MTA Long Island Rail Road

East Side Access

Final Environmental Impact Statement

Appendices

March 2001

United States Department of Transportation
Federal Transit Administration

Metropolitan Transportation Authority
State of New York

Foreword **F-1**

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EAST SIDE ACCESS

FINAL ENVIRONMENTAL IMPACT STATEMENT

IN
NEW YORK, QUEENS, AND BRONX COUNTIES, NEW YORK
AND
NASSAU AND SUFFOLK COUNTIES, NEW YORK

PREPARED BY
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION

AND

THE METROPOLITAN TRANSPORTATION AUTHORITY
OF THE STATE OF NEW YORK
IN COOPERATION WITH
MTA LONG ISLAND RAIL ROAD

Submitted pursuant to the National Environmental Policy Act of 1969, §102, 42 U.S.C. §4332; Federal Transit Laws, Title 49 U.S.C. Chapter 53, §5301(e), §5323(b), and §5324(b); Title 49 U.S.C. §303, formerly Department of Transportation Act of 1966, §4(f); National Historic Preservation Act of 1966, §106, 16 U.S.C. §470(f); Executive Order 11990 (Protection of Wetlands); Executive Order 12372 (Intergovernmental Review of Federal Programs); Executive Order 11988 (Flood Plain Management); and Executive Order 12898 (Environmental Justice) and all applicable laws, regulations, orders, and guidelines.

Date: March 6, 2001

Letitia Thompson
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MTA/Long Island Rail Road East Side Access

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION
MTA LONG ISLAND RAIL ROAD
EAST SIDE ACCESS PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT

Abstract

The Federal Transit Administration (FTA) and the Metropolitan Transportation Authority (MTA), in cooperation with the Long Island Rail Road (LIRR), have completed a Final Environmental Impact Statement (FEIS) for the East Side Access Project. The project is proposed to improve access to Manhattan's East Side for commuters in the Long Island Transportation Corridor (LITC), which consists of Manhattan, Queens, and Brooklyn in New York City and Nassau and Suffolk Counties on Long Island. The proposed action would bring LIRR trains from Long Island and Queens through the existing 63rd Street Tunnel into a new LIRR terminal at Grand Central Terminal. New tunnel construction in Queens would connect the LIRR Main Line and Port Washington tracks south of Sunnyside Yard to the lower level of the existing 63rd Street Tunnel under 41st Avenue. In Manhattan, the tunnel alignment would curve southward from the existing tunnel at 63rd Street and Second Avenue to Park Avenue, where it would continue beneath existing Metro-North tunnels to Grand Central Terminal. The proposed transportation improvements would expand seating capacity on the LIRR system and reduce the number of standees on LIRR trains during peak hours, relieve train and pedestrian congestion at Penn Station, and balance utilization of Manhattan's railroad terminals. As automobiles would be removed from the highway network and East River crossings, air quality would also be improved.

The alternatives considered in the FEIS include a No Action Alternative, a Transportation Systems Management (TSM) Alternative, and the Preferred Alternative. The Preferred Alternative is the locally preferred alternative, recommended after careful consideration of a full range of alternatives in the Major Investment Study (MIS) for the LITC that was completed in April 1998. Two engineering options for the Preferred Alternative's alignment in Manhattan were considered in the DEIS; the deeper alignment, Option 2, has been identified as preferred for implementation. The analyses and impact assessments in the FEIS consider potential effects on rail, freight, and transit service, ridership, accessibility, highway congestion, land use, neighborhoods, visual and aesthetic resources, natural resources, water quality, air quality, noise and vibration, energy, contaminated materials, and cultural resources. Mitigation measures to reduce anticipated localized impacts are detailed in the document. The analyses also consider the financial feasibility and cost-effectiveness of the alternatives.

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Appendix A: Alternatives Screening and Evaluation

Appendix A: Alternatives Screening and Evaluation*

A. INTRODUCTION

The project alternatives for the East Side Access Project were identified as part of the Major Investment Study (MIS) through a comprehensive planning process that developed alternatives and evaluated them against project goals and objectives, and a number of other criteria to focus in and ultimately determine a Preferred Alternative. This chapter summarizes the alternatives identified and evaluated during the MIS phase of project planning.

Development and evaluation of alternatives in the MIS was a comprehensive process, involving consideration of the universe of alternatives that might meet Long Island Rail Road (LIRR) goals for the Long Island Transportation Corridor. To bring focus to the evaluation, it was performed in two stages. Once all options were identified, these "long list" alternatives were screened for their performance in meeting project goals and their potential for technical and operational feasibility. The remaining "refined list" alternatives that did not fail the screen were subject to a more detailed evaluation, so that project alternatives for further review in the EIS could be identified. Once a preferred alternative was selected, components of that alternative were further screened to determine their appropriateness for including in the alternative.

B. IDENTIFYING ALTERNATIVES

The identification of alternatives that could meet the project goals began in January 1995, through an MIS sponsored by the LIRR and carried out under the auspices of the Federal Transit Administration (FTA), the New York Metropolitan Transportation Council (NYMTC), and the Metropolitan Transportation Authority (MTA). The process involved several years of discussions, outreach, scoping meetings, and research geared toward developing scenarios that would improve transit access to the East Midtown Manhattan and increase the capacity of the LIRR. Above all, the project strove toward establishing ongoing dialogue among sponsoring agencies, private consultants, and the community.

The project team began by reviewing a host of reports published by public and private agencies and organizations, and convened public meetings and brainstorming sessions both large and small. Group presentations were prepared, ideas were solicited, and public concerns and comments were documented throughout the process. A Technical Advisory Committee aided in the review of technical data, and a Citizens Advisory Committee provided a formal mechanism for obtaining a broad base of community input relating to project goals.

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* The description of the long list of alternatives presented here, along with the evaluation of the long and refined list of alternatives, is a summary of information from the Major Investment Study for the Long Island Transportation Corridor (April 1998) and its associated Appendices. Please refer to the MIS for additional detail.

These efforts elicited a wide variety of ideas for improving access to the east side of Manhattan—from building a new rail terminal in East Midtown, to running LIRR trains on Manhattan subway lines, to expanding subway service beyond New York City limits. With all of these accumulated ideas and thoughts in mind, the project team compiled a preliminary list of alternatives designed to capture the universe of ideas about how to improve access to East Midtown Manhattan. This was the "long list" of project alternatives. The first step in alternatives evaluation was to screen the long list candidates for their ability to meet project goals and their overall feasibility, as described below.

C. SCREENING THE LONG LIST OF ALTERNATIVES

The long list consisted of 21 separate "Build" alternatives, plus two alternatives required for consideration under National Environmental Policy Act (NEPA) regulations: the No Action Alternative, which includes improvements to the transportation system that would be implemented regardless of the construction of East Side Access; and the Transportation Systems Management (TSM) Alternative, which consists of transportation improvements that could be implemented without intensive capital expenditures. Regulations require that any selected alternative be evaluated in comparison with both the No Action and TSM Alternatives. As such, these two alternatives were not subject to the MIS screening of "long list" alternatives and are discussed separately below, followed by a summary of the screening of long list alternatives.

THE NO ACTION AND TSM ALTERNATIVES (ALTERNATIVES 1 AND 2)

Both the No Action and TSM Alternatives represent the options that a decision-maker could take other than major construction. As such, they were not subjected to the screening procedures, but remained for comparison during the detailed evaluation and for consideration in the EIS. Because transportation plans have changed over time, the two alternatives, as they are described in the MIS, are the same in concept, but different in their components from the two alternatives of the same name in this FEIS.

Essentially, the No Action Alternative consists of all transportation system improvements that are planned and funded for construction or operation by 2020—the MIS forecast year. Since the MIS was completed, some projects have already been completed (and are now incorporated as "Existing Conditions"), some new projects have been planned, and still others have been delayed beyond 2020.

The TSM Alternative comprises a set of low-cost measures designed to improve the transportation system. Some of the TSM components defined in the MIS have already been constructed, making them part of existing conditions. Others have been adopted as plans and are now included in the No Action Alternative. Others have evolved and new components have been added since the MIS. The up-to-date versions of these alternatives that form the basis of the EIS analyses are described in Chapter 2 "Project Alternatives."

SCREENING OF THE LONG LIST BUILD ALTERNATIVES

The first screening of "long list" alternatives eliminated any alternative that either did not meet the project's two critical study goals—to reduce travel time to East Midtown Manhattan and to relieve train traffic congestion at Penn Station—or was deemed either technically or operationally infeasible. In order to conduct the initial screening, the project team examined each long list alternative. Information was gathered and organized in the following categories: right-of-way requirements, track work, utilities, structures/tunnels, traction power, signals and

communications, stations, parking, maintenance facilities/depots, vehicles, operating plans, impact on other operators, environmental issues, and community issues/concerns, among others. Each alternative and its first screen evaluation are described below (see also Table A-1). The names of each alternative are adaptations of names used in the MIS, while the numbers for each alternative have been retained from the MIS.

Table A-1

Screening of Long List Alternatives

Alternatives	Meets Study Goals	Technically Feasible	Operational Issues		Further Evaluation?
			Sufficient Capacity	Institutionally and Operationally Feasible	
1. No Action					Yes
2. TSM					Yes
3. Express Bus/HOV Lane*	No	Yes	No	Yes	Yes
4. LIRR East Side Terminal					
A. GCT via the Main Line	Yes	Yes	Yes	Yes	Yes
B. GCT via the Montauk Branch	Yes	Yes	Yes	Yes	Yes
C. Third Avenue via the Main Line	Yes	Yes	Yes	Yes	Yes
D. Third Avenue via the Montauk Branch	Yes	Yes	Yes	Yes	Yes
5. East Side Rail Station	No	Yes	No	No	No
6. East Side Rail Station with New East River Tunnel*	Yes	Yes	No	No	Yes
7. Sunnyside Transfer Station					
A. Queens Plaza**	Yes	Yes	Yes	Yes	No
B. Harold Interlocking	No	No	No	No	No
C. 42nd LRT to Sunnyside	Yes	Yes	No	No	No
D. Long Island City Intermodal	Yes	Yes	Yes	Yes	Yes
8. Subway Operation Over LIRR Tracks					
A. Port Washington Branch	No	Yes	Yes	No	No
B. Inner Port Washington and Rockaway Beach Branches	No	Yes	Yes	No	No
C. Atlantic Branch	No	Yes	Yes	No	No
D. Atlantic Branch Shuttle	No	Yes	Yes	No	No
9. LIRR Operation Over NYCT Tracks					
A. Port Washington Branch/BMT	No	Yes	Yes	No	No
B. Port Washington Branch/IND	No	Yes	No	No	No
C. Atlantic Branch to IND	No	Yes	No	No	No
D. Atlantic Branch—Clockwise	No	Yes	No	No	No
E. Atlantic Branch—Counter-Clockwise	No	Yes	No	No	No
F. Atlantic Branch to Fulton Street Line	No	Yes	No	No	No

Notes:
* These alternatives passed to more detailed evaluation by exception. See text discussion.
** Similar to Long Island City Intermodal Alternative, but not as beneficial. See text discussion.

