FTA, and MTA.

TRANSPORTATION

The effects of the project alternatives on regional travel patterns and on specific local components of the region's transportation system—traffic, parking, subway, bus, other commuter railroads, and pedestrian conditions were assessed. The No Action Alternative would not improve transportation conditions in the region. Regional traffic conditions would deteriorate as more commuters attempt to drive to work, at the same time that the LIRR became increasingly crowded. The TSM Alternative would do little to improve those conditions.

In terms of regional travel, the Preferred Alternative would provide an overall benefit by improving transportation service from Long Island and eastern Queens to Manhattan and Queens. It would provide commuters destined for Manhattan with increased and improved train service—there would be more trains into Manhattan, greater availability of seats, and the flexibility to get directly to the East Side of Midtown Manhattan in addition to the West Side. The Preferred Alternative would reduce auto commutation into Manhattan as well, by diverting auto trips from eastern Queens and Long Island, to the LIRR.

At the same time, however, the project could result in localized effects on other transportation elements. These would include the potential for increased traffic at intersections surrounding GCT, where the number of taxis would increase; these effects would also include increased traffic and parking at LIRR stations in eastern Queens and on Long Island, where the number of riders is projected to increase because of the Preferred Alternative. Other local effects would include increases to ridership on some subways serving GCT, and increases to the number of pedestrians in the terminal. At the same time, however, pedestrian, subway, and taxi activity in the Penn Station area would decrease—passenger movements would be less congested, vehicle traffic on the street network would be less congested, and crowding in subway stations and on subway lines would be eased.

REGIONAL EFFECTS

The Preferred Alternative is expected to bring about 62,000 LIRR riders into GCT during the 4-hour weekday AM peak period in the year 2010, and just 5 percent more (about 65,000) in the year 2020. It would also reduce the volume of LIRR riders arriving at Penn Station in the 4-hour AM peak period by about 45,700 in the year 2010 (representing a 45 percent reduction in LIRR commuter activity in Penn Station). Many of these riders into GCT currently take LIRR trains to Penn Station, but a significant volume of new riders would be diverted from their autos. Overall, the Preferred Alternative would reduce total daily vehicle miles traveled by about 342,000 in 2010 and by 375,000 in 2020. There would be 11,000 fewer daily auto trips to work in 2010, and 12,000 fewer trips in 2020.

The Preferred Alternative would also improve transportation service for other providers. In Manhattan, the project would create new capacity in Penn Station that could benefit MNR, allowing MNR to bring service for its commuters to Penn Station if that agency's Penn Station Access Project is implemented. If MNR does bring new service into Penn Station, the number

of MNR commuters shifted to Penn Station would be lower than the number of LIRR commuters shifted to GCT by East Side Access. In addition, the work proposed at Harold Interlocking in Queens would significantly improve congested conditions there. This would result in a positive impact for Amtrak, which operates its Northeast Corridor service through the interlocking.

GRAND CENTRAL TERMINAL AREA

Traffic

The Preferred Alternative would decrease general background traffic in the overall Midtown area by about 2 percent. There would be traffic increases on some streets near GCT due to increased taxi activity there, but also decreased taxi activity in the Penn Station area since LIRR commuters who presently travel to Penn Station and then take taxis to get to their East Midtown destinations could now take the LIRR directly to GCT.

There would be significant traffic impacts at 12 out of the 54 intersections in the Midtown Manhattan traffic study area and significant traffic benefits at 9 intersections in the AM peak hour, 6 significant impacts and 2 significant benefits in the midday peak hour, and 8 significant impacts and 6 significant benefits in the PM peak hour. All significant traffic impacts could be mitigated by the New York City Department of Transportation (NYCDOT) via standard traffic engineering improvements such as signal phasing and timing modifications, more restrictive parking regulations, and by providing exclusive phases for turning movements at some intersections where there are significant conflicts with high volumes of pedestrians.

The Preferred Alternative would significantly reduce parking demand in Manhattan by approximately 3,000 vehicles or more on a typical weekday.

Pedestrian Flows Within GCT

Introducing LIRR service into GCT would significantly affect the pedestrian flows and conditions in the terminal. Current efforts at GCT would, however, help disperse these new pedestrians by improving circulation in and around GCT. Under the Preferred Alternative, all pedestrian movements within GCT would function acceptably except for one escalator bank in GCT's Main Concourse and vertical circulation elements leading down to the Lexington Avenue Nos. 4, 5, and 6 subway line (see the separate discussion about the subway below). All other existing stairwells, escalators, and concourse corridors and passageways within GCT would not have significant impacts. The new platforms for LIRR service, and the stairwells, escalators, and cross passageways serving LIRR commuters to be built as part of the Preferred Alternative (under either Option 1 or Option 2), would also all typically operate at acceptable levels of service.

Under certain delay circumstances, conditions in the existing 47th Street cross passage would become congested. Option 1 would greatly shorten the time it would take for the 47th Street cross passage to become overcrowded compared to the No Action condition. Option 2 would have much less of a negative effect, as riders waiting for delayed trains would have a new large waiting area below the 47th Street cross passage.

Lexington Avenue Subway

The Preferred Alternative would add about 2,310 southbound riders and 970 northbound riders to the Lexington Avenue subway line in the 8-9 AM peak hour. Ridership increases in the 5-6

PM peak hour would be about 15 percent lower than the AM increases. These additional riders would result in the following:

- The additional LIRR passengers on the Lexington Avenue subway line would result in significant impacts to the Nos. 4 and 5 express lines southbound in the AM peak hour. The local line would not experience significant impacts. Line-haul capacity utilization rates on the express lines would increase from 112 percent in the No Action condition to 117 percent with the Preferred Alternative; on the local line utilization would rise from 61 to 64 percent. On average, each car of each express train would have 6 additional riders, while each car of each local train would have 3 additional riders.
- The new passengers from the Preferred Alternative would increase crowding on the western stairs and escalators (west of the Grand Hyatt Hotel) leading from GCT to the subway station mezzanine area during the AM and PM peak periods. This would aggravate an already overcrowded condition.
- The Preferred Alternative would significantly affect conditions on some stairwells connecting the mezzanine area to the platform. The new LIRR passengers would increase peak-direction flows on some stairs to the platforms by 20 to 25 percent, with the greatest number of passengers on the center stairs leading to the platforms. Overall, the project would cause the center stair to the southbound platform and the north end stairwells to both the south- and northbound platforms to operate over capacity.
- On the platforms, the analysis considered different zones to account for the different crowding conditions in different areas. The project would create the most congestion near the center stairwell on the southbound platform and the center stairwells on the northbound platform. In some locations, this increase in crowding would be significant.

Recognizing the existing crowded conditions on the Lexington Avenue line, NYCT is expecting to increase service during peak periods based on signalization improvements on the Lexington Avenue line and the application of platform management techniques at the 42nd Street/GCT station. These improvements are planned regardless of whether or not East Side Access goes forward. NYCT will pursue, at a minimum, the following programs to increase line-haul capacity: the “step aside and speed the ride” campaign, which includes etched tiles incorporated into the floor design telling passengers to “step aside” and let passengers off the trains; automated “dwell control announcements,” quick response programs for customers who require medical attention while on the subway; platform assistants to expedite loading/unloading; and wider-door cars and changes in the design of new subway cars (now on order) to ease movement into and out of the cars.

In addition, the East Side Access Project team has been working with NYCT to develop potential mitigation measures to be included as part of the Preferred Alternative to help alleviate the crowded conditions at the 42nd Street Lexington Avenue line station. These measures would be designed to help mitigate impacts on line-haul capacity, access to the subway platforms from the mezzanine, and access to the Lexington Avenue subway mezzanine from GCT—all of which are interrelated.

The critical strategy to mitigate line-haul capacity impacts is to add trains during the peak hour. Currently, dwell times at the 42nd Street station are long, resulting from high volumes of riders getting on and off Lexington Avenue line trains. A variety of initiatives (noted above) are

designed to reduce dwell times to allow additional trains through the station. Operation of additional trains in the peak hour is physically possible, and it is NYCT's policy to bring this about.

To complement these measures, *certain other changes are also proposed to stairwell configurations, locations, and the design of the mezzanine level to better distribute passengers on the subway platform. This mitigation plan would balance the use of existing mezzanine stairs leading to the station's platforms to more evenly distribute pedestrian flows into the subway's paid zones. In addition, by spreading passengers on the station's platforms more evenly, these measures would in turn decrease dwell times at the station, thereby increasing the number of trains that can move through the station. The proposed mitigation measures are described below in section F, "Summary of Mitigation Measures."*

Second Avenue Subway/Manhattan East Side Alternatives Study

Separately from the East Side Access Project, MTA is pursuing plans to develop a Second Avenue subway to extend the entire length of Manhattan's East Side, bringing critical relief to the Lexington Avenue subway. The alignment would extend generally along Second Avenue from 125th Street in East Harlem to the Financial District in Lower Manhattan. A total of \$1.05 billion has been allocated in the MTA's 2000-2004 Capital Program for a full-length Second Avenue subway project. The goal of the Second Avenue subway is to improve mobility and reduce crowding on the East Side of Manhattan, including the reduction of peak hour demand on the Lexington Avenue express subway lines, reducing delays in passenger loading and unloading at major stations, including 42nd Street, and thus increasing train capacity by allowing better train throughput. MTA NYCT is currently conducting the Manhattan East Side Alternatives (MESA) Study, which is the planning effort for the northern element of the full build subway. The MESA Study has identified several alternatives, including construction of the northern portion of the Second Avenue subway from 125th Street to 63rd Street, continuing via the unused Broadway line express tracks to West Midtown and Lower Manhattan. The MESA Study is an important and necessary step in the planning for the Second Avenue subway project.