NON-RAIL ALTERNATIVE: BUS/HOV LANE (ALTERNATIVE 3)

This Build Alternative proposed surface transit as an alternative to rail transit. It provided for the operation of new express bus service along the Long Island Expressway (LIE). Express buses would run in each direction along High Occupancy Vehicle (HOV) lanes—some existing and some to be constructed by the New York State Department of Transportation (NYSDOT)—from the Van Wyck Expressway (Exit 22) in Queens, to Medford (Exit 64) in Suffolk County, and along normal LIE lanes east of Medford.

In the AM peak hour(s), buses would run westbound on LIE HOV lanes to the Van Wyck Expressway, via normal lanes from the Van Wyck and via express bus lanes from approximately 108th Street in Corona, Queens to the Queens-Midtown Tunnel. From the tunnel, buses would run north on Third Avenue to 57th Street. In the PM peak period, following New York City Department of Transportation policy (NYCDOT) to avoid excessive congestion in the Queens-Midtown Tunnel and backup on tunnel entrances, buses would run north on Third Avenue from 42nd Street, over the Queensboro Bridge, along Queens Boulevard to the LIE, and east along the LIE in HOV lanes to Medford; and then in normal lanes to Riverhead. Construction of HOV lanes would be accompanied by construction of bus shelters and park-and-ride lots at major LIE interchanges.

This alternative did not pass the first screen for a number of reasons. It did not meet the critical study goal of relieving train traffic congestion at Penn Station because it would not have had the capacity to divert enough riders from the LIRR to reduce the number of trains at Penn Station. Moreover, the alternative's operational feasibility was questionable because it was likely to increase traffic congestion along some sections of the route, particularly in Manhattan and at the river crossings. Despite this essential flaw, the Bus/HOV Lane Alternative was retained for evaluation in the second stage. This was done to enhance the overall review process, enabling transit and highway administrators to consider a surface transit alternative in the evaluation.

LIRR EAST SIDE TERMINAL ALTERNATIVES

Four alternatives in the long list provided for improved LIRR access to East Midtown Manhattan through the lower level of the existing 63rd Street tunnel to a terminal in East Midtown. Each of the following alternatives also provided for the construction of a new LIRR station (Sunnyside Station) in the vicinity of Thomson Avenue in Queens. Two sets of the four alternatives differed in how they would connect to the 63rd Street tunnel, and two sets differed in where they would terminate in Manhattan, as described below.

Grand Central Terminal (GCT) via the Main Line/Port Washington (Alternative 4A)

This alternative would construct access in the vicinity of Sunnyside Yard to the 63rd Street tunnel and would also construct a tunnel starting at Second Avenue and 63rd Street, curving over to and down Park Avenue, to terminate at a new track area in GCT.

GCT via Montauk/Port Washington (Alternative 4B)

This alternative was similar in concept to the alternative above, except that it would connect the Montauk Branch, instead of the Main Line, to the 63rd Street tunnel route. This would involve electrification of portions of the Montauk Branch and the construction of an 8,000-foot elevated structure in the vicinity of Sunnyside Yard.

Third Avenue Terminal via the Main Line/Port Washington (Alternative 4C) and Third Avenue Terminal via Montauk/Port Washington (Alternative 4D)

Both of these alternatives offered the same variations in Queens as the above alternatives, but would have terminated in a new, underground East Midtown Terminal to be built under Third Avenue between 42nd and 52nd Streets. This terminal location was examined because it had been proposed in a number of previous studies for the LIRR.

Screening

All four of these alternatives offered faster access to East Midtown and relieved congestion at Penn Station. Initial examination found them to be technically and operationally feasible. Thus, they all "passed" the first stage evaluation and proceeded to the second, more detailed evaluation stage.

LIRR EAST SIDE STATION ALTERNATIVES

These two alternatives used the LIRR's current train path to Penn Station along 32nd and 33rd Streets, but added a rail station in East Midtown between Third and Madison Avenues. This station would have been a stop along the route into Penn Station.

East Side Station (Alternative 5)

This alternative proposed to widen existing tunnels between Second and Sixth Avenues to accommodate a new station on a passing siding. This would have allowed the LIRR to stop trains at the station or institute routes with no East-Side stop. The station would have had a connection to the Lexington Avenue No. 6 train (local service) at its 33rd Street station on Park Avenue.

East Side Station with New East River Tunnel (Alternative 6)

This alternative proposed to construct a new, two-track East River tunnel just south of existing tunnels, to be used by NJ Transit and Amtrak for connections to and from Penn Station. With exclusive use of the existing tunnels, the LIRR could increase capacity of the line to Penn Station and build a station in East Midtown without widening the existing tunnel. This station, too, provided a connection to the No. 6 train.

Screening Summary

The East Side Station Alternative would not have relieved—and very well could have aggravated—congestion at Penn Station by creating new restrictions to train movements. As such, it failed the first screening and was eliminated from further consideration.

The East Side Station with East River Tunnel Alternative met study goals, because it would improve access to East Midtown (by adding a rail station) and relieve congestion at Penn Station (by constructing a new East River tunnel). However, it was found to have several problems rendering it potentially operationally infeasible: (1) all LIRR trains would have had to stop at the new station, adding to running time in some cases and affecting peak hour schedules and throughput to Penn Station; (2) capacity for LIRR reverse peak service through the East River tunnel would be constrained; (3) the plan, which altered track usage and routes for NJ Transit and Amtrak, might not have been acceptable to those carriers; (4) the short distance between the new station and Penn Station would have clearly limited the LIRR's flexibility for re-routing and changing tracks at Penn Station; and (5) connection to local subway service held the potential for pedestrian congestion.

However, because the alternative did meet study goals, had intrinsic merit in significantly expanding tunnel capacity between Queens and Penn Station, and merited a more detailed evaluation because some of the questions related to operational feasibility, this alternative was retained for the next evaluation stage.

SUNNYSIDE TRANSFER STATION ALTERNATIVES

These four alternatives addressed the concept of improving access to East Midtown by facilitating transfers from the LIRR to other carriers on the Long Island side of the East River. Each alternative created a rail station in the vicinity of Sunnyside Yard in Long Island City, close to subways, buses, or new light rail lines, which would bring commuters to East Midtown, as follows:

Queens Plaza Transfer Station (Alternative 7A)

This alternative proposed to bring diesel-hauled LIRR trains operating on the Montauk Branch to a station in Yard A where passengers would connect to the various New York City Transit (NYCT) services at the Queens Plaza and Queensboro Plaza stations.

Harold Interlocking Transfer Station (Alternative 7B)

This alternative proposed to extend the upper level of the 63rd Street tunnel east, past its terminus at Northern Boulevard, through Sunnyside Yard, to Harold Interlocking at 43rd Street. New subway service would be provided by running NYCT BMT Broadway express trains east to the transfer station, where passengers could connect to the LIRR across a platform.

42nd Street LRT Transfer Station (Alternative 7C). This alternative extended the proposed 42nd Street Light Rail Transit (LRT) system north along Third Avenue (for northbound LRT trains) and Second Avenue (for southbound LRT trains), east across the Queensboro Bridge, and into Sunnyside Yard. At a transfer station in Yard A, passengers from LIRR Montauk Branch diesel-hauled trains would connect to the LRT.

Long Island City Intermodal Transfer Station (Alternative 7D). This station plan was developed as part of the MTA Long Island City Transportation Needs and Opportunities Study. It proposed to build a new Sunnyside Transfer Station for LIRR, NYCT, and NJ Transit passengers in the vicinity of Sunnyside Yard and Queens Boulevard. It would have installed platforms on both the LIRR Hunterspoint Line tracks and the Main Line tracks, built an off-street bus terminal, and constructed pedestrian walkways over Sunnyside Yard for access to Queens Plaza and Court Square subway service. Additionally, the alternative would have used the Sunnyside Loop track to provide transfer facilities for NJ Transit passengers working in Long Island City.

Screening Summary

The Queens Plaza Transfer Station Alternative met study goals and would have been operationally feasible, but it was eliminated because it was similar to the Long Island City Intermodal Transfer Station in providing new service. Since it only provided transfer service to Montauk Branch passengers, it was not as beneficial in meeting study goals.

The Harold Interlocking Transfer Station Alternative failed to meet the study's two essential criteria: (1) use of the BMT Broadway express trains would not reduce travel time to East Midtown, because it would bring LIRR passengers only to the northen end of East Midtown, before heading to the West Side; and (2) the diversion of LIRR trains within Harold Interlocking would reduce throughput capacity of trains to Penn Station—thus it would not relieve train traffic

congestion. It would have been infeasible operationally as well, since the single-track subway line would not adequately provide the capacity to serve LIRR passengers.

The 42nd Street LRT Transfer Station Alternative met study goals; however, it would have needed an exclusive right-of-way along Second and Third Avenues in Manhattan as well as on the Queensboro Bridge, severely constraining traffic flow in Manhattan and over this key East River vehicular crossing, and was thus operationally infeasible.

The Long Island City Intermodal Transfer Station Alternative met screening level study goals and was found to be operationally feasible, so it was retained past the initial screening stage.

SUBWAY OPERATION OVER LIRR TRACKS

The concept for this set of alternatives was to provide direct service for LIRR customers to Manhattan's East Midtown by running NYCT service on LIRR tracks east of the East River. The alternatives vary widely in location and operation, as follows:

Subway Over Port Washington Branch (Alternative 8A)

This alternative proposed to connect the LIRR Port Washington Branch to the upper level of the 63rd Street tunnel and convert the entire branch to NYCT operation, with trains running along the NYCT Broadway line express tracks.

Subway Over Inner Port Washington and Rockaway Beach Branch (Alternative 8B)

This two-part alternative proposed NYCT subway operation from Great Neck on the Port Washington Branch into Manhattan through the upper level of the 63rd Street tunnel with through service either on the BMT Broadway express, as above, or on the Sixth Avenue line. The Elmhurst and Corona stations were to be reopened. In addition, the inactive Rockaway Beach Branch of the LIRR was to be reactivated and connected to the 63rd Street tunnel. This would have allowed for new NYCT subway service to JFK International Airport. Major capital improvements to the Rockaway Beach Branch were required, including extensive track work.

IRT to the Atlantic Branch (Alternative 8C)

This alternative proposed to convert the LIRR Atlantic Branch (which terminates now at Flatbush Avenue) to NYCT IRT operation and connect the branch to the IRT Seventh Avenue line. This would allow express subway service to operate between Springfield Gardens in Southeast Queens, through the LIRR station in Jamaica, to Downtown Brooklyn and Downtown Manhattan.

Convert LIRR Atlantic Branch to IND Shuttle Train (Alternative 8D)

This alternative proposed to convert the LIRR Atlantic Branch service between Jamaica and Flatbush Avenues to NYCT subway service, and extend the branch east of Jamaica to the Green Acres Shopping Center just over the Nassau County border.

Screening Summary

All four alternatives did not pass the screening. None met the basic study goals of reducing both train traffic congestion at Penn Station and travel time between Long Island and East Midtown. Alternatives 8A, 8B, and 8D would not bring riders to East Midtown, providing service either to West Midtown (with one stop at 63rd Street and Lexington/Third Avenue) or to Lower Manhattan. Alternative 8C would not provide any direct connection to East Midtown. Thus, they all

failed to meet a basic study goal. Several serious operational and institutional issues that would be difficult, if not impossible, to overcome were also associated with each alternative.

LIRR OPERATION OVER NYCT TRACKS

This set of six alternatives called for the operation of LIRR trains over tracks currently used by NYCT subways. To negotiate the more restrictive horizontal clearance, curves, and grades found on the NYCT system, each of these options required the use of hybrid, electric multiple unit (EMU) railcars. Additionally, LIRR train lengths would have had to be reduced to conform with NYCT platform lengths.

LIRR Port Washington Branch Connection to NYCT Broadway Line (Alternative 9A)

This alternative proposed to connect the LIRR Port Washington Branch to the upper level of the 63rd Street tunnel and onto the express tracks of the BMT Broadway line, giving commuters a one-seat ride to East 63rd Street at the far northern end of East Midtown and to West Midtown and Downtown Manhattan. As part of this alternative, LIRR trains could continue through Downtown, over the Manhattan Bridge, and onto the Atlantic Branch of the LIRR via a new track connection to the LIRR Flatbush Avenue Terminal in Brooklyn. Regular NYCT subway service would continue to be provided along the Broadway line trains.

LIRR Port Washington Branch Connection to NYCT Sixth Avenue Line (Alternative 9B)

Similar to the above alternative, this alternative would run LIRR Port Washington Branch trains through the upper level of the 63rd Street tunnel to a stop at Lexington Avenue and East 63rd Street, and then along the IND Sixth Avenue line, with an option to continue service through the Rutgers Street tunnel and onto the Atlantic Branch via a new connection to the Flatbush Avenue Terminal.

LIRR Atlantic Branch Connection to NYCT Sixth Avenue Line (Alternative 9C)

This alternative proposed to connect the Atlantic Branch of the LIRR to the Rutgers Street tunnel in Downtown Brooklyn and the IND Sixth Avenue line. This option would have brought LIRR passengers directly into Manhattan and north along Sixth Avenue from West 4th Street to 57th Street and to the Lexington Avenue station at 63rd Street. A new crossover built just north of the 63rd Street station would have permitted trains in this service to reverse direction without conflicting with other trains that were operating along the 63rd Street line.

LIRR Atlantic Branch via Montague Street Tunnel—Clockwise Distribution Loop through Financial District (Alternative 9D)

This alternative offered a one-seat ride into the Financial District in Lower Manhattan. It would have connected the LIRR Atlantic Branch to the Montague Street tunnel (for inbound service into Manhattan) and the Manhattan Bridge (for loop service back to the Flatbush Avenue Station and points beyond), via the Nassau Street subway line.

LIRR Atlantic Branch over BMT Manhattan Bridge—Counter-Clockwise Distribution Loop Through Financial District via Montague Street Tunnel (Alternative 9E)

This alternative proposed similar service to Alternative 9D using the Nassau Street subway line, but in the opposite direction. LIRR trains were to use the Manhattan Bridge for service into Manhattan and either terminate at Chambers Street or Broad Street, or continue through the Montague Street tunnel back to Flatbush Avenue.

Connect LIRR Atlantic Branch to NYCT IND Fulton Street Line at East New York (Alternative 9F)

This alternative connected the LIRR Atlantic Branch to the IND Fulton Street and Eighth Avenue subway line at East New York, allowing for direct service through the Cranberry tunnel into Manhattan. In Manhattan, the LIRR switched to the Sixth Avenue line at West 4th Street for service to Midtown Manhattan.

Screening Summary

Like the other set of subway/LIRR alternatives, this set of alternatives failed to meet the basic study goal of providing improved service to East Midtown and thus did not pass the screening. All would have brought passengers onto West Side subway lines or to Downtown Manhattan. In addition, all posed issues of operational and technical feasibility, and raised institutional issues as well.

CONCLUSION OF LONG LIST ALTERNATIVES SCREENING

As discussed above and shown in Table A-1, the following alternatives passed the initial screening and were included on the "refined list" of alternatives for further evaluation:

- Bus/HOV Lane Alternative (Alternative 3);
- All East Side Terminal Alternatives (Alternatives 4A-4D);
- East Side Rail Station with New East River Tunnel Alternative (Alternative 6); and
- Long Island City Intermodal Transfer Station Alternative (Alternative 7D).

In addition, the No Action and TSM Alternatives were included in the more detailed evaluation as a basis of comparison.

C. EVALUATING THE REFINED LIST OF ALTERNATIVES

Once the initial screening was complete, the refined list of alternatives was subjected to more detailed evaluation aimed at identifying the most appropriate alternative(s) for consideration in the EIS. This stage of the evaluation established a set of quantitative and qualitative criteria for evaluating the refined list of alternatives. These criteria included issues of performance, cost, community effects, social equity, and environmental impact. The TSM Alternative was included in the evaluation for comparison purposes, and the No Action Alternative served as the baseline against which effects of candidate alternatives were measured.

EVALUATION CRITERIA

These evaluation criteria were developed to represent the full range of considerations that come into play when considering each alternative: what would it cost to build and operate, how would it affect the community and the environment, how useful and effective would it be in solving identified problems, what would its economic impacts be, and would it adversely affect any portion of the population?

Information was developed for the following criteria: order-of-magnitude capital cost range; operating and maintenance costs; revenues, ridership, quality of service, economic impacts, community impacts, environmental impacts, and social equity impacts. Some of the criteria were assessed quantitatively using capital cost estimates. Quantitative assessments also used preliminary ridership forecasts for the year 2020; this gave information for each alternative on the trips it would generate, riders who would use new facilities, travel time savings, and reduction in

vehicle miles traveled (VMT). In other categories, where quantification was not available or inapplicable, alternatives were rated according to impacts (from +++ for the greatest positive impacts, to -- for the greatest negative impacts), as shown in Table A-2.

Table A-2
Evaluation Criteria

Symbol	O&M Cost Impacts	Impacts on LIRR and NYCT Revenue	Quality of Service		Economic Impacts	Community Impacts	Environmental Impacts	Equity Impacts (Impacts on Access to Transit)
			Travel Time Savings	Comfort and Convenience				
+++				Significant service improvement				Significant improvement
++	Significant decrease (20 percent or more)	Increased revenue for both LIRR and NYCT	15 or more minute reduction	Moderate service enhancement	Long-term positive	Very positive	Long-term positive	Moderate improvement
+	Moderate decrease (less than 20 percent)	Increased for one, no change for the other	0-14 minute reduction	Limited overall service improvement	Short-term positive	Positive	Short-term positive	Limited improvement
0	No change	Increased for one, decreased for the other or no change for both	No change		No change	Negligible or mixed	No change	No change from No Action
-	Moderate increase (less than 20 percent)	Decreased for one, no change for the other	0-14 minute increase		Short-term negative	Negative	Short-term negative	Disproportionate adverse impact
--	Significant Increase (20 percent or more)	Decreased revenue for both LIRR & NYCT			Long-term negative	Very Negative	Long-term negative	

Note: * The order-of-magnitude capital cost range and ridership impact criteria are not included in the table, as they were rated with numerical values, while the service quality and environmental impacts criteria are included, because they were rated with both qualitative matrix symbols (+/-) and numerical values.

ORDER-OF-MAGNITUDE CAPITAL COST RANGE

How much would each alternative cost to build? This factor was key to the evaluation. Capital cost estimates were developed using a number of factors, including project facilities, support costs (such as design services, construction and project management, etc.), and contingencies. Information about facilities thought to be required for each alternative (including stations and parking, demolition, utilities, track work, structures, maintenance facilities, vehicles, traction power, and signals) was gathered. Support costs were added in as a percentage of construction costs. Finally, allowances for contingencies were added in as a percentage of construction costs (rolling stock at 5 percent of construction costs, track work at 10 percent, and other capital cost elements at 30 percent).

OPERATION AND MAINTENANCE (O & M) COSTS

In addition to how much each alternative would cost to build, another key factor was how much each alternative would cost to operate and maintain. Since actual dollar amounts for each alternative were not available, the alternatives were rated according to broad estimations of how much more or less they would cost to operate and maintain than the No Action Alternative. If a project reduced transportation costs by 20 percent or more, it was given the highest rating (++), if it increased costs by 20 percent or more, it was given the lowest rating (−−).

REVENUE IMPACT

A complete picture of the total costs of each alternative requires an understanding of new revenue sources generated by the project. By providing new service options and generating new riders and trips, all alternatives, except for the No Action Alternative (which is the base against which they are compared), would increase either NYCT or LIRR revenues, or both. These revenue streams, when offset by capital plus operation and maintenance costs, resulted in a net cash flow estimate for the TSM and Build Alternatives under consideration.

RIDERSHIP IMPACT

Who would use the new service? One measure of a viable alternative is the number of riders and trips it would attract. Using a ridership forecasting model developed for the MIS, ridership potential in the year 2020 was assessed for each alternative and reported as incremental new riders and trips, compared with the 2020 No Action Alternative. Increments ranged from a low of less than 17,000 weekday riders using new facilities (Long Island City Intermodal) to a high of almost 180,000 (East Side Terminal: GCT via the Main Line).

QUALITY OF SERVICE

The quality of service criterion was intended to measure two things: the comfort and convenience of the service, and the time it would save travelers in their daily commutes. Comfort and convenience were assigned only positive ratings (since, as a requirement to pass the initial screening, all alternatives had to improve comfort and convenience). Travel time savings, measured quantitatively, was also rated. Alternatives that saved 15 minutes or more on trips from Long Island to East Midtown Manhattan were given the highest ratings, and those that increased travel time were given the lowest ratings.

ECONOMIC IMPACTS

The effect of each alternative on the local and regional economy was considered. This qualitative evaluation rated each alternative based on how much it would help or hurt the area's economy. It assigned differing weights to impacts, based on their time frame (long- versus short-term) and their scope (regional versus local). For example, greater weight was given to potential long-term lowering of property values due to changing traffic patterns, while less weight was given to the relocation of individual businesses during construction. Similarly, greater weight was given to improving commuting times from Nassau and Suffolk into Manhattan, then to improving access to businesses on one particular block.

COMMUNITY IMPACTS

While financial, ridership and economic considerations are key to gauging an alternative's feasibility and economic viability, they do not give a full picture of an alternative's effects. The alternatives were also evaluated for their community impacts, environmental impacts, and social equity impacts during both construction and operation. Community impacts were assessed using information gathered through the project's public outreach program. The assessment of each alternative emphasized potential impacts during both construction and operation of each alternative.