The impact of the Second Avenue subway in conjunction with the Preferred Alternative would be to alleviate conditions on the Lexington Avenue line, particularly at the Grand Central subway station. In particular, the Second Avenue subway would divert riders from the Lexington Avenue line, so that it is no longer operating over capacity. With this change in place, the addition of new riders from the Preferred Alternative to the Lexington Avenue subway would not contribute to overcrowding and would not result in significant adverse impacts on station elements and line-haul crowding in the subway. Construction of the Second Avenue subway, which is itself a multibillion dollar undertaking, must be considered as a separate and distinct project serving independent goals and objectives, rather than as related to East Side Access.

Other Subway Lines

The Preferred Alternative would reduce demand levels and crowding on several other subway lines. In the year 2010, there would be 6,000 fewer riders on the northbound, or uptown, A/C/E lines (combined) in the AM peak hour, and about 13,600 fewer riders in the four-hour peak periods. Queuing at stairwells, corridors, token booths, turnstiles, and platforms at the 34th Street station of these lines would all be significantly reduced. Southbound A/C/E ridership would decrease by about 200 in the AM peak hour and 500 in the four-hour AM peak period.

There would be improvements on other subway lines as well—700 fewer riders on the southbound 1/2/3/9 lines at 34th Street in the AM peak hour, 500 fewer riders on the northbound B/D/F/Q lines, and 1,185 fewer riders on the Manhattan-bound No. 7 Flushing line, and congestion-reduction benefits on other lines and their station facilities as well.

On-Street Pedestrian Flows

Pedestrian paths into and out of GCT were analyzed along with the key streets bordering GCT and adjacent to the new access and egress points (i.e., Grand Central North) opened recently by Metro-North along Park and Madison Avenues. With the introduction of LIRR service at GCT under the Preferred Alternative, pedestrian activity in the area would increase substantially. However, not all of these LIRR commuters are new pedestrians to the area, since many are already there after taking LIRR trains into Penn Station and either walking, taking subways or buses to the area, or taking taxis and then walking to their final destinations. Detailed pedestrian flow analyses and intersection crosswalk and corner reservoir analyses and midblock sidewalk analyses indicate that there would be significant impacts requiring mitigation at several East Side locations. *Mitigation is described below in section F.*

Buses

Bus ridership projections show that there would be reduced demand for several bus routes that connect Penn Station with the East Side, since LIRR commuters could take direct LIRR service to GCT. There would also be some ridership increases on East Side bus routes by LIRR commuters arriving at GCT who would need to transfer to other routes to get to their final destinations. The bus routes subject to the highest ridership demand increases would be those that travel directly past GCT. The project's regional ridership forecasting model indicates that M101/102/103 bus routes would need up to *four* additional bus trips in the AM peak hour along its southbound Lexington Avenue portion and up to *two* additional bus trips in the PM peak hour along northbound Third Avenue. The M42 would require an extra *one* (PM) to *three* (AM) bus trips along 42nd Street. The buses traveling along Fifth Avenue (M1/2/3/4) would need up to *two* additional bus trips. It is NYCT's policy to adjust schedules and frequencies, within fiscal and operating constraints, as demand dictates.

SUNNYSIDE/LONG ISLAND CITY AREA

The Preferred Alternative is projected to generate 1,530 new LIRR riders in the four-hour AM peak period at the new Sunnyside station, and 675 riders in the AM peak hour in the year 2010. There would be 1,300 riders in the PM peak period and 575 riders in the PM peak hour. It is anticipated that 90 percent of these LIRR commuters at Sunnyside would walk to their final destination in the area after alighting from LIRR trains, that 9 to 10 percent would transfer to subways or buses, and that less than 1 percent would take taxis or be picked up or dropped off by car. Parking would not be provided as part of the station development, and park-and-ride activity is not expected. Significant traffic and transportation impacts are not expected.

EASTERN QUEENS AND LONG ISLAND

The analysis of potential impacts at LIRR stations focused in detail on 15 of the LIRR's 124 stations in eastern Queens and Long Island. These stations represent the range of all stations, and included several of the busiest stations (Hicksville, Huntington, Ronkonkoma) and others with more moderate usage, stations within local business districts and others closer to residential areas or in fringe areas, stations with multiple bus routes and others with limited service, and

stations with extensive parking capacity and others with very limited parking availability. Potential traffic impacts were examined at the 15 representative stations, while parking impacts—determined to be a much larger issue—were evaluated at all stations.

Traffic

The analysis of traffic conditions at a set of 39 intersections at the 15 stations studied indicated that 11 of the intersections would have significant impacts in the AM peak hour and 13 would have significant impacts in the PM peak hour in the year 2010. Each of the significant traffic impacts could be mitigated via standard traffic engineering improvements, such as the installation of traffic signals at unsignalized intersections, signal phasing and/or timing modifications at signalized intersections, lane re-striping, offsetting centerlines of streets where it would be necessary to gain additional capacity in one direction, and more restrictive parking regulations. These are standard measures within the day-to-day jurisdiction of the agencies responsible for maintaining traffic operations. In the year 2020, traffic impacts and required mitigation would be similar. Since the detailed traffic impact analyses were conducted for a representative set of 15 LIRR stations, it can reasonably be expected that standard traffic engineering improvements would likely be sufficient to mitigate traffic impacts that might occur at the LIRR's numerous other stations.

Traffic analyses were also conducted at eight grade crossing locations as a result of the operation of more LIRR trains through these locations as well as additional vehicle traffic generated by the Preferred Alternative. Impacts at the grade crossing locations analyzed would generally be minimal.

Parking

The Preferred Alternative can be expected to increase parking demands at each of the LIRR's 124 stations. Several stations would be able to accommodate the demands, while others would experience significant parking shortfalls (in most cases, parking shortfalls would be expected even under the No Action Alternative).

The range of projected parking shortfalls at the stations analyzed is quite extensive, and mitigation of these shortfalls would need to be individualized on a station by station basis. While LIRR owns only 28 percent and operates a much smaller percentage of the parking facilities at its stations, and the vast majority of these parking facilities are under the jurisdiction of the local town, village, or other municipal entity, the LIRR has a parking improvement program to address parking needs at its stations. Mitigation *would be* developed under this program, as described below in section F.

AIR QUALITY

Air quality can be affected by air pollutants produced by mobile sources, such as vehicular traffic or diesel locomotives, and by fixed or stationary sources, such as ventilation facilities, parking garages, and diesel freight yards. The air quality analysis for East Side Access examined the proposed project's effects on both a regional and local basis. On a regional basis, the issue of concern is the project's effect on pollutant emissions throughout the Long Island Transportation Corridor, which is designated as "non-attainment," by the U.S. Environmental Protection Agency (EPA) for ozone (O₃), indicating that the National Ambient Air Quality Standards (NAAQS) for ozone are exceeded. In addition, with the exception of Suffolk County, the study area is also designated as non-attainment for carbon monoxide (CO), while Manhattan has been

designated non-attainment for respirable particulate matter (PM_{10}). Therefore, it is important to evaluate a transportation project's effects on these pollutants.

It is also important to determine the proposed project's effect on local air quality at key locations, such as stations where the increased commuter rail service would increase vehicular activity. Therefore the analysis assessed the local effects from increased automobile and taxi traffic around the GCT area and at various stations on Long Island and in Queens. Since the proposed rail service would be electrically powered, the air quality effects of the project are essentially related to the change in traffic patterns induced by the project. The potential effects of the new ventilation facilities and diesel storage yards were also examined.

The Preferred Alternative would result in an overall decrease in regional pollutant emissions, since it would attract a significant number of new LIRR customers who would otherwise drive to work. In fact, the Preferred Alternative would reduce regional vehicle-related pollutants by about three to five times more than the TSM Alternative.

To assess the project's potential impacts on local air quality, detailed microscale intersection CO modeling was performed at several intersections surrounding GCT and at locations on Long Island where the greatest project-generated vehicular activity would occur. The maximum predicted CO concentration at any of the intersections modeled in Manhattan and on Long Island is less than the NAAQS. Operation of the Preferred Alternative would, however, cause one significant change in air pollutant levels (although not an exceedance of the NAAQS): at the intersection of Madison Avenue and 48th Street, traffic due to the project would result in an increase in CO levels over No Action conditions of more than 0.5 parts per million (ppm). Within the Manhattan CBD, this level of increase is considered significant according to the New York State Implementation Plan (SIP) for air quality and would require mitigation. The standard traffic mitigation measures discussed above would provide effective mitigation for this air quality impact.

The heating, ventilation, and air conditioning (HVAC) plant on East 44th Street under Option 2 would be equipped with either air- or water-cooled chillers, cooling towers (if water chilled), and several air-handling units. The equipment would be powered with either electricity or natural gas supplied by Con Edison. The exhaust from the gas-fired system would be placed on the roof in accordance with the applicable air quality pollution control requirements for similar HVAC systems in New York City.

The analysis indicates that the additional diesel activity in new yards at Blissville or Maspeth and Fresh Pond would not result in air quality impacts. *Furthermore, MNR's plans to create a new dual-mode (electric and diesel) train storage yard at Highbridge adjacent to the electric train yard at Highbridge created by East Side Access would not result in significant adverse air quality impacts.*

The Preferred Alternative would conform to the regional air quality requirements, defined in the SIP, of the Clean Air Act Amendments of 1990.

NOISE AND VIBRATION

Operation of the project could affect noise and vibration levels in a number of ways. The Preferred Alternative would increase train service throughout the LIRR system in Queens and Long Island. The additional service would increase train passbys along most branches, creating the potential to increase noise levels at properties adjacent to the railroad (this type of noise is

referred to as “wayside noise”). The relocation of the MNR Madison Yard operations and NYAR freight operations to alternate locations *would also have the potential to increase noise levels nearby.*

Fixed railway operations also have the potential to produce high vibration levels, since railway vehicles contact a rigid steel rail with steel wheels. Ground-borne vibration can cause discernable movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. This is referred to as ground-borne noise. In Manhattan, new rail service in a tunnel beneath existing residential and commercial buildings could increase vibration and ground-borne noise levels in those structures. In Queens, portions of the new tunnel along 41st Avenue in close proximity to existing structures could also change existing levels.

These issues were examined for the project alternatives following FTA guidance for the assessments of noise and vibration impacts.

Based on FTA criteria, the Preferred Alternative would cause noise impacts along certain segments of the LIRR system. Noise impacts would occur at most residential properties adjacent to the railroad between Woodside and Hicksville stations, Jamaica and Valley Stream stations, and Huntington and Port Jefferson stations. There are more than 400 residences located adjacent to the 47 miles of track where noise impacts are predicted to occur. The Forest Hills Stadium, considered a land use where quiet is an essential element, would also experience a noise impact. In certain locations between Huntington and Port Jefferson, noise levels would exceed FTA criteria for “severe impacts.” The wayside noise impacts along this segment are a direct result of operating more dual-mode trains, which would occur under the No Action and TSM Alternatives as well, since *in the future No Action condition* LIRR is planning to operate all of the dual-mode trains it currently owns to provide direct service between the Port Jefferson, Oyster Bay, and Montauk Branches and Penn Station. There are approximately 52 residences that are located adjacent to the approximately 2.7 miles of track where “severe” impacts are predicted to occur.

While noise impacts are predicted occur under FTA criteria, cumulative noise levels with the project would be at most 3 dBA more than, and typically within 1 dBA of, existing noise levels. Furthermore, at all locations, noise levels under the Preferred Alternative would be at most 1 dBA more than under the No Action and TSM Alternatives. These increases would be imperceptible to the average human ear. The Preferred Alternative would not increase noise levels over the No Action or TSM Alternatives between Huntington and Port Jefferson stations, since East Side Access trains would not operate along this diesel segment. *A discussion of potential noise mitigation measures is provided in section F of this summary.*

The analysis of noise from the new replacement rail facilities at Blissville or Maspeth, Fresh Pond, and Highbridge concluded that no significant noise impacts would occur from those facilities.

The results of the vibration analysis for the Preferred Alternative indicate that vibration levels would be below the FTA criteria and no impacts would occur. The Preferred Alternative would, however, affect ground-borne noise levels, as follows:

- Option 1 would potentially affect 237 residential and 234 non-residential structures in Manhattan. However, predicted levels may be lower than existing levels in areas where there is currently train activity, such as along Park and Lexington Avenues. A monitoring program to establish ambient conditions is being performed and will continue during subsequent

design phases to more precisely define where adversely affected buildings are located. Nevertheless, given the worst-case analysis results, mitigation for some of the affected structures would require up to a 17 dB reduction in ground-borne noise levels. Effective mitigation would be achieved through the installation of resilient ties and/or floating slabs on the tracks for the length of the alignment in Manhattan, as needed.

- Option 2 would potentially affect only six residential and two non-residential buildings in Manhattan. Resilient ties to reduce ground-borne noise levels by 5 dB would effectively mitigate these potential impacts.
- In Queens, the alignment would potentially affect 45 residential and 37 non-residential buildings, requiring a 10 dB insertion loss, provided by resilient ties and fasteners to effectively mitigate the impacts. Again, field measurements would be conducted in Queens to determine if the effects of the Preferred Alternative could be perceived above current conditions.

ENERGY

Direct energy expenditure can be affected by the project alternatives as a result of the change in total fuel consumption by vehicles operating on roadways in the Long Island Transportation Corridor and the energy required to operate the trains, both diesel and electric. The Preferred Alternative would reduce the regional vehicle miles traveled in the study area and result in a reduction of annual energy consumption of 151 billion British Thermal Units, or BTUs (BTUs are a measure of energy used to compare consumption of energy from different sources, such as gasoline and electricity, taking into account how efficiently those sources are converted to energy).

UTILITIES AND SUBSURFACE STRUCTURES

The Preferred Alternative would require relocation and/or protection of numerous utilities along its tunnel alignment approach to GCT and in Queens at Northern Boulevard and in Sunnyside Yard. Option 1 of the Preferred Alternative, which would be closer to the surface in the GCT approach, would require more utility work than Option 2. In Sunnyside, a 42-inch sewer near the Honeywell Street bridge in Sunnyside Yard would be relocated. Physical conflicts between the new facilities proposed by the Preferred Alternative and existing utilities would be determined at a later date when the design of these facilities is further advanced. To ensure that no significant adverse impacts occur to the existing utility infrastructure in the area of project construction, a utility relocation report is being prepared by the project designers. A detailed field survey is being conducted along the entire alignment of the Preferred Alternative, and all relevant agencies, utilities, and property owners are being contacted.

CONTAMINATED MATERIALS

Contaminated soil and groundwater may be present in areas where construction is proposed for the project alternatives. Construction activities were therefore considered with respect to soil and groundwater conditions to assess any potential risks to public health, safety, and the environment.

To assess the potential for the project to disturb contaminated soil or groundwater, a two-step process was followed. First, all of the project sites were subjected to a preliminary site assessment (commonly referred to as a Phase I Site Assessment). The purpose of this assessment is

to ascertain the site's potential for the presence of contaminated soil and groundwater. The assessment includes a detailed historical investigation, an examination of regulatory databases listing sites of concern, and a visit to the site to investigate any indicators of potential issues related to contaminated or hazardous materials. The results of the Phase I were used to develop programs for subsurface investigations in areas with potential contamination. Detailed investigations were conducted in GCT, Sunnyside Yard, Yard A, Maspeth, Blissville, Fresh Pond, and Highbridge.

The operation of the Preferred Alternative would not create new contamination at any of the project sites. The maintenance facilities constructed at Fresh Pond, Arch Street, and Highbridge would include pre-treatment systems for any discharges, designed in accordance with New York City Department of Environmental Protection (NYCDEP) regulations. Maintenance and car wash activities would be conducted within enclosed facilities. The registration of petroleum storage tanks and chemical storage tanks with the New York State Department of Environmental Conservation (NYSDEC) would occur prior to their installation. Overall, the operation of the Preferred Alternative would not result in significant adverse impacts related to contaminated materials. The discussion below focuses on construction-related activities and their potential to disturb existing contaminated materials.

In Manhattan, work in the below-grade portions of GCT and to construct the tunnels for both Option 1 and Option 2 would be predominantly in bedrock, and little soil would be encountered during construction. Since bedrock in Manhattan is relatively unfractured and impervious, the potential for the downward migration of water or other liquids that may transport contaminants into the bedrock is reduced.

In Queens at Sunnyside Yard, Yard A, and Harold Interlocking, construction activities would include cut-and-cover and soft-ground tunneling techniques. These activities would require the excavation of large amounts of soil and the use of TBMs to construct tunnels deep beneath Sunnyside Yard. TBMs are used to avoid potential human contact with contaminated materials.

Sunnyside Yard is listed as a Class II Inactive Hazardous Waste Disposal Site by NYSDEC and has had widespread contamination from petroleum and PCBs. Amtrak is currently under a consent order to perform remedial investigations in Sunnyside Yard. To date, Amtrak's subsurface investigations have established the presence of an approximately 75,000-gallon plume of PCB-contaminated oil floating in the groundwater approximately 2 to 7 feet beneath Sunnyside Yard. This plume is in the northeast portion of the yard, near Northern Boulevard and 38th Avenue. No schedule for future remedial activities related to the floating product has been established. Coordination with NYSDEC and Amtrak regarding project-related construction activities within Sunnyside Yard and Yard A is ongoing. The project's design incorporates measures to minimize the effect of dewatering activities on the plume, in the event its cleanup is not complete prior to construction. These measures would include the use of low permeability barriers in a "bathtub"-like design for construction of the TBM launch site. Groundwater models would be used to determine the effectiveness of the design and to identify other measures that would further minimize the movement of the plume, if required. In accordance with regulations governing Inactive Hazardous Waste Disposal Sites, the project would be constructed so as not to interfere with any proposed or ongoing program to remediate conditions in Sunnyside Yard and construction would not expose public health or the environment to a significantly increased threat of harm or damage. NYSDEC approvals and permits for dewatering activities would be obtained prior to construction activities.

Pockets of contamination and buried drums are likely to be encountered at many of the sites where construction is proposed (in addition to Sunnyside Yard and Yard A) due to their current or past use as rail yards. Based on the initial sampling effort performed for this *EIS*, a comprehensive program to sample, analyze, delineate, and quantify contamination within each of the construction areas is under development. Findings Reports will be prepared that document the on-site sampling and analytical efforts, and quantify and delineate the contamination found. Site-specific Construction Contamination Management Plans (CCMPs) would be prepared based on the conclusions in the Findings Reports. Each CCMP would contain a Sampling and Analytical Plan (SAP) for contaminated materials to identify sampling and analytical requirements for materials (soil, groundwater, drums, USTs, and asbestos) encountered during construction (specific to both the cut-and-cover and TBM methods). In addition, the CCMPs would describe the requirements for handling, management, treatment, and disposal of contaminated materials encountered in soil or groundwater during construction. All materials leaving the site would require sampling and characterization prior to disposal or reuse off-site.