ENVIRONMENTAL IMPACTS

Each alternative was assessed for its potential environmental effects. In general, these included the potential for property acquisition, relocations and displacement, land use changes, noise and vibration, community disruption, air quality, traffic and pedestrian impacts. Reductions in auto travel, defined as VMTs, were also considered. The impacts were rated for their potential severity and long-term significance.

SOCIAL EQUITY IMPACTS

The equity impact evaluation focused on the extent to which each alternative could affect population groups that are disadvantaged due to low income, race, or inadequate access to public transportation. A primary concern was the extent to which the alternative could improve access to jobs for these disadvantaged groups, and if those improvements outweighed any negative impacts as a result of the alternative. Ratings here included the proximity of the alternative to residential areas where disadvantaged groups lived, the location of potential jobs for these groups in relation to the location of the alternative, and the ease of travel for disadvantaged persons (e.g., transfers en route, reverse commutation, frequency of service).

EVALUATING THE ALTERNATIVES

The decision to retain or eliminate an alternative in the reduced long list was based upon the evaluation results as shown in Table A-3, and discussed below.

TSM (ALTERNATIVE 2)

The TSM Alternative, as defined in the MIS, was evaluated along with all other alternatives in the refined list. The TSM ratings provide a basis for identifying the degree to which the other Build alternatives offer improvements for their higher costs.

Capital Cost Range

By definition, the TSM Alternative is a lower-cost option than the Build alternatives. All of its components, as outlined in the MIS, were estimated to cost approximately $300 million (1997 dollars).

Impact on Operation and Maintenance Costs

While economic to construct, TSM components required funding for operations and maintenance. Components that would carry with them increased O&M costs included an increase in the number of rail cars in the peak hour on selected LIRR branches, and additional train service to the Long Island City and Hunterspoint Avenue stations. These costs were limited, but still resulted in a rating of moderate increase in O&M costs compared with the No Action Alternative.

Table A-3

Refined Long List Alternatives Evaluation Summary

Alternative	Impact on O&M Costs	Capital Cost Range (billions of 1997 dollars)	2020 Average Weekday Incremental LIRR Linked Trips (vs. No Action)	2020 Average Weekday Incremental Riders Using New Facility (vs. No Action)	Impact on Travel Time	Travel Time Savings (Person-Hours/Day vs. No Action)	Comfort and Convenience	Revenue Impacts	Community Impacts	Economic Impacts	Environmental Impacts	Automobile Vehicle Miles Traveled (Average Daily Reduction vs. No Action)	Impacts on Social Equity
1. No Action	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Transportation System Management	-	0.30	3,680	8,554	+	2,646	+	+	0	+	+	88,333	0
3. Bus/HOV Lane	-	0.3	8,456	11,800	-	4,712	-	-	--	+	--	22,584	0
4. LIRR East Side Terminal:													
A. GCT via Main Line	--	2.8-3.0	23,909	179,257	++	10,801	+++	+	-	++	+	293,473	++
B. GCT via Montauk Branch	--	3.7-4.4	20,434	167,895	+	5,960	+	+	-	++	-	254,875	++
C. Third Avenue Terminal via Main Line	--	3.3-3.9	16,893	137,933	++	6,498	++	+	--	++	--	209,813	+
D. Third Avenue Terminal via Montauk Branch	--	4.2-5.0	13,905	131,352	+	2,410	+	+	--	++	--	179,475	++
6. New East River Tunnel and East Side Rail Station	--	2.8-3.0	15,364	174,759	++	12,612	++	+	--	++	--	232,524	+
7D. Long Island City Intermodal Transfer Station	-	0.4	2,008	16,662	+	3,914	+	++	+	++	0	33,455	++

Notes:

* Costs are presented in 1997 dollars; NA = not applicable in this analysis. +++ = Substantial benefit. ++ = Moderate benefit. + = Slight benefit. 0 = No change, little impact.

-- = Moderate adverse impact potential. -- = High to very high adverse impact potential.

Revenue Impacts

The components of the TSM that resulted in additional LIRR passengers—longer trains on certain branches and additional trains to Long Island City and Hunterspoint Avenue Stations—would increase LIRR revenues. In addition, because the TSM would bring more commuters to Hunterspoint Avenue, transfers to the Flushing line No. 7 train into Manhattan would also increase NYCT revenues. As such, the TSM was rated as improving revenues moderately.

Ridership Impacts

The TSM demonstrates a moderate attraction of new riders (approximately 3,700) and an attendant moderate decrease in automobile VMTs (approximately 88,000 fewer daily vehicle miles). These ridership figures range from approximately 5 percent to 50 percent of the ridership figures for the Build alternatives (discussed below).

Quality of Service

Many of the TSM's components would decrease travel time between Long Island and the Queens side of the East River. Similarly, by improving transfers between the LIRR and subways/ferries into Manhattan, the TSM improved comfort and convenience of travel slightly.

Economic Impacts

Economic impacts are closely related to an alternative's ability to improve the overall transportation network, and therefore improve the efficiency of doing business in the New York Metropolitan Area. For the TSM, moderate travel time savings, new riders, and comfort improvements resulted in moderately positive economic impacts.

Community Impacts

Since all TSM components involve adjusting existing transportation systems, extremely few community impacts were anticipated, as reflected in the neutral rating.

Environmental Impacts

The TSM would reduce daily automobile VMTs on the regional highway network somewhat—an environmental benefit. Construction and operational impacts were minimal. For this reason, it was determined to be of moderate environmental benefit.

Impacts on Social Equity

While the TSM would improve commuter trips into Manhattan, it would have had little positive impact on the extent to which disadvantaged residents could access transit, and was so rated.

Summary of Evaluation

The TSM Alternative did not meet project needs and goals as well as the Build alternatives. However, it is retained for comparison purposes in the FEIS, updated to reflect recently completed railroad improvements and the latest future planning assumptions.

EXPRESS BUS/HOV (ALTERNATIVE 3)

Capital Cost Range

The Express Bus/HOV Alternative had costs similar to the TSM, approximately $300 million. It too, was a low-cost improvement to the transportation system.

Impact on O&M Costs

Moderate costs to operate new express bus service into Manhattan are reflected in its "slight increase in costs" rating.

Revenue Impacts

While express bus service would have generated revenue in the form of fares from new passengers, new riders would be drawn off of both LIRR trains and NYCT subways. Since both LIRR and NYCT revenues would therefore decrease marginally, this alternative received a (▬) negative rating.

Ridership Impacts

This alternative generated the fewest number of new transit riders among all alternatives other than the TSM, because the majority of its passengers would be drawn from a relatively narrow market corridor centered on the LIE. As such, it would not permit the LIRR to reduce peak hour trains to Penn Station and thereby would not relieve congestion there.

Quality of Service

While travel time data generated by preliminary ridership forecasts indicate potentially significant savings, these savings would vary widely, depending on conditions on the LIE, in Manhattan, and over the Queensboro Bridge in PM peak periods. Data indicate that eastbound trip times would be approximately 25 minutes longer than westbound trip times, nullifying much of the travel time savings gained in the inbound commute from Nassau and Suffolk. Given small overall travel time savings and a generally comfortable, one-seat ride in motor coaches, quality of service was rated as slightly beneficial as compared with the No Action Alternative.

Economic Impacts

The new express bus service may facilitate some short-term retail and/or residential economic development around park-and-ride lots on Long Island. It would not, however, have large-scale positive impacts on economic development in the region.

Community Impacts

The increased traffic and noise due to additional express buses on local streets in Manhattan were considered adverse community impacts, as was the increased congestion at existing express bus loading and unloading stops in Manhattan. The extent of concerns raised about these issues resulted in the Express Bus/HOV Alternative receiving a rating of highly adverse community impact.

Environmental Impacts

While the Express Bus/HOV Alternative would have resulted in a modest decrease in daily automobile VMTs of approximately 23,000, this slight environmental benefit would be more than offset by the alternative's adverse impacts, including increased traffic congestion (and related pollutant emissions) on other LIE lanes due to the taking of highway space to build HOV lanes in Manhattan, on the Queensboro Bridge, and on Queens Boulevard.

Impacts on Social Equity

This alternative would primarily serve those workers who live on Long Island, commute into Midtown Manhattan, and have access to cars with which they can drive to park-and-ride lots.

The alternative would not provide reverse-peak service to allow city residents to access jobs on Long Island. As such, the alternative would have been of little benefit to disadvantaged residents.

Summary of Evaluation

The Express Bus/HOV Alternative did not meet one of the project's essential screening criteria, in that it did not draw enough riders away from the LIRR to relieve train traffic congestion in Penn Station. This alternative was also suspected of being operationally infeasible as well, because of its potential impacts on vehicular traffic congestion in Manhattan. It was included for further evaluation, however, because it was a non-rail build alternative, one that attempted to use a companion mass transit travel system to meet project objectives. The more detailed evaluation did not enhance this alternative, but instead revealed a number of additional problems. Although it showed certain very moderate economic, travel time savings, and ridership benefits, the alternative also evinced a number of adverse effects, including:

- Community impacts, including a conflict with New York City policy to discourage additional express buses on Midtown streets, since they would exacerbate very congested conditions already occurring there, and a related impact on neighborhoods along the travel routes that are already burdened by very heavy traffic.
- Environmental impacts, primarily noise and air pollution associated with bus travel and increased traffic congestion in Midtown Manhattan.
- Social equity, in that this alternative favored the Long Island resident with access to a car, but provided no reverse commute or other improvement to public transportation for lower-income and other disadvantaged workers and residents.

The alternative was therefore eliminated from further consideration. However, portions of this alternative (e.g., extending the existing exclusive bus and taxi lane) are now included in the TSM Alternative presented in this FEIS.

EAST SIDE TERMINAL (ALTERNATIVES 4A-4D)

These four alternatives, all of which proposed to bring riders to a new LIRR terminal on the East Side, were each found to have high construction costs, but to offer a combination of good ridership demand and travel time savings, along with fiscal benefits, such as positive revenue impacts and economic effects. The level of benefit varied, however, among the alternatives, as did the potential for adverse effects in other areas, as discussed below.

Capital Cost Range

Capital costs for the four alternatives ranged from a low of $2.8 billion to a high of $4.4 billion (in 1997 dollars). Major cost items for each of the four alternatives included procurement of electric rolling stock, construction of new tunnels in Manhattan and Queens, and construction of new LIRR facilities. Alternatives that included connections from the Montauk Branch in Queens (4B and 4D) had the highest capital costs, due to significant added costs of upgrading signal systems, building an elevated structure, and electrifying the Montauk Branch west of Jamaica to its connection to the 63rd Street tunnel. Costs of alternatives that would build a new LIRR terminal under Third Avenue (4C and 4D) were also slightly higher than those that would utilize GCT, due to the more extensive construction needed. Appropriately, Third Avenue via

the Montauk Branch carried the highest capital costs, as it included both the Montauk connection and the Third Avenue Terminal.

Impact on O&M Costs

All East Side Terminal alternatives were determined to have high adverse impacts on O&M costs. This is not surprising, as they all required the construction of new infrastructure and fleet expansion, which would require major increases in operations and maintenance activities.