For excavated materials that would not be used on-site, testing would be required to determine appropriate disposal options. A program to test wastewater and set site-specific discharge limits would be developed in accordance with NYCDEP criteria for discharge to the sewer or NYSDEC criteria for discharge to a waterbody.

The CCMPs would be coordinated with relevant local, state, and federal agencies and would identify preliminary requirements for Health and Safety Plans (HASPs) to be submitted by each construction contractor prior to commencement of work at the site. The HASPs would comply with federal requirements and address worker safety issues related to construction activities and railroad worker protection.

NATURAL RESOURCES

The project's effects on natural resources were assessed for the terrestrial environment (vegetative habitats and associated species) and the aquatic environment (wetlands, surface water, groundwater, and associated habitats and life forms).

Most of the project sites have few issues related to either terrestrial or aquatic resources. The sites are largely developed and surrounded by urban areas, and the little vegetation to be removed is not significant. At all the sites, the groundwater is not used as a potable resource. Several of the sites are near water bodies and thus also lie within the mapped 100-year and 500-year floodplains. In particular, Highbridge Yard is located along the Harlem River, while Yard A/Sunnyside Yard and Blissville Yard are near Newtown Creek and Dutch Kills. Development of Highbridge Yard and Yard A would increase the amount of impervious area, and therefore the amount of runoff to nearby water bodies as well. The project would include a new stormwater system at Highbridge Yard and improvements to the system at Yard A to accommodate this runoff. These systems would include measures to prevent the introduction of new pollutants to the receiving water bodies. The changes at the portions of project sites within floodplains would not contribute to increased flooding in the surrounding areas, as none of the sites are in floodways. The small number of structures to be developed within the floodplain would not be considered significant encroachments and would not result in increases in flood levels. At the new maintenance facility planned at Fresh Pond Yard, pre-treatment systems would be designed and specified to meet industrial discharge limits as administered by NYCDEP, so that the discharges would not have an adverse impact on water quality.

COASTAL ZONE MANAGEMENT

The federal Coastal Zone Management Act of 1972, established to support and protect the distinctive character of the waterfront, set forth standard policies for reviewing proposed development projects along coastlines. New York State Department of State administers the program at the state level and New York City Department of City Planning administers it in New York City through the City's Waterfront Revitalization Program. Because several of the *project* sites (Blissville, Maspeth, and Highbridge) lie within the coastal zone, the East Side Access Project must be assessed for its consistency with applicable coastal policies.

The policies address the following specific coastal issues: public access, recreation, development, flood and erosion hazards, water resources, fish and wildlife, scenic quality, cultural resources, air quality, energy, and agriculture. Overall, the project would be consistent with those policies, which encourage revitalization of underused waterfront areas, while protecting natural resources in the coastal zone from degradation, protecting humans from flooding and erosion, and, where appropriate, increasing public access to the waterfront. Reusing the Blissville or Maspeth and Highbridge rail yards would be fully consistent with these policies; as described earlier, measures would be taken to mitigate any potential for impacts related to possible contaminated materials.

CONSTRUCTION IMPACTS

Construction of the Preferred Alternative would result in disruptions and inconveniences in areas near the construction sites. Considering the size and scope of the project, however, the disruption would be quite limited. Most of the work would occur either underground, with limited or no activity at the surface or in public areas, or in railroad yards that are separated from surrounding uses. Disruptions would occur near GCT in Manhattan, and near Northern Boulevard in Queens.

The Preferred Alternative would require energy to construct new tunnels, tracks, yards, stations in GCT and Sunnyside, and support systems. The onetime, non-recoverable construction energy expenditure for either option of the Preferred Alternative is estimated at 1.6 trillion BTUs. However, this expenditure would be offset by savings in energy during operation, due to a reduction in vehicle miles traveled as a result of the Preferred Alternative. The length of time it would take for the energy consumed to construct the Preferred Alternative to match the energy saved as a result of the operation of the Preferred Alternative (also known as the construction energy pay-back period), would be approximately 10.7 years.

MANHATTAN

In Manhattan, most of the work with either option would be related to the construction of the new tunnels deep beneath the surface. This work would not be perceptible at the surface, except for some possible ground-borne noise during the few weeks of construction directly under some buildings. In addition, both options would use the existing 63rd Street Tunnel and a staging area in Queens to access the tunnels, which would eliminate much of the trucking activity typically associated with tunnel construction such as muck removal and material and equipment delivery. The major effects associated with construction are outlined below.

Due to its shallower depth, Option 1 would result in much more disruption at the street level than Option 2. Under Option 1, extensive cut-and-cover work lasting up to 4 years at any one location would be required along 52nd, 53rd, and 54th Streets between Park and Madison

Avenues and 54th Street between Park and Lexington Avenues. These streets are predominantly commercial, but do include some residential and hotel uses. The disturbances would be limited as much as possible through the use of traffic maintenance plans. Access to adjacent properties would be maintained at all times. The anticipated sources of disturbance would include dust, noise, and vibration during surface excavation; storage and handling of construction materials; and temporary reductions in sidewalk width, traffic lanes, and curbside parking. The construction work at these locations would last several years.

Option 1 would also require the underpinning of four buildings along the west side of Park Avenue—Lever House (390 Park Avenue), the Racquet & Tennis Club (370 Park Avenue), 400 Park Avenue, and 410 Park Avenue. The work would involve the temporary use of a portion of each basement for a period of up to 2 years. In addition to the displacement of the current users of each space (including the 200-space parking garage at Lever House) and the generally disruptive nature of construction work, the most noticeable effect would be noise and vibration during excavation of rock below the current basements. The excavation work could take up to 6 months at Lever House and the Racquet & Tennis Club, while 410 and 400 Park Avenue would require less time. This would most likely be accomplished by controlled blasting. While the effect would be of very short duration (4 to 5 seconds a few times a day), they may be disconcerting to some building occupants. At these locations, with primarily daytime uses, all efforts would be made to schedule the blasting during non-work hours.

Option 1 would also require significant work that would affect MNR operations. Work in the lower level of GCT related to the relocation, underpinning, or removal of existing structural columns would require track and platform outages on the upper level. In addition, the underpinning of the four buildings on Park Avenue and the construction of the new LIRR tunnel under the MNR structure between 54th and 56th Streets would require closing of some lower-level MNR tracks in this area for an estimated 3½ years. During the peak period, up to two tracks would be out of service continuously and at the same time. During off-peak hours and weekends, up to three tracks would be out of service at one time. These track outages would adversely affect MNR service, and on-time performance would be expected to deteriorate. Schedule resiliency, or the ability of the system to absorb delay, and the recoverability of the railroad in the event of equipment failure or another operational incident would be adversely affected for as long as the track outages are required. Measures to minimize prolonged service disruptions resulting from track outages would include reducing the number of tracks taken out of service during the peak periods and sequencing track outages to maximize the efficient completion of construction tasks. The optimal solution would be determined through the use of a simulation model to test the effects of delays and equipment failures under a variety of track outages.

With Option 2, most of the above adverse effects on MNR could be avoided. Because this option would be deeper than Option 1, no underpinning would be required either for MNR tracks or the four Park Avenue buildings. In addition, the required structural work in the lower level of GCT would either not be necessary or at least be much less extensive than in Option 1. This would eliminate the impact to MNR operations and the buildings along Park Avenue. In addition, Option 2 would only require limited cut-and-cover construction.

Construction work for new entrances and the vent plant on 44th Street would be essentially the same for either option. The disruptions associated with this work would be similar to other construction projects in New York City, and would not be considered overly disruptive.

The cut-and-cover work required in Manhattan would cause temporary disruptions to vehicular and pedestrian traffic. One curb lane and portions of the sidewalk would be closed at affected locations for the duration of the construction (up to 4 years at any one location in Option 1, no more than 2½ years at the longest location in Option 2). One moving lane would be maintained for traffic.

QUEENS

Most of the work along the Queens alignment and in the railroad yard complex would be buffered from surrounding uses. Construction activities on either side of Northern Boulevard at 41st Avenue would in effect continue the construction activities that have been ongoing there for the 63rd Street Connector Project. The construction site being used for that project would also be used for the Preferred Alternative. This would cause some disruption (principally noise) at Newcomers High School at 28-01 41st Avenue, adjacent to the site. *A detailed construction noise impact assessment, including interior and exterior noise monitoring, was performed at Newcomers High School to quantify worst-case noise levels during the height of construction activities that would occur on the proposed Queens staging area adjacent to the school. The results of the analysis indicate that interior and exterior noise levels could increase by up to 10 dBA (constituting a doubling of loudness) due to project-related construction activities. While this increase would be temporary (the majority of work would occur over a 2½-year period, with minimal activity occurring on the site for another 2½ years), the magnitude of the increase could potentially affect the learning environment in the classrooms facing the staging area on 29th Street. While a noise barrier would effectively mitigate the noise level increase for first-floor classrooms, it would be relatively ineffective for the upper floors of the school. MTA is committed to working with Newcomers High School throughout the construction period to provide suitable mitigation, as discussed below in section F.*

Construction of the Preferred Alternative across Northern Boulevard would result in some disruption to the subway lines (E and F) under the roadway. Over an approximately 3-month period, followed by another 2-month period 6 months later, up to two tracks would need to be taken out of service at night and over the weekend. This would result in some inconvenience to NYCT customers requiring additional transfers and backtracking to access some local stops.

Construction activities in Queens may require a temporary (2-year) construction easement for a staging area on portions of the General Motors property west of 43rd Street. This would displace up to 28 parking spaces at that facility, and may require relocation of the access bridge leading to the facility to a site adjacent to the existing bridge.

YARD SITES

The construction activities proposed at Blissville or Maspeth Yard, Fresh Pond Yard, and High-bridge Yard are relatively minor. It is not expected that the work at these locations would result in any significant adverse effects during construction.

ECONOMIC BENEFITS DURING CONSTRUCTION

The public expenditure required for the Preferred Alternative would translate directly into jobs associated with construction labor itself, as well as services and materials. As a result of direct expenditures (under either project option), the direct employment from construction activities would be an estimated 14,200 person-years (a person-year is the equivalent of one employee

working full-time for 1 year). In addition to these jobs, the project would also result in indirect or secondary economic benefits, representing secondary-level expenditures by material suppliers, construction workers, and other employees involved with the project. This includes jobs in business establishments providing goods and services to the contractors and construction workers. Implementation of the Preferred Alternative would generate significant economic activity throughout its construction period. An investment of this magnitude would result in tens of thousands of induced jobs throughout the regional and national economy.

ENVIRONMENTAL JUSTICE

As a project that would use federal funds, the East Side Access Project must comply with Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations." This Executive Order is designed to ensure that each federal agency "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Executive Order 12898 also requires federal agencies to work to ensure greater public participation in the decision-making process. To this end, the East Side Access Project has an extensive public participation and community outreach program.

Overall, the impacts of the Preferred Alternative that could not be fully mitigated would not be disproportionate. While impacts would occur in some locations with concentrations of low-income and minority residents, similar impacts would occur in other locations with populations without those concentrations. Furthermore, the project would provide substantial benefits that would affect the same broad range of people that would experience the project's impacts. The project would also result in decreases in vehicle miles traveled, and associated decreases in air pollutants, throughout the LITC as well as in the Bronx. On balance, the significant unmitigated impacts of the Preferred Alternative would not disproportionately affect low-income or minority populations.

PUBLIC PARTICIPATION

The alternatives in the EIS are the result of decades of planning and community participation. The East Side Access Project development has involved the community at every step. The primary goal of the public outreach program has been to create a public forum for the exchange of information among the project team, concerned citizens, and federal, state, and local agencies. Elements of the program include the following:

- Coordination with affected community boards;
- Public information meetings advertised via local newspapers, seat drops on MNR and LIRR, and a 300-person project mailing;
- Small group meetings and presentations to interested organizations;
- Regular meeting of a 55-person Technical Advisory Committee;
- Regular meetings of a 200-person Citizens' Advisory Committee;
- Targeted outreach to those who live in the immediate project area in Manhattan and Queens, which includes a 5,000-person mailing list; and
- Hundreds of ongoing working meetings with affected operating agencies such as Amtrak, MNR, and NYCT.

The program has reached *out to* major planning boards, government organizations (federal, state, and local), elected officials, and transportation and environmental groups throughout New

York City; Long Island; Westchester, Putnam, and Dutchess Counties; and New Jersey. The general consensus of these groups is supportive of the East Side Access Project, particularly with Option 2 of the Manhattan alignment.

F. SUMMARY OF MITIGATION MEASURES

PROPERTY ACQUISITIONS AND RELOCATION

To construct the new ventilation facility and entrances to the new concourse at GCT in Manhattan, the project would permanently displace approximately 10 businesses. The project would also require acquisition of private property and permanent easements at other locations in Manhattan for the new entrances, ventilation facilities, and below-ground tunnels, as well as acquisition of at least a portion of one privately owned property in Queens for the project's loop track, a small City-owned property in Queens for its ventilation structure, and a small City-owned property in the Bronx for development of Highbridge Yard. Temporary construction easements would also be required in Manhattan and Queens. Displacements and relocations would be subject to 49 CFR Part 24, Uniform Relocation Assistance and Real Property Acquisition Regulations for Federal and Federally Assisted Programs ("the Uniform Act"), which provides entitlements for property owners and qualified businesses that are displaced. MTA's Real Estate Department would administer the relocation program in accordance with federal rules and regulations.

Once the project's final design is under way, property identification plans would be developed to identify every parcel affected by the project and to define the need for property acquisitions and/or easements. From property identification plans, preliminary title reports would be obtained to ascertain the owners of record and legal descriptions of the parcels. The parcels would then be certified as needed for the project and the acquisition process initiated.

The MTA Real Estate Department is responsible for acquiring right-of-way and other real estate interests necessary to complete the project. The Real Estate Department would be assisted by the right-of-way coordinator from the East Side Access Project team. The acquisition process would consist of the following six steps: identification of required real estate once final design information is available; appraisal of required property; acquisition, either through negotiation or eminent domain; settlement or litigation of any claims for additional compensation or property damage; relocation of occupants if necessary; and property management, including demolition of improvements. MTA will adhere to the federal regulations of the Uniform Act, which covers the appraisal and acquisition of real property, relocation services, moving payments, replacement housing payments, and other allowable expense payments.

MITIGATION OF EFFECTS TO HISTORIC AND ARCHAEOLOGICAL RESOURCES

A Programmatic Agreement was executed by the FTA, the New York State Historic Preservation Officer (SHPO), and the MTA, and a copy of the Programmatic Agreement is included in Appendix B of the FEIS. This agreement specifies the measures that would be taken by the FTA and the MTA to avoid, minimize, or mitigate the potential adverse impacts of the project on historic and archaeological resources. There would be no

adverse effects on historic properties or archaeological resources provided that the measures detailed in the Programmatic Agreement are implemented.

For archaeological resources, the measures detailed in the Programmatic Agreement include development and implementation of a soil boring program, and field testing where the potential for archaeological resources is confirmed to exist by soil borings or further evaluation. For any sites that are determined eligible for the National Register using those steps, where MTA also determines in consultation with SHPO that avoidance is not practicable, a data recovery plan would be developed and implemented. All archaeological field analysis and data recovery required would be completed prior to construction activities in the vicinity of affected resources. If this is not practicable, MTA, in consultation with SHPO, would develop a phasing plan for the archaeological and construction activities.

For historic resources, the measures detailed in the Programmatic Agreement include development and implementation of a construction protection plan to ensure the protection of Grand Central Terminal, the Yale Club, Switch Tower Q, and the Sunnyside Yard Office, and any other historic resources listed on or determined eligible for the National Register or designated as a New York City Landmark. Any such resource within 75 feet of construction activities would be included in a construction protection plan. In addition, the Programmatic Agreement requires development of design specifications to ensure that new elements constructed as part of East Side Access within Grand Central Terminal are compatible with the terminal's significant qualities. Design specifications would also be developed in coordination with SHPO for any new project elements within visual range of any historic resources listed on or eligible for the National Register or designated as New York City Landmarks.

MITIGATION FOR TRANSPORTATION IMPACTS

TRANSIT

With the East Side Access Project, a number of improvements would be made to elements of the New York City Transit Lexington Avenue line subway station at 42nd Street/Grand Central Terminal. These measures are designed to mitigate congestion on stairwells, platforms, and line-haul capacity of the Lexington Avenue subway by improving circulation patterns and train throughput. The specific mitigation measures are listed below and illustrated in Figure S-6:

- *Increase use of the free passage connecting NYCT fare control area 236 at the shuttle turnstile area entrance and fare control area 238 at the Lexington Avenue line western turnstile bank.*
- *Create a new turnstile bank just west of fare control area 238 to attract passengers from the free passageway area into the mezzanine area and relieve use of the western stair/escalator bank.*
- *Widen the corridor mouth into space currently occupied by the Pershing Building's basement to create a new stair P10.*
- *Restore stair P16.*
- *Enlarge fare control area 238's turnstile line farther east into the mezzanine area.*