Revenue Impacts

Each of the four alternatives had similar revenue impacts: increased LIRR revenue due to additional riders attracted to the new service, and marginal decreases in NYCT revenues due to the relatively small number of riders who would switch from subways to the LIRR.

Ridership Impacts

Of the four alternatives, GCT via the Main Line showed the strongest ridership projections in every category: approximately 24,000 new trips, 180,000 total riders, and a reduction in daily automobile VMT of over 290,000. With few exceptions, GCT via Montauk ranked second in all ridership categories, Third Avenue Terminal via the Main Line third, and Third Avenue via Montauk ranked fourth. One factor that contributed to the strong performance of GCT via the Main Line was the speed with which trains could get from the Main Line to East Midtown (reducing travel times, attracting new and current riders, and subsequently reducing daily VMTs) as compared with using the Montauk Branch to access East Midtown. Another factor was the proximity to the subway and to place of work provided by a terminal at GCT (also reducing travel times, attracting new and current riders, and subsequently reducing daily VMTs). These two factors accounted for much of this alternative's superiority to the ridership evaluation.

Quality of Service

As mentioned above, alternatives that save travel time tend to be more popular with commuters, generating higher ridership numbers. Appropriately, GCT via the Main Line saved the most person-hours each day (almost 11,000) compared with the other three alternatives (from 2,400 to 6,500 person-hours). As such, it was ranked highest in "Impact on Travel Time," along with the Third Avenue Terminal via the Main Line, which would also have saved more than 15 minutes on a one-way commute.

In terms of comfort and convenience, GCT via the Main Line again ranked highest, for two reasons. First, it would provide a direct link to East Midtown for all LIRR customers, including those at stations along the Main Line west of Jamaica, whereas the Montauk Branch alternatives would have required passengers west of Jamaica to transfer to Port Washington Branch trains at Woodside to access the new service. Second, it would provide direct access to subway service from GCT in Manhattan, whereas Third Avenue Terminal alternatives would have required passengers to travel farther to transfer to the subway.

Economic Impacts

Because of their overall ability to meet all study goals, each of the four alternatives would have significantly improved the region's transportation system. In addition to generating short-term construction jobs, all four alternatives could have been expected to spur long-term economic activity, and were rated highly in this measure.

Community Impacts

Community concerns for all four alternatives centered around the disruption associated with constructing a large-scale transportation project—noise and vibration, street closings, and truck traffic. However, the two Third Avenue Terminal alternatives would have engendered more intensive community concerns due to the added disruption of constructing an entirely new terminal under a major thoroughfare. As such, the GCT options were given moderate adverse impact ratings while the Third Avenue Terminal alternatives were given highly adverse impact ratings.

Environmental Impacts

GCT via the Main Line was the only alternative of the four rated that compared favorably in terms of environmental benefits. All four alternatives would have had negative traffic and pedestrian effects in the area of the new terminal, potential increases in noise levels due to additional trains running along LIRR lines (especially the Montauk Branch, which is not currently heavily used), and temporary environmental impacts due to construction. However, it was determined that the substantial offsetting positive regional environmental impacts of GCT via the Main Line (i.e., reductions in VMTs and associated pollutants) were sufficient to give it a positive rating. While the other alternatives would have also had somewhat offsetting positive impacts, it was determined that these impacts would not have been sufficient to warrant a positive rating.

Impacts on Social Equity

Each alternative would enable disadvantaged residents in Manhattan (in neighborhoods along the Lexington Avenue subway line in East Harlem and the Lower East Side) to access jobs on Long Island, and also residents on Long Island to access jobs in the Sunnyside area of Queens. As such, all alternatives were rated as offering moderate benefits.

SUMMARY OF EVALUATION

The net rating for the GCT via the Main Line Alternative (4A) was clearly positive. It had the highest ridership of the four, reflecting significant travel time savings to East Midtown. These plus factors gave rise to another important positive impact: long-term economic activity. The costs, while relatively high, were at least half a billion dollars less than in the three other East Side Terminal options. The alternative's potential negative community and environmental effects were generally limited to the construction phase. As with the other three alternatives, social equity effects were moderately beneficial.

The GCT via the Montauk Branch (4B) merited more mixed ratings, lower than those of GCT via the Main Line. Costs were predicted to be considerably ($1.1 billion) higher, and ridership was lower. The smaller diversion of auto users to the train reduced the air quality benefit of this alternative, so that its overall rating on environmental concerns was slightly negative, compared to the GCT via the Main Line's overall beneficial rating.

Both of the Third Avenue Terminal alternatives (4C and 4D) also did not show the benefits of the GCT via the Main Line alternative. They cost more (especially the Third Avenue Terminal via the Montauk Branch [4D]) and their ridership was lower. With lower ridership, they did not merit a positive overall environmental rating. These alternatives were also distinguished from the GCT options by the more serious community and related noise impacts during construction of the terminal beneath Third Avenue.

In short, GCT via the Main Line (4A) was found to be clearly superior to its three similar options, and the three were therefore dropped from further consideration.

EAST RIVER TUNNEL WITH EAST SIDE RAIL STATION (ALTERNATIVE 6)

Capital Cost Range

Costs for this alternative, while not quite as high as for the East Side Terminal alternatives, would have approached $3 billion. This reflects the capital cost of constructing an entirely new tunnel under the East River, continuing it under 31st Street more than halfway across Manhattan into Penn Station, constructing new facilities in the southern half of Penn Station, and constructing an underground station in East Midtown.

Impact on O&M Costs

As for the East Side Terminal alternatives, O&M costs were expected to rise by at least 20 percent. Costs included maintaining an additional right-of-way and operating and maintaining a new station in East Midtown.

Revenue Impacts

Like the East Side Terminal alternatives, an east side station would draw substantial additional new transit riders to the LIRR and reduce subway ridership only slightly, resulting in a positive impact on LIRR revenues and no impact on NYCT revenues.

Ridership Impacts

This alternative would have generated more total riders that any other alternatives (approximately 180,000 per day) and a significant number of new transit riders (almost 24,000). Accordingly, it would have reduced daily VMT by more than 290,000.

Quality of Service

Creating a new east side rail station would save more travel time than any other alternative and retained a one-seat ride into East Midtown for many LIRR riders. While subway connections from the east side station would be limited to local service, congestion at the 33rd Street/ Lexington Avenue station would be serious, and fewer employees would be within walking distance of offices closer to GCT, the convenience of this new station outweighed these factors and the alternative was highly rated in regard to quality of service to East Midtown. However, it would actually degrade service to Penn Station by requiring that all trains stop at the new station, thus increasing travel time for all trains to that terminal and reducing hourly capacity. Thus, it failed to meet a basic project objective.

Economic Impacts

Similar to the East Side Terminal alternatives, the East Side Station with East River Tunnel Alternative would significantly improve the transportation system in the New York Metropolitan Area. It would ease passenger congestion at Penn Station and through the East River tunnels and provide convenient access to East Midtown. These extensive transportation benefits could be expected to generate long-term benefits to economic development, especially in the vicinity of the new East Side Station.

Community Impacts

This alternative was expected to generate severe impacts on local communities, mostly due to construction requirements. Large areas of cut-and-cover construction would be required between Fifth and Seventh Avenues, as well as demolition and displacement of residential and commercial properties along the proposed route. In addition, constructing a new rail station adjacent to and above the existing East River tunnel approaches to Penn Station, while maintaining full service to Penn Station, would require elaborate construction staging, including the closure of streets and sidewalks for extended periods of time.

Environmental Impacts

Environmental impacts of this alternative were found to be predominantly negative. It would have substantial impacts during construction, including waterfront effects, impacts on the East River, noise and vibration from substantial tunneling including cut-and-cover methods, and community disruption from cut-and-cover construction between Madison and Third Avenues along 32nd or 33rd Streets. Long-term impacts during operation include potential effects on the 33rd Street subway station on the No. 6 line, which is a designated New York City Landmark (NYCL), and additional traffic and pedestrian congestion in the vicinity of that station.

Impacts on Social Equity

While this alternative would not create a new station in Long Island City, it would improve reverse commuting from the East Side of Manhattan to Long Island, improving the capacity of disadvantaged residents on the East Side of Manhattan to get to jobs.

Summary of Evaluation

The East River Tunnel with East Side Train Station Alternative did not meet one of the project's essential screening criteria, in that it would not be operationally feasible if the study objective to relieve train traffic congestion at Penn Station was to be met. It was included for further evaluation, however, to better understand its operational possibilities and its benefits. The more detailed evaluation did not enhance this alternative, but confirmed the screening conclusions. Level of service at Penn Station would actually decrease, because the operating plan found that all trains would have to stop at the new station. This would add to travel times and limit the number of trains per hour that could approach Penn Station. The cost of the alternative was equivalent to that of the GCT via the Main Line Alternative and not as high as some of the East Side Terminal alternatives, but its overall benefits were lower. The alternative involved serious community disruption during construction of the station beneath the street and provided a connection only to a local subway station, which is an NYCL station of limited capacity. Because it did not meet basic criteria and the additional evaluation only revealed additional problems, this option was dropped from further consideration.

LONG ISLAND CITY INTERMODAL TRANSFER STATION (ALTERNATIVE 7D)

Capital Cost Range

Capital costs of approximately $400 million would be required for construction of the subway extension from the upper level of the 63rd Street tunnel, the new intermodal subway/LIRR terminal, and a new bus terminal above the railroad facilities.

Impact on O&M Costs

O&M costs were expected to be minor in this alternative. They would encompass operating and maintaining the new intermodal station and the modest subway extension.

Revenue Impacts

Both LIRR and NYCT revenues were projected to increase as a result of this alternative. A limited number of additional LIRR passengers would use the intermodal terminal to transfer to the subway. However, the fact that revenues for both carriers would only have increased slightly over the No Action Alternative (due to the relatively few additional riders) led to a downgrading of the rating from ✚✚ to ✚.

Ridership Impacts

The intermodal terminal was determined to generate the fewest new riders of any alternative other than the No Action Alternative (fewer than even the TSM). Additionally, fewer than 17,000 people in total would use the new facility on a daily basis—approximately one-tenth the number of riders using other new terminal or station alternatives.

Quality of Service

Since the subway connection envisioned in this alternative would have required passengers to transfer in Manhattan at Lexington Avenue and 63rd Street to the Lexington Avenue local train to reach many East Midtown destinations, its ability to reduce travel times was minimal. Only the TSM reduced travel times to a lesser extent than this alternative, which would improve service over the No Action level; however, those improvements would be minimal.

Economic Impacts

Most of the positive economic impacts of this alternative were related to its potential for spurring development in the Sunnyside/Long Island City area of Queens, an area envisioned by planners as a possible fourth Central Business District of New York City.

Community Impacts

Very few community impacts would be expected under this alternative. No construction in Manhattan and unobtrusive construction in a rail yard in Queens would impact few local residents. Accordingly, this was the only alternative that was rated as positive in regard to community impacts.

Environmental Impacts

Overall environmental impacts would be neutral, since the alternative would create impacts during construction, but would also generate a minor reduction in VMT and traffic congestion.

Impacts on Equity

This alternative performed well in providing access to jobs in the Long Island City area for disadvantaged residents of New York City and Long Island. In addition to providing rail access to the area, convenient bus transfers would support those who do not own cars. This alternative would not, however, improve access to jobs in Nassau and Suffolk Counties.

Summary of Evaluation

In summarizing the evaluation of the Intermodal Transfer Station Alternative, the most significant measure was the very limited number of new LIRR riders projected to use the station, a major deficiency. Even though the option achieved some positive ratings, its failure to improve quality of service and reduce travel time between Long Island and East Midtown was found to be an overriding limitation. The alternative was thus dropped from further consideration.

However, the idea of a station in the vicinity of the Sunnyside Yard enhanced the City's plans for economic growth in Long Island City and was very well received within the community. In support of development in this area of Queens, LIRR agreed to include a rail station at Sunnyside near Queens Boulevard as part of the Preferred Alternative.

CONCLUSIONS OF THE REFINED LIST ALTERNATIVES EVALUATION

The evaluation of the refined list of alternatives resulted in the selection of GCT via the Main Line Alternative 4A as the Preferred Alternative. Each of the other alternatives was judged to be inferior to GCT via the Main Line for the following reasons, as detailed above:

- The primary reason for eliminating the Express Bus/HOV Alternative (3) was that it would not have drawn enough riders to alleviate congestion at Penn Station. Secondarily, it would have adverse impacts on local communities, the environment, and social equity.
- The three other East Side Terminal Alternatives (4B, 4C, and 4D) would all have cost considerably more than GCT via the Main Line, while drawing significantly fewer riders. Accordingly, 4B, 4C, and 4D would reduce automobile VMT by less than GCT via the Main Line and would be less beneficial to the environment.
- The East River Tunnel with East Side Train Station Alternative (6) was fatally flawed in that it would not have relieved train traffic at Penn Station. Further analysis showed that it actually would have negative effects on train traffic at Penn Station and would have disrupted the community significantly during construction.
- Similar to the Express Bus/HOV alternative, the Intermodal Transfer Station Alternative (8D) would not draw enough riders to warrant its selection. Furthermore, it would not improve quality of service or reduce travel times significantly.

D. EVALUATION OF OTHER ALTERNATIVES

APPLE CORRIDOR

In June of 1996, The Committee for Better Transit published Apple Corridor, a proposal for a one-seat rail link between GCT and John F. Kennedy International Airport (JFK). The link would route trains from GCT, through new and existing tunnels to LIRR tracks at Harold Interlocking adjacent to Sunnyside Yard, to Rego Park along current LIRR tracks, and on to JFK along a Rockaway Beach LIRR branch restored to service and newly constructed tracks. Key to the Apple Corridor proposal was a LIRR connection to GCT similar to MIS Alternative 4A: GCT via Main Line, which was identified as the Preferred Alternative (as described above). The Apple Corridor proposal, however, called for a slightly different means of access to GCT than did Alternative 4A.

A number of components of the Apple Corridor proposal led to the decision to retain the core components of GCT via Main Line, rather than those of Apple Corridor, for the ESA Project:

USE OF UPPER-LEVEL METRO-NORTH TRACKS

Apple Corridor called for the use of the five westernmost tracks (38-42) of the upper level of GCT for both LIRR service and airport access service. This would have had a number of adverse impacts on Metro-North, would not have been sufficient to handle projected LIRR passenger volumes, and would have been more costly to construct than originally envisioned:

The use of these five upper level tracks would have provided LIRR and Airport Access service at the expense of existing and future Metro-North service. On the contrary, GCT via Main Line would use existing, predominantly non-revenue trackage in the lower level to preserve Metro-North's current operations and maintain space for future Metro-North growth. While GCT via Main Line would use four Metro-North passenger tracks from the lower-level, it would not use upper level tracks, which are currently heavily used by Metro North and accommodate 12-car trainsets. In addition, use of the five westernmost upper level tracks would have completely taken away Metro-North's access to the upper level loop track—severely constraining Metro-North operations.

CREATING CAPACITY FOR LIRR AND AIRPORT ACCESS

The Apple Corridor proposal would not have created sufficient capacity to handle LIRR peak hour service. Track and platform alignments would have accommodated only 18 trains/hour (versus GCT via Main Line's 24 trains/hour), and would have utilized existing platforms of insufficient width to accommodate large LIRR commuter crowds. Moreover, Apple Corridor's proposed simplified track configuration on approach to GCT would not have permitted parallel train moves: just a single track in and a single track out—insufficient to handle LIRR and Airport Access service concurrently. The same shortcomings were apparent in the vicinity of Sunnyside Yard in Queens, where the Apple Corridor proposal did not address the need for midday storage of LIRR trains. Finally, Apple Corridor would require all LIRR passengers heading to or from GCT to transfer at Jamaica.

COST ESTIMATES

Apple Corridor's cost estimate, which was significantly lower than that of GCT via Main Line, did not include key elements that would have brought its costs into line with those of GCT via Main Line, including throughput connections at Harold Interlocking; mitigation for loss of Metro-North tracks, platforms and upper loop; design and construction of additional exits and cross passageways at GCT; real estate/easement costs; mitigation of Lexington Avenue subway impacts; and midday train storage, among others.

For the above reasons, Alternative 4A: GCT via Main Line, was retained as the Preferred Alternative for East Side Access.

E. SELECTION OF A LOCALLY PREFERRED ALTERNATIVE

On June 25, 1998, a NYMTC resolution affirmed that the Long Island Transportation Corridor MIS study was completed and the GCT via the Main Line Alternative was the Locally Preferred Alternative. The GCT via the Main Line Alternative is called the Preferred Alternative, and together with the No Action and TSM Alternatives, is evaluated further in this FEIS. ❖

Appendix B: Historic and Archaeological Resources

PROGRAMMATIC AGREEMENT
AMONG THE
FEDERAL TRANSIT ADMINISTRATION,
METROPOLITAN TRANSPORTATION AUTHORITY,
AND
THE NEW YORK STATE HISTORIC PRESERVATION OFFICER
REGARDING IMPLEMENTATION OF THE
MTA/LIRR EAST SIDE ACCESS PROJECT

WHEREAS, the Federal Transit Administration ("FTA") has identified through an Environmental Impact Statement ("EIS") prepared under the National Environmental Policy Act that the MTA/LIRR East Side Access Project may have an effect on properties included in or eligible for inclusion in the National Register of Historic Places; and

WHEREAS, the FTA has consulted with the Advisory Council on Historic Preservation ("the Council") and the New York State Historic Preservation Officer ("SHPO") pursuant to Section 800.13 of the regulations (36 CFR Part 800) implementing Section 106 of the National Historic Preservation Act; (16 USC 470f), and Section 110(f) of the same Act (16 USC 470h-2(f)); and

WHEREAS, the Metropolitan Transportation Authority ("MTA") has participated in the consultation and has been invited to execute this Programmatic Agreement; and

WHEREAS, the New York City Landmarks Preservation Commission ("LPC") has been included in the consultation as a consulting party; and

WHEREAS, pursuant to 36 CFR Section 800.8(c), FTA is utilizing the process under the National Environmental Policy Act ("NEPA") to comply with its requirements under Section 106 of the National Historic Preservation Act; and

WHEREAS, the parties have determined that it is appropriate to enter into a Programmatic Agreement;

NOW, THEREFORE, FTA, MTA, and SHPO agree that the MTA/LIRR East Side Access Project (the "East Side Access Project") shall be administered in accordance with the following stipulations to ensure that potential effects on historic and archaeological resources are taken into account and to satisfy FTA's Section 106 responsibility for all aspects of the project.

STIPULATIONS

FTA, MTA, AND SHPO AGREE THAT THE FOLLOWING STEPS WILL BE UNDERTAKEN IN CONNECTION WITH THE EAST SIDE ACCESS PROJECT AND THAT FTA WILL INCLUDE THE OBLIGATIONS SET FORTH IN THIS AGREEMENT AS PART OF ITS RECORD OF DECISION AND AS A CONDITION OF FTA's APPROVAL OF A GRANT(s) ISSUED FOR THE PROJECT, TO ENSURE THAT THESE MEASURES ARE IMPLEMENTED AS PART OF THE COMPLIANCE WITH THE SECTION 106 PROCESS AND THE SUBSEQUENT PLANNING, DESIGN, AND CONSTRUCTION OF ANY APPROVED PROJECT ALTERNATIVE.

I. ARCHAEOLOGICAL RESOURCES

The EIS prepared under NEPA identify several areas that may be archaeologically sensitive within areas of potential effect ("APEs") for the project. The following measures will be carried out in connection with implementation of the East Side Access Project for all areas within those APEs that MTA in consultation with SHPO identified as potentially archaeologically sensitive and in which construction activities will occur.

A. Soil Borings

At all sites where the potential for archaeological sensitivity was identified through Stage 1A evaluation and where soil borings were determined to be appropriate, MTA in consultation with SHPO will develop and implement a soil boring program to better delineate the filling and grading that have occurred and determine archaeological sensitivity. At all sites where borings confirm the potential for archaeological resources to exist, MTA will conduct further subsurface testing, in consultation with SHPO, in accordance with Paragraph I.B, below.

B. Field Testing

At all sites where the potential for archaeological resources to exist is confirmed by soil borings conducted under Paragraph I.A above, MTA, in consultation with SHPO, will perform further subsurface testing to identify the presence or absence of archaeological resources. The field evaluation and testing program will be developed by MTA in consultation with SHPO and at a level sufficient to determine if sites meet the criteria for listing in the National Register. In consultation with FTA and SHPO, MTA will apply the National Register criteria and reach one of the following conclusions:

1. The site does not meet the National Register criteria; no further action is required.
2. The site does meet the National Register criteria, in which case the site will be treated in accordance with Paragraph I.C below.
3. A dispute exists regarding whether the criteria are met, in which case the opinion of the Keeper of the National Register of Historic Places at the National Park Service ("the Keeper") will be sought to resolve disagreements, and the site treated in accordance with the Keeper's findings.

MTA will notify SHPO of conclusions regarding evaluation of all sites for National Register eligibility.

C. Mitigation and Data Recovery

MTA, in consultation with SHPO, will consider measures for avoidance of archaeological sites, such as design modification, rather than data recovery. For those sites determined to be eligible for inclusion in the National Register where MTA determines, in consultation with FTA and SHPO, that avoidance is not practicable, MTA, in consultation with SHPO, shall develop and implement a data recovery plan that is consistent with the Secretary of the Interior's *Standards for the Treatment of Historic Properties* and *Standards and Guidelines for Archeological Documentation* and the Council's *Treatment of Archeological Properties* and subsequent amendments.

The plan will be designed to recover data sufficient to address significant research issues and test assumptions and thus substantially preserve the archaeological value of National Register eligible or listed sites; allow for addressing unanticipated resources or site conditions; include a process for consultation with SHPO; and include a schedule of proposed data recovery efforts.

D. Professional Standards

MTA shall ensure that all archaeological research, testing, and analysis conducted pursuant to this Agreement are carried out by or under the direct supervision of a person or persons meeting the Secretary of Interior's Professional Qualifications Standards and certified by the Register of Professional Archeologists. FTA shall ensure that all final archaeological reports are responsive to the New York Archaeological Council's Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State and to the Department of the Interior's *Format Standards for Final Reports of Data Recovery Program.*

E. Curation

MTA shall develop, in consultation with SHPO, and in accordance with 36 CFR Part 79, a plan for the analysis and curation of material and records from any archaeological excavations. MTA shall be responsible for the implementation of such a plan.

F. Phasing of Construction Activities and Archaeological Field Work

MTA will ensure that all steps practical to ensure that archaeological field analysis and data recovery, if required, will be completed prior to construction activities in the vicinity of affected resources. The MTA, in consultation with FTA and SHPO, will develop a plan to appropriately phase the archaeological field analysis and data recovery with construction activities.

II. HISTORIC PROPERTIES/STRUCTURES

In the EIS for the East Side Access Project, within the APEs for the East Side Access Project, MTA, in consultation with SHPO, determined that one historic property, Grand Central Terminal, is a National Historic Landmark, and that 20 historic properties/structures are listed or eligible for listing on the State and National Registers and/or New York City Landmarks. These properties are as follows: in Manhattan (New York County), Grand Central Terminal, Park Avenue Viaduct, Grand Central Terminal Post Office, New York Central (Helmsley) Building, Waldorf-Astoria Hotel, St. Bartholomew's Church and Community House, Seagram Building, Four Seasons Restaurant (interior), Lever House, Racquet & Tennis Club, Vanderbilt Avenue Building, Yale Club, Vanderbilt Concourse Building, Roosevelt Hotel, Postum Building, Graybar Building, and Hotel Intercontinental; and in Queens County, Sunnyside Gardens Historic District, Switch Tower Q in Sunnyside Yard, and Office (formerly Signal Cabin F) in Sunnyside Yard.

In consultation with SHPO, the physical and contextual impacts on the historic properties/structures were assessed and potential adverse effects identified. It was determined that the project (under Option 2, the selected engineering option for the project in Manhattan) would have the potential for impacts on Grand Central Terminal and the Yale Club in Manhattan (New York County); and Switch Tower Q and the Office in Sunnyside Yard, Queens County. A comprehensive program for treatment of historic properties/structures will be developed and implemented by MTA in the manner set forth below.

A. Construction Protection Plan

The MTA, in consultation with SHPO, will develop and implement 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 New York City Landmarks from damage due to the construction of the East Side Access Project. The MTA shall ensure that any construction conducted within the APE of an identified historic resource (e.g., within 75 feet of that resource) will be included in the construction protection plan.

B. Design Specifications

The MTA, in consultation with SHPO, will develop design specifications to ensure that new elements constructed as part of the East Side Access Project inside Grand Central Terminal are compatible with the terminal's historic and architectural qualities. The MTA, in consultation with SHPO, will also develop design specifications to ensure that new elements constructed as part of the East Side Access Project within the contextual APE (i.e., within visual range of a resource) for the Yale Club and any other historic resources listed on or eligible for the National Register or New York City Landmarks are compatible with the historic and architectural qualities of those resources. The design and specifications for those elements of the East Side Access Project will be developed in consultation with the SHPO and submitted to the SHPO for approval.

III. REPORTING

MTA shall ensure that all final archaeological reports and all final historic resources reports resulting from the actions pursuant to this Agreement shall be provided to SHPO.

Annual reports about archaeological resources and historic structures will be completed and provided by MTA to FTA and the SHPO one year from the date this Agreement is fully executed and every year thereafter until project completion. The signatories to this Agreement will review implementation of the Agreement and determine whether revisions are needed at the time the reports are submitted. If revisions are needed, the parties to this Agreement will consult to make such revisions.

IV. DISPUTE RESOLUTION

Should the SHPO object within 30 days to any action proposed pursuant to this agreement, FTA shall consult with the objecting party to resolve the objection. If FTA determines that the objection cannot be resolved, FTA shall forward all documentation relevant to the dispute to the Council. Within 30 days after receipt of all pertinent documentation, the Council will provide FTA with recommendations or comments, which FTA will take into account in reaching a final decision regarding the dispute.

Any recommendation or comment provided by the Council will be understood to pertain only to the subject of the dispute; FTA's responsibility to carry out all actions under this agreement that are not the subject of the dispute will remain unchanged.

V. OTHER

The SHPO and FTA may monitor activities carried out pursuant to this Programmatic Agreement, and will review such activities if so requested. MTA will cooperate with the FTA and SHPO in carrying out their monitoring and review responsibilities.

Any party to this Programmatic Agreement may request that it be amended, whereupon the parties will consult to consider such amendment.

If the East Side Access Project does not proceed, this Agreement shall be terminated.

EXECUTION AND IMPLEMENTATION OF THIS PROGRAMMATIC AGREEMENT EVIDENCES THAT FTA HAS SATISFIED ITS SECTION 106 RESPONSIBILITIES FOR ALL INDIVIDUAL UNDERTAKINGS OF THE PROGRAM.

FEDERAL TRANSIT ADMINISTRATION

By: _____ **Date:** 02/02/01

Letitia Thompson
Regional Administrator, Region II

METROPOLITAN TRANSPORTATION AUTHORITY

By: _____ **Date:** 1/22/1

Anthony F. Japha
Chief Program Executive, MTA/LIRR East Side Access

NEW YORK STATE HISTORIC PRESERVATION OFFICER

By: _____ **Date:** 19 January '01

J. Winthrop Aldrich
Deputy Commissioner for Historic Preservation

Jamaica Station
Jamaica, NY 11435-4380
718 558-7400 Tel

Thomas F. Prendergast
President

Long Island Rail Road

May 18, 1999

Ms. Kathleen A. Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Re: **MTA/Long Island Rail Road East Side Access Project**
95PR1757
New York, Bronx, Queens Counties

Dear Ms. Howe:

Enclosed for your review is a copy of the draft identification of the areas of potential effect (APEs) for cultural resources—architectural and archaeological resources—for the Build Alternative for the MTA/Long Island Rail Road East Side Access Project. The APEs for architectural resources are defined to include any potential impacts that might be expected to occur either during the project's construction or during its operation. The APEs for archaeological resources are defined to include the areas where ground disturbance in the form of new excavation or other subsurface disturbance may impact potential archaeological resources.

As you know, we submitted a draft work plan for the environmental impact statement (EIS) to the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) for review in January 1998, and OPRHP prepared comments on the project, dated February 8, 1999. The project has subsequently been developed to include new project elements and revisions to the project. Therefore, APEs have been refined for architectural resources and archaeological resources, and a Stage 1A Archaeological Study will be prepared to assess archaeological sensitivity in the new areas of proposed subsurface work.

We would like to arrange a meeting with you and appropriate OPRHP staff to discuss the project and APEs, at your earliest convenience. We will be calling you to set up a meeting within the next week.

Thank you for your assistance in this matter.

Sincerely,

Pamela Burford
Director, Planning and External Relations

cc: Gina Santucci, NYC Landmarks Preservation Commission
Betsy Kearns, Historical Perspectives, Inc.
Audrey Heffernan, Bechtel/URS Greiner

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

Letter No.: 99.2070.0521
Reply Requested: No

May 21, 1999

Gina Santucci
New York City Landmarks Preservation Commission
100 Old Slip
New York, NY 10005

SUBJECT: MTA/LIRR EAST SIDE ACCESS PROJECT

Dear Gina:

As we discussed, enclosed please find the draft work plan for the Environmental Impact Statement (EIS) for the MTA/LIRR East Side Access Project that was prepared in January 1999. A revised work plan is currently being prepared and will be forwarded to you once it is completed.

If you have any questions, please call me at (212) 340-9745.

Sincerely,

AKRF, INC.

Claudia Cooney
Historian

cc: Audrey Heffernan
Julia Cowing
File ✓

cc/wp

THE CITY OF NEW YORK LANDMARKS PRESERVATION COMMISSION
100 Old Slip, New York, NY 10005 (212) 487-6800

ENVIRONMENTAL REVIEW

MTA/SEQRA-Y — PROJECT NUMBER
05/25/99 — DATE RECEIVED

PROJECT MTA/LIRR EAST SIDE ACCESS

[ ] No architectural significance

[ ] No archaeological significance

w/in Project study area

[X] Designated New York City Landmark or Within Designated Historic District

[X] Listed on National Register of Historic Places

[ ] Appears to be eligible for National Register Listing and/or New York City Landmark Designation

[X] May be archaeologically significant; requesting additional materials

COMMENTS

Work plan for EIS preparation appears adequate for architecture and archaeology. Site plans showing locations of proposed in-ground construction, showing existing and proposed conditions, are needed before LPC can complete the assessment of archaeological impacts.

The study area boundaries map for historic resources in Manhattan does not contain any properties which are calendared for public hearing or are potentially eligible for New York City landmark designation. The following properties within the study area are New York City individual landmarks: The Seagram Building, 375 Park Ave., the Waldorf Astoria, 301 Park Ave and the New York Central Building, 230 Park Ave. The following properties within the study area are New York City individual landmarks and listed on the State/National Registers: Lever House, 390 Park Ave; The Racquet and Tennis Club, 370 Park Ave; St. Bartholomew's Church, Park Ave and E. 50 St; and Grand Central Terminal.

cc: SHPO

Signature — SIGNATURE
06/04/99 — DATE

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE

Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

June 21, 1999

Ms. Pamela Burford
Director, Planning and External Relations
Long Island Rail Road
Jamaica Station
Jamaica, New York 11435-4380

RE: MTA/Long Island Rail Road East Side Access Project
New York, Bronx, Queens Counties
95PR1757

Dear Ms. Burford:

Thank you for requesting the comments of the Office of Parks, Recreation and Historic Preservation (OPRHP) concerning the identification of the areas of potential effect (APEs) for cultural resources for the Build Alternative for the MTA/Long Island Rail Road East Side Access Project. We have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966. Based upon this review, the OPRHP concurs with the architectural and archaeological assessments of APEs for your project.

Please be sure to refer to the OPRHP Project Review (PR) number noted above for any further correspondence.

Sincerely,

Kathleen A Howe

Kathleen A. Howe
Historic Preservation Specialist

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printed on recycled paper

Jamaica Station
Jamaica, NY 11435-4380
718 558-7400 Tel

Thomas F. Prendergast
President

Long Island Rail Road

July 19, 1999

Ms. Gina Santucci
Director of Environmental Review
New York City Landmarks Preservation Commission
100 Old Slip
New York, NY 10005

Re: **MTA/LIRR EAST SIDE ACCESS PROJECT**

Dear Ms. Santucci:

For your information, enclosed please find the comments of the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) on the draft memorandum, dated May 18, 1999, prepared by AKRF, Inc. to identify the areas of potential effect (APEs) for cultural resources for the MTA/LIRR East Side Access Project.