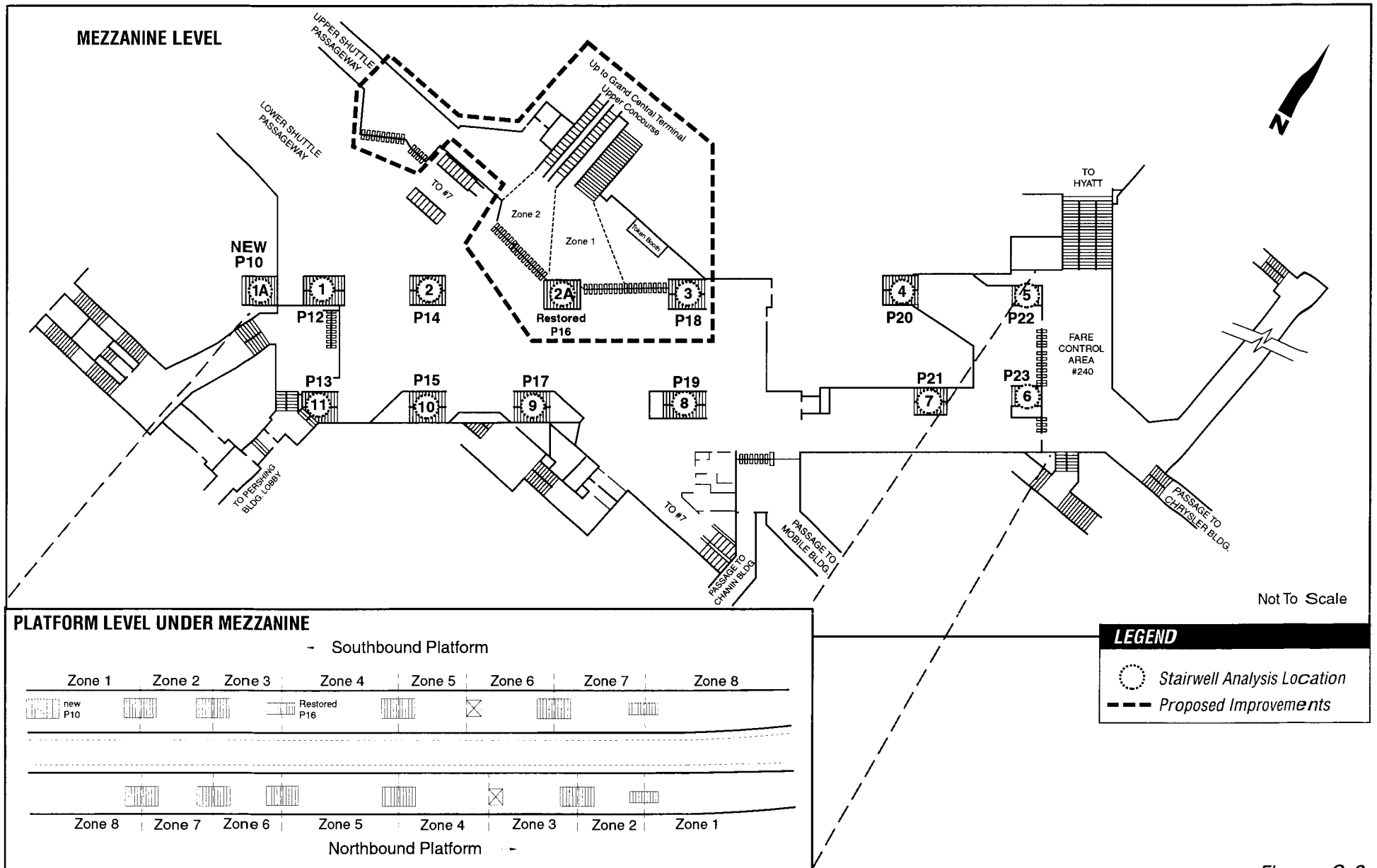


Figure S-6
**Stairwell and Fare Control Area Improvements
Lexington Avenue Subway at Grand Central Terminal**

Increases in demand for bus service in the vicinity of Grand Central Terminal would be mitigated by NYCT as demand dictates, through the adjustment of bus schedules and frequencies, as is their policy.

PEDESTRIAN FLOWS

Increased pedestrian flows in Grand Central Terminal would result in a significant adverse impact at the escalator bank leading to the New York Transit Museum store on the west side of the Main Concourse. Partial mitigation for this impact could be achieved through redirection of the escalator so both elements operate in the peak direction, if warranted upon completion of the project.

Outside the terminal, for significant impacts on sidewalks and at crosswalks due to the increase in pedestrian activity in the Grand Central Terminal area, mitigation measures identified include widening of crosswalks in some locations. In other locations, the New York City Department of Transportation (NYCDOT) may choose to limit sidewalk vendors and/or street furniture such as newspaper kiosks and flower boxes to create more sidewalk capacity. These measures would be implemented if NYCDOT deems them warranted upon project completion.

TRAFFIC

Increased taxi activity on streets near Grand Central Terminal would result in significant adverse impacts at up to 12 intersections during peak hours. Mitigation for these impacts, which is the responsibility of the NYCDOT as part of their normal procedures, consists of standard traffic engineering improvements, such as signal phasing and timing modifications, more restrictive parking regulations, and by providing exclusive phases (e.g., left-turn arrows) for turning movements at some intersections to minimize conflicts with crossing pedestrians (see Table S-4). These measures would be implemented if the NYCDOT deems them warranted upon project completion.

Traffic increases in the vicinity of some LIRR stations on Long Island would also require mitigation via standard traffic engineering improvements such as the installation of traffic signals at unsignalized intersections, signal phasing and/or timing modifications at signalized intersections, lane re-striping, offsetting centerlines of streets where it would be necessary to gain additional capacity in one direction, and more restrictive parking regulations. Responsibility for implementation of these mitigation measures lies with the local jurisdictions affected.

PARKING

Parking shortfalls at LIRR stations on Long Island, which occur in the existing condition and are predicted for both the No Action and Preferred Alternatives, would be mitigated on a station-by-station basis, through the LIRR's existing Parking Program. This program involves working with the local jurisdictions that own, operate, and maintain parking facilities at LIRR stations to identify and implement appropriate improvements. For the parking facilities affected by East Side Access, the range of parking mitigation measures could include consideration of one or more of the following on a station-by-station basis:

Table S-4

**Summary of Traffic Mitigation Measures for the
Preferred Alternative 2010, Grand Central Terminal Area**

Intersection	Mitigation Measure
AM PEAK HOUR	
Madison Avenue and 41st Street	Prohibit parking on north side of EB lanes to create a left-turn lane; provide a protected EB LT phase.
Park Avenue and 42nd Street	Prohibit parking on the NB lanes to provide 2 RT/1 LT lanes; adjust signal timing to provide protected NB movement.
Park Avenue and 46th Street	Remove parking on the SB lanes to provide 2 LT/ 2 RT lanes.
Park Avenue and 47th Street	Provide protected NB/SB phase.
Park Avenue and 48th Street	Provide a protected NB/SB phase; daylight the south curb of the EB approach.
Lexington Avenue and 43rd Street	Provide protected WB signal phase.
Third Avenue and 41st Street	Provide protected EB/WB signal phase.
Third Avenue and 42nd Street	Provide protected EB/WB signal phase.
Third Avenue and 43rd Street	Prohibit parking on north side of WB lanes to create an exclusive RT lane; provide protected WB signal phase.
Third Avenue and 45th Street	Prohibit parking on north side of WB lanes to create an exclusive RT lane.
Third Avenue and 46th Street	Prohibit parking on north side of EB lanes to create an exclusive LT lane.
Third Avenue and 48th Street	Prohibit parking on north side of EB lanes to create an exclusive LT lane.
MIDDAY PEAK HOUR	
Park Avenue and 42nd Street	Prohibit parking on north side of EB lanes to create 2 RT/1 LT lanes; adjust signal timing to provide a protected NB movement and shift green time from the NB phase to the EB/WB phase.
Park Avenue and 48th Street	Same as AM.
Lexington Avenue and 43rd Street	Same as AM.
Third Avenue and 42nd Street	Provide protected NB signal phase; shift green time from the NB phase to the EB/WB phase; prohibit parking on westside of EB lanes.
Third Avenue and 43rd Street	Shift green time from the NB phase to the WB phase.
Third Avenue and 48th Street	Prohibit parking on north side of EB lanes to create an exclusive LT lane.
PM PEAK HOUR	
Sixth Avenue and 42nd Street	Prohibit parking along the NB lanes to provide 2 RT/1 LT; adjust signal timing to provide a protected NB movement and shift green time from the NB phase to the EB/WB phase.
Park Avenue and 42nd Street	Same as midday.
Park Avenue and 47th Street	Provide protected NB/SB signal phase.
Park Avenue and 48th Street	Same as AM.
Lexington Avenue and 43rd Street	Same as AM.
Third Avenue and 41st Street	Prohibit parking on north side of WB lanes.
Third Avenue and 42nd Street	Same as AM.
Third Avenue and 43rd Street	Same as midday.

- *Re-striping of existing surface parking lots to increase capacity, expansion of existing lots, or construction of new lots.*
- *Construction of parking garages atop existing surface lots or at new locations.*
- *Modification of train service and schedules to improve or increase service at stations with available parking or where parking could be added more easily.*
- *Institution of fare policy changes to attract riders to a new station by shifting one or more stations from one fare zone to another.*
- *Increase of existing bus service to stations to promote bus use. Free or heavily subsidized fares and combination fare tickets could also be considered.*
- *Implementation of new station-oriented feeder bus service or jitney service, with local riders or a local Chamber of Commerce or Business Improvement District group designing the route themselves.*
- *Substantial improvements to and prioritization of pick-up/drop-off facilities to increase pick-up/drop-off activity and reduce parking demand.*
- *Provision of preferential parking areas for carpoolers, with enforcement. Consideration could also be given to decreasing parking charges for carpoolers, although this is generally outside of LIRR jurisdiction, since the vast majority of station parking facilities are owned, operated, and maintained by local governmental bodies, and not LIRR.*
- *Construction of new station(s) near or between two major stations where parking demands greatly exceed parking availability.*
- *Provision of bicycle racks and/or lockers to promote increased bicycle use for access to stations.*

MITIGATION FOR AIR QUALITY IMPACTS

The standard traffic engineering measures implemented to mitigate traffic impacts at the intersections of 48th Street and Park and Third Avenues (see Table S-4) would also mitigate the air quality impact predicted for the intersection of 48th Street and Madison Avenue absent the mitigation.

MITIGATION FOR NOISE AND VIBRATION IMPACTS

Design features would be incorporated into the project to mitigate its potential ground-borne noise impacts along the project route in Manhattan and Queens. Resilient rail fastenings and ties would be used in project tunnels in Manhattan to avoid potential ground-borne noise impacts. In Queens, potential ground-borne noise impacts would be mitigated through the use of floating slabs, resiliently supported ties and fasteners, or ballast mats as needed at certain locations.

While certain segments of the LIRR system would experience wayside noise impacts of up to 3 dBA more than existing levels as a result of the additional train service, it is not practical to install noise barriers due to the extensive wall length that would be required. At the portions of the Port Jefferson Branch where noise impacts are predicted, the construction of sound barrier walls would cost approximately \$2.3 million per mile. The size of the existing system—with more than 700 trains a day and more than 365 miles of

right-of-way—prohibits the LIRR from considering mitigation measures for impacts related to changes in the operating plan. It is LIRR policy to consider noise mitigation only for railroad extension projects and new yard locations.

MITIGATION FOR CONTAMINATED MATERIALS

During construction, the East Side Access Project would require excavation and disturbance of soil, including tunnel spoil. For materials that would not be used on-site, testing would be performed to determine appropriate disposal options.

Building on the initial sampling effort performed for the EIS, a comprehensive program to sample, analyze, delineate, and quantify contamination within each of the construction areas would be developed. Findings Reports would be prepared that document the on-site sampling and analytical efforts, and quantify and delineate the contamination found. Site-specific Construction Containment Management Plans (CCMPs) would be prepared based on the conclusions in the Findings Reports. The CCMPs would describe the requirements for handling, management, treatment, and disposal of contaminated materials encountered during construction. In the case of groundwater contamination, containment, treatment, and discharge options would be included in the CCMP.

The approach to mitigation of soil and groundwater conditions would include the following:

- *NYSDEC approvals and/or permits for activities relating to the remediation of oil or hazardous substances would be sought. In accordance with regulations governing Inactive Hazardous Waste Disposal Sites, the project would be constructed so as not to interfere significantly with any proposed or ongoing program to remediate conditions in Sunnyside Yard. If oil contamination is discovered in connection with the project, the requirements of the New York State Navigation Law (spill reporting and others) would be followed.*
- *Potentially contaminated soils would be excavated and stockpiled on polyethylene sheeting until they can be tested and if necessary, removed for off-site disposal at an appropriate facility. Depending on the quantities and locations of contaminated soils, other mitigation technologies would also be used. All soil disposal from Sunnyside Yard would be coordinated with Amtrak.*
- *Groundwater mitigation would include ongoing monitoring and treatment of water removed during dewatering operations, and monitoring the plume of separate-phase PCB-contaminated oil in Sunnyside Yard to assure there is no migration into the project area. The permanent placement of low permeability barriers (e.g., slurry walls) around the project area would also prevent contaminated groundwater from entering the project area. NYSDEC dewatering permits (6 NYCRR §602) for the operation of wells to withdraw water would be obtained prior to construction activities, where required.*

MITIGATION FOR IMPACTS TO NATURAL RESOURCES

Pollution source reduction techniques and prevention strategies, as recommended by the EPA Office of Pollution Prevention, would be incorporated into the design of the cleaning and maintenance facilities to be constructed in Arch Street Yard, Fresh Pond Yard, and

Highbridge Yard. These facilities would use detergents, oil, and solvents, but their use would be limited to within enclosed buildings. An industrial discharge evaluation would be conducted and pre-treatment systems would be designed and specified to comply with federal Industrial Pretreatment Program regulations as administered by NYCDEP, NYSDEC requirements for new discharges, and all other applicable standards and guidelines.

At project sites where new facilities (e.g., additional buildings or an increase in the paved area) could lead to additional runoff, stormwater systems would be used to collect runoff that is generated from the affected areas. Any existing storm drainage systems would be evaluated for condition, regulatory compliance, and capacity. The systems would be rehabilitated, replaced, or supplemented with new systems for new yard development. To handle the sediment and sand expected in the stormwater runoff from paved parking areas and service aisles, storm water would be collected and piped through a gross particle separator (GPS) before discharging into a storm drain trunk line feeding to a storm-water oil/waste separator.

MITIGATION FOR CONSTRUCTION IMPACTS

LAND USE AND SOCIAL CONDITIONS

In the vicinity of project construction areas in Manhattan and Queens, access would be maintained to adjacent land uses at all times. In areas where sidewalks or street lanes are being closed for extended periods of time, standard practices for maintaining pedestrian and vehicular access would be followed. These practices would include providing alternate routes of entry into buildings for employees, residents, and deliveries; providing appropriate signage to direct people to these alternate entrances; establishing a traffic management plan to ensure vehicular access to affected buildings; and implementing an outreach program to share construction schedules, potential impacts, and mitigation measures with local retailers, businesses, and residents.

HISTORIC AND ARCHAEOLOGICAL RESOURCES

The Programmatic Agreement executed for the East Side Access Project sets forth requirements for mitigation measures to protect historic and archaeological resources during construction. Most importantly, these include development and implementation of construction protection plans for all resources that are eligible for or listed on the National Register or designated as New York City Landmarks that are in the vicinity of project construction activities.

TRANSPORTATION

Construction between 44th and 55th Streets in Manhattan would require closing sidewalks and vehicular traffic lanes and could cause changes to vehicular traffic patterns in the vicinity of traffic lane closures. To minimize any potential impacts of construction activities on traffic, Maintenance and Protection of Traffic Plans (MPTs) would be developed and implemented. At all times, at least one moving travel lane would be maintained on each affected street. On streets where lane closures would be necessary, on-street parking would be prohibited and parking regulations would be changed to "No Standing

Anytime” to ensure continued vehicular flow. Access to loading areas and driveways would be maintained during construction.

In Queens, disruption of traffic would be minimized at Northern Boulevard by limiting construction activities to nighttime hours when practical and covering excavated areas to maintain traffic flow at street level while underpinning is under way. Similarly, any lane closures associated with work on the Sunnyside station would occur only during off-peak hours, during weekends, or at night. To the maximum extent possible, the existing rail infrastructure would be used to transport materials to and from the various construction sites. In the event that rail is not used to transport the Manhattan and Queens tunnel spoil from the stockpile site in Yard A, as well as for the delivery of construction material, a Maintenance and Protection of Traffic Plan (MPT) would be developed and implemented for Northern Boulevard between 42nd Place and 41st Avenue. Measures to minimize the effects of construction traffic would include standard temporary traffic engineering solutions such as on-street parking limitations, lane restripings, dedicated turn lanes, and traffic control personnel.

Detailed construction staging plans would be developed and implemented to minimize disruptions to LIRR, Metro-North, NYCT, Amtrak, and NJ Transit service during construction of East Side Access. In coordination with Amtrak, project schedules would be developed for all work that could affect Amtrak operations at Sunnyside Yard. Construction would be staged so that access is available at all times to Amtrak’s High-Speed Service & Inspection facility. Disruptions to New York City Transit subway service in Queens related to construction work near Northern Boulevard would be minimized to the extent possible by requiring track outages on weekday nights and weekends rather than during the workday.

AIR QUALITY

All appropriate dust control measures—including watering of exposed areas and dust covers for trucks—would be employed to minimize the effects of construction on nearby people or buildings. The Queens MPT would be designed to minimize the vehicular congestion and associated air quality problems. To the maximum extent possible, the existing rail infrastructure would be used to transport materials to and from the various construction sites.

At the tunnel ventilation shaft in Queens where the tunnels are vented, the shaft would be equipped with air pollution control equipment at its exhaust point to minimize particulate matter.

NOISE

The construction contracts would include specifications related to blasting operations, requiring the contractors to implement a program to minimize noise impacts. Modern blasting techniques—such as timed multiple charges, blastmats, etc.—would be employed to lessen the severity of blasting noise levels.

To minimize disruptions at Newcomers High School, adjacent to the construction staging and tunnel access shaft in Long Island City, Queens, MTA would work with representatives from the school to develop a plan to mitigate the construction-related noise effects. Such a plan would include sound-insulating construction fencing and the installation of

double-glazed windows or air conditioning units. MTA would continue to coordinate with school representatives throughout the construction period to address problems if they arise.

At the site of cut-and-cover sections in Manhattan and in Queens in the vicinity of Northern Boulevard, as well as near the Harold Interlocking work east of 43rd Street in Queens, noise from construction activities would result in disruptions at surrounding receptors. At locations where it is feasible, plywood barriers would be constructed around the excavation of cut-and-cover sections to reduce noise levels.