OPRHP has concurred with the findings of the memo, and does not wish to meet to discuss the project APEs. However, if you require further clarification or you would like to meet to discuss the project, please contact me at (718) 558-7520.

Sincerely,

Pamela Burford
Director, Planning and External Relations

cc: Audrey Heffernan, Bechtel/URS Greiner
Julie Cowing, AKRF
Betsy Kearns, Historical Perspectives, Inc.

Allee
King
Rosen &
Fleming, Inc.

Environmental and Planning Consultants
117 East 29th Street • New York, New York 10016-8022

TEL: 212/696-0670
FAX: 212/213-3191

October 22, 1999

Memo No.: 99.6021.10.22
Reply Requested: Yes

Ms. Kathleen A. Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Re: **MTA/Long Island Rail Road East Side Access Project**
New York, New York County
95PR1757

Dear Kathy:

Enclosed are **Building Structure Inventory Forms** ("Blue Forms") for the properties listed below for your review and comment, in connection with the above referenced project. These properties have either been identified as potential historic resources or may be affected by the proposed project. We would like to include your determination on the buildings described in the Blue Forms in the Environmental Impact Statement. We will be sending you Blue Forms for additional such properties in Manhattan and Queens within the next two weeks.

- 47 East 44th Street
- Vanderbilt Avenue Building, 51 East 42nd Street
- Yale Club, 50 Vanderbilt Avenue
- Vanderbilt Concourse Building, 52 Vanderbilt Avenue
- Graybar Building, 420 Lexington Avenue
- 270 Park Avenue

Please let me know if you have any questions at (212) 340-9745.

Sincerely,

ALLEE KING ROSEN & FLEMING, INC.

Claudia Cooney
Historian

cc: Audrey Heffernan, Bechtel/URS Greiner
Julia Cowing, Allee King Rosen & Fleming, Inc. ✓
File

cc/wp

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL. 212/696-0670
FAX. 212/447-5546

October 27, 1999

Memo No.: 99.6021.10.27
Reply Requested: Yes

Ms. Kathleen A. Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Re: **MTA/Long Island Rail Road East Side Access Project**
Sunnyside Yard, Queens County
95PR1757

Dear Kathy:

Enclosed are **Building Structure Inventory Forms** ("Blue Forms") for the properties listed below for your review and comment, in connection with the above referenced project. These properties have been identified as potential historic resources in Sunnyside Yard in Queens and may be affected by the proposed project. We would like to include your determination on the buildings described in the Blue Forms in the Environmental Impact Statement. We will be sending you Blue Forms for additional such properties in Manhattan and Queens in the next few weeks.

- Stores & Lavatory Building (Building #3)
- Electric Battery/Machine Repair Building (Building #4)
- Switch Tower Q
- Former Signal Cabin F

Please let me know if you have any questions at (212) 340-9745.

Sincerely,

ALLEE KING ROSEN & FLEMING, INC.

Claudia Cooney
Historian

cc: Audrey Heffernan, Bechtel/URS Greiner
Julia Cowing, Allee King Rosen & Fleming, Inc. ✓
File

cc/wp

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

November 10, 1999

Ms. Claudia Cooney
Historian
Allen King Rosen & Fleming, Inc.
Environmental and Planning Consultants
117 East 29th Street
New York, New York 10016-8022

RE: MTA/Long Island Rail Road East Side Access Project
New York and Queens Counties
95PR1757

Dear Claudia:

Thank you for requesting the comments of the Office of Parks, Recreation and Historic Preservation (OPRHP) concerning your project's potential effect upon historic and cultural resources in the proposed project area. I have reviewed the information you submitted in accordance with the provisions of Section 106 of the National Historic Preservation Act of 1966.

Based upon the documentation provided, we have determined that the following properties appear to meet the criteria for inclusion in the National Register of Historic Places, as indicated on the attached Resource Evaluations:

Vanderbilt Avenue Building, 51 East 42nd Street, Manhattan
Yale Club, 50 Vanderbilt Avenue, Manhattan
Vanderbilt Concourse Building, 52 Vanderbilt Avenue, Manhattan
Graybar Building, 420 Lexington Avenue, Manhattan
Switch Tower Q, Sunnyside Yard, Queens
Former Signal Cabin F, Sunnyside Yard, Queens.

The following four do not appear to meet the National Register criteria:

47 East 44th Street, Manhattan
270 Park Avenue, Manhattan
Stores & Lavatory Building (Bldg. #3), Sunnyside Yard, Queens
Electric Battery/Machine Repair Building (Bldg. #4), Sunnyside Yard, Queens.

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If you have any questions please don't hesitate to call me at (518) 237-8643, ext. 3266. When responding, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Kathleen A Howe

Kathleen A. Howe
Historic Preservation Specialist

Cc: Gina Santucci, NYCLPC

Enc.: Resource Evaluations

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 11/10/99 STAFF: Kathy Howe

PROPERTY: Yale Club MCD: Manhattan

ADDRESS: 50 Vanderbilt Avenue COUNTY: New York Co.

PROJECT REF: 95 PR 1757 USN: 06101.010659

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Yale Club of New York is architecturally significant under Criterion C as an intact representative example of an early twentieth century Renaissance Revival style building in New York City. It was built in 1915 by the Yale Leasing Company and designed by James Gamble Rogers. The building is also historically significant under Criterion A for its association with Terminal City, a planned commercial district built over the Grand Central Terminal track network.

The Yale Club of New York was founded in 1897 by an active local alumni association. The club chose to locate on Vanderbilt Avenue in large part due to the proximity to Grand Central Terminal (GCT) and its commuter trains to New Haven, Connecticut. The structure, built over

the railroad tracks, had an underground pedestrian connection to GCT, allowing members direct access to the club from the station.

The building exhibits features associated with the Renaissance Revival style including a rusticated limestone base, a symmetrical entrance façade, monumental pilasters, brick quoins, round arched window openings at the second and 21st floor, and a prominent bracketed copper cornice. The 21-story building consists of a variety of public rooms, including dining rooms, library, lounge, card room, social room, and gymnasium, as well as 158 bedrooms. The club's public spaces, including the lobby, are elegantly designed spaces with classical detailing, including moldings, columns, pilasters, and coffered ceilings.

The Yale Club was one of 23 buildings erected over the GCT track network owned by the New York Central and Hudson River Railroad. The railroad company raised revenues for the construction of the GCT through the selling and leasing of air rights above the tracks to allow for the construction of revenue-producing office and apartment buildings, and hotels. The area, known as Terminal City, was a progressive attempt at creating a planned business district within the city on such an ambitious scale and with an integrated design – it remained unmatched until the design and construction of Rockefeller Center (1931-1940).

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

Source: Building-Structure Inventory Form on the Graybar Building by Claudia Cooney, Allee King Rosen & Fleming, Inc., Oct. 1999.

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 11/10/99 STAFF: Kathy Howe

PROPERTY: Vanderbilt Avenue Building MCD: Manhattan

ADDRESS: 51 East 42nd Street COUNTY: New York Co.

PROJECT REF: 95 PR 1757 USN: 06101.010658

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Vanderbilt Avenue Building at 51 East 42nd Street is architecturally significant under Criterion C as an intact representative example of an early twentieth century Renaissance Revival style commercial office building in New York City. It was erected as a six-story building by the American Real Estate Company in 1913 with the upper eleven stories added in 1924. The building is also historically significant under Criterion A for its association with Terminal City, a planned commercial district built over the Grand Central Terminal track network. The building has a direct below-grade connection to Grand Central Terminal. It gains additional significance as a fine example of the work of the prominent architecture firm of Warren & Wetmore.

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The original six-story building is clad in stone and features window bays notable for their decorative metal panels, classical terra cotta columns and arched pediments. The structure is capped by an attic story with decorative plaques and a dentil cornice. The eleven-story addition is composed of buff brick and topped by a two-story attic with decorative terra cotta ornament and a cornice.

The firm of Warren & Wetmore is noted for their design of railroad stations, including their joint design of Grand Central Terminal with Reed & Stem. The firm is also well known for hotel designs, including several hotels built in the Grand Central Terminal area. Other buildings designed by Warren & Wetmore within Terminal City included the Grand Central Terminal Post Office, the New York Central Building, Grand Central Palace (demolished), and the Vanderbilt Concourse Building. Many of the firm's designs reflected the Beaux Arts Classical tradition.

The Vanderbilt Avenue Building was one of 23 buildings erected over the Grand Central Terminal (GCT) track network owned by the New York Central and Hudson River Railroad. The railroad company raised revenues for the construction of the GCT through the selling and leasing of air rights above the tracks to allow for the construction of revenue-producing office and apartment buildings, and hotels. The area, known as Terminal City, was a progressive attempt at creating a planned business district within the city on such an ambitious scale and with an integrated design – it remained unmatched until the design and construction of Rockefeller Center (1931-1940).

Changes to the building – including window replacement, alterations to the main entrance, and ground-floor storefront alterations – have not resulted in the removal of notable exterior features. The building retains a sufficient level of historic architectural integrity and is a good example of the work of Warren & Wetmore.

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

Source: Building-Structure Inventory Form on the Graybar Building by Claudia Cooney, Allee King Rosen & Fleming, Inc., Oct. 1999.

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 11/10/99 STAFF: Kathy Howe

PROPERTY: Graybar Building MCD: Manhattan

ADDRESS: 420 Lexington Avenue COUNTY: New York Co.

PROJECT REF: 95 PR 1757 USN: 06101.010661

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Graybar Building at 420 Lexington Avenue is architecturally significant under Criterion C as an intact representative example of a 1920s office building in New York City. The 31-story brick and limestone clad building was the largest office building in the world at the time of its construction. It was built primarily as an office building for the Graybar Electric Company. The building is also historically significant under Criterion A for its association with Terminal City, a planned commercial district built over the Grand Central Terminal track network. The building was erected in 1925-27 by developer John R. Todd, who later became known for his involvement with the construction of Rockefeller Center. It gains additional significance as a fine example of the work of the architecture firm of Sloan & Robertson. The firm specialized in institutional and commercial designs, most frequently in the Art Deco style.

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The building is composed of two pavilions, with an exterior light court in between, that rise above a two-story base. The limestone base was designed in an eclectic mix of Moorish and Classical detailing, including decorative limestone and cast iron window grilles, a flagstaff above the central entrance with a Moorish band decorated with bronze and colored terra cotta, and flat, sculpted bas-relief figures, symbolizing Transportation and Electricity at the central entrance and similar figures representing the four elements – Earth, Air, Fire and Water – above the northern and southern entances. In contrast, the upper stories of the building, clad in buff brick, are relatively simple.

Significant intact interior spaces include the connecting concourse to Grand Central Terminal; and the vestibule, lobby and elevator hall. The concourse has vaulted ceilings with an allegorical painting of transportation by artist