VIBRATION

With respect to mitigation of vibration during construction, the following controls would be implemented:

- *A preconstruction survey of any structure likely to be affected by the construction activities would be performed and threshold or limiting values of each structure's ability to withstand the loads and displacements due to construction vibrations would be established. Detailed construction specifications that impose reasonable acceptance criteria would be included in construction contracts.*
- *Site-specific vibration control plans would be developed by the contractor and best management practices to limit vibration would be employed, including the following:*
 1. *Use of deep saw-cuts to minimize the transmission of vibrations from pavement-breaking operations to foundations of nearby structures.*
 2. *Use of concrete cutters on pavement surfaces instead of pavement breakers, where practical.*
 3. *Use of vibratory rather than impact pile drivers where feasible for installation of retaining walls and other structural elements.*
 4. *Routing of truck traffic and heavy equipment to avoid impacts to sensitive receptors.*
 5. *Conducting vibration monitoring during highly disruptive construction activities, such as pile driving and drilling, particularly if situated within 150 feet of a sensitive receptor.*
 6. *Properly securing street decking over cut-and-cover excavations.*
 7. *Scheduling of work to limit nighttime impacts in residential areas.*
 8. *Heightened attention and controls when working in historic districts and near historic structures.*
 9. *Minimizing the duration of vibration impacts.*
- *Vibration levels would be monitored by the contractor in the foundations of nearby buildings during all blasting activities. U.S. Bureau of Mines Standards for maximum air blast, New York State Department of Transportation standard specifications, and, in Sunnyside Yard, Amtrak specifications for blasting would be followed.*

- *Special measures set forth by the New York City Landmarks Preservation Commission and the New York City Buildings Department would be taken into account to protect historic resources from increased vibration levels associated with construction activities. Contractors working within 150 feet of historic structures or residences would be required to establish and monitor construction methods to limit vibration to levels that would not cause structural damage, as determined by the preconstruction survey.*
- *A project-wide vibration monitoring program would be developed and implemented to minimize vibration levels from blasting, TBM operations, and general construction activities at nearby sensitive receptors. A complaint response procedure would be utilized to promptly address community concerns and implement additional control methods where necessary.*

NATURAL RESOURCES

A Stormwater Pollution Prevention Plan and an Erosion Control Plan would be developed to comply with the permitting requirements of the NYSDEC State Pollutant Discharge Elimination System (SPDES) permits. Contract specifications would require that best management practices be employed to minimize soil erosion and other effects of storm water runoff. These include the use of silt fences, straw bales, vegetative covers, etc. At all construction sites, a rodent control program would be employed. The project would demonstrate that work performed in floodplains (Highbridge Yard, Blissville Yard and portions of Arch Street Yard, Yard A and Sunnyside Yard) meets NYSDEC criteria (NYCRR Part 502).

Throughout the project area, regular settlement monitoring of overlying properties and streets would be performed to ensure that construction impacts remain within permitted ranges. Threshold (trigger) limits would be established for any settlements recorded, so that mitigation measures can be instituted ahead of any potential damage. Similarly, settlement and groundwater levels at Sunnyside Yard would be monitored throughout construction. Corrective measures would be maintained on standby for immediate implementation if specified levels are being approached or exceeded.

UTILITIES

Prior to construction of the project, detailed investigation and engineering design would determine all of the utilities that could be affected by project construction. A detailed field survey would be conducted and a utility relocation report prepared. Utilities located in areas of construction would either be protected and maintained during construction or relocated temporarily or permanently (in the case of some sewers), without interruption in service, if maintenance is not feasible.

SAFETY AND SECURITY

Standard safety and security measures would be followed and the most stringent provisions of the applicable statutes and regulations of New York City and New York State, and the Department of Labor, Occupational Safety and Health Administration, pertaining to the safe performance of the work, would be observed. In the few instances where contractors would obstruct sidewalk pedestrian areas in the performance of their work, protective sidewalk sheds, barricades, warning signs, and other items to protect the public

would be provided. All sites would be secured during construction to prevent trespass, theft, and vandalism. A project-wide environmental health and safety plan would be developed for the project to delineate project-wide policies and requirements for railroad safety, construction safety, environmental safety and industrial hygiene. Construction contractors would be required to develop and implement site-specific Health and Safety Plans.

G. SUMMARY OF ASSESSMENT OF ILLUSTRATIVE LONG ISLAND STORAGE YARDS

As described earlier, the FEIS includes an illustrative assessment of the types of impacts that could occur from future development of nighttime storage yards in Nassau and Suffolk Counties. The assessment is presented to address potential environmental effects related to the project's incremental need for nighttime storage facilities. The analyses in the FEIS in no way preclude or replace the full site selection and environmental review process that will occur in the future for the new storage yards.

The assessment considered the full range of environmental impacts analyzed in the FEIS, and concluded that, depending on their specific locations, new yards in Nassau and Suffolk Counties for storage and servicing of LIRR trains might have the following types of potential impacts (see also Table S-5). As noted in Table S-5, even with mitigation, some impacts would not be fully mitigated.

- Yard sites located near residential uses would have the potential to have significant adverse impacts on land use, community character, and visual character. Mitigation would consist of vegetated walls or buffers between the yard and sensitive uses. Of the sites analyzed in the FEIS, this was true for the Babylon and Riverhead sites.
- Any yard site developed on property not currently owned by the LIRR would need to be acquired. If any active uses are present, these would be displaced.
- All sites would require review and coordination with SHPO to identify any historic and archaeological resources and appropriate mitigation measures for any potential impacts.
- Significant adverse noise impacts on adjacent uses might result from introduction of new yards. The analysis indicated that potential impacts are more likely at yards for diesel trains than those for electric trains. Mitigation would consist of 10-foot-high noise barriers, where appropriate.
- In terms of natural resources, any new yard proposed on Long Island would be located above Nassau and Suffolk Counties' sole source aquifer, which is protected by federal, state, and local regulations. Wastewater would be discharged to sewers where they are available; where they are not, wastewater from toilets would be removed by truck and wastewater from cleaning would be discharged to a leaching field as and to the extent appropriate under the circumstances. These measures would be adequate to protect the sole source aquifer. Any sites located near freshwater wetlands or Critical Environmental Areas would need to demonstrate minimal impact on those resources.

Table S-5
Summary of Adverse Effects and Mitigation
for Illustrative Yard Sites on Long Island

Analysis Area	Effects	Mitigation	Unmitigated Impacts
Land Use, Zoning, and Public Policy	Potential land use conflicts with surrounding uses at Babylon and Riverhead yard sites. Potential impacts from displacement of farmland at Yaphank East, Yaphank West, and Riverhead sites.	Buffers consisting of landscaped walls and/or vegetated areas would be constructed around new yards at Babylon and Riverhead.	Impact would remain partially unmitigated at Riverhead.
Social Conditions	Adverse impact to character of residential communities surrounding Babylon and Riverhead yard sites. Development of Babylon site would also require displacement of 5 residences.	The yards would be buffered from adjacent or nearby properties by a landscaped wall or vegetated area.	Impact would remain partially unmitigated at Riverhead.
Property Acquisitions	Permanent acquisition of any yard site selected. Could involve displacement of active uses.	The properties would be acquired following the requirements of New York State.	None.
Visual Quality	Potential for impacts at Babylon, Yaphank East, and Riverhead Yard sites.	Buffers consisting of landscaped walls or vegetated areas would be provided around those new yards.	Impact would remain partially unmitigated at Riverhead.
Historic Resources	Potential demolition of Pilgrim Hospital structures on Long Island would constitute a significant adverse impact.	Ongoing consultation with SHPO regarding design alternatives if this site is selected.	None.
Archaeological Resources	Impacts would occur if significant archaeological resources exist at yard sites selected. All sites but Cerro Wire have potential for resources.	Ongoing consultation with SHPO as detailed in a Programmatic Agreement regarding further analysis and design of mitigative measures.	None.
Noise	Noise impact at site of potential new train storage yard in Riverhead.	A noise wall would be constructed around the yard.	None.
Contaminated Materials	Potential for exposure to contaminated materials during construction.	Sampling, analysis, delineation and quantification of contamination prior to construction; development of site-specific CCMPs based on findings of the sampling program.	None.
Natural Resources	Babylon site could affect Sampwams Creek (freshwater wetland that connects to Critical Environmental Area). Yaphank East site could affect Carmans River (New York State Wild and Scenic River, freshwater wetlands, floodplain). Potential for impact on protected grassland species. Pilgrim Hospital site could affect freshwater wetland and Edgewood oak brush plains habitat, also a significant ground-water protection area. Riverhead site near wetlands that are part of a critical natural resources area under the Peconic Estuary Program.	Minimize clearing at Yaphank East and Pilgrim Hospital sites. Comply with runoff management policies of Coastal Zone Management Program at Riverhead.	None.
Construction Impacts: Natural Resources	Potential increased erosion and storm-water runoff during construction.	Preparation of soil and sedimentation control Plan and other SPDES permitting requirements.	None.

Other sites may have specific, site-related natural resources issues requiring further investigation. Three of the sites analyzed in the FEIS—Yaphank East, Pilgrim Hospital, and Riverhead—serve as examples. The Yaphank East site analyzed in the FEIS would have to be designed to minimize clearing of forested land so as to avoid impacts to the nearby Carmans River, a New York State Wild and Scenic River with surrounding freshwater wetlands, and further study would be required to determine whether a federally endangered grassland species identified by the U.S. Fish and Wildlife Service is present on the site. As another example, the Pilgrim Hospital site is in the Oak Brush Plains significant groundwater protection area. Depending on the extent of washing activities that are being considered, containment and/or pretreatment facilities may be required to protect groundwater. A small portion of the Pilgrim Hospital site is wooded and is part of the 1,400 acres of Edgewood oak brush plains habitat that are found in this area. Minimizing clearing of natural pitch-pine scrub-oak forest at this site would be required to preserve natural groundwater recharge at the site. While there is the potential for certain state-protected plant species to be present in this habitat, given the prior disturbances from the construction of the nearby Sagtikos Parkway and within the hospital grounds itself, it is not considered likely that the area of impact hosts these species. The Riverhead yard site is located close to the Saw Mill Creek and its wetlands, which together are a critical natural resources area under the Peconic Estuary Program. Therefore, development at the Riverhead Yard site would need to strictly comply with the nonpoint source management measures defined by the Coastal Zone Management Program, to ensure controlled runoff and minimized pollutant concentrations. Surface runoff control structures would be evaluated for their effectiveness and installed as appropriate.

- *All sites would require evaluation of potential contaminated materials in the soil and groundwater through a Phase I environmental assessment.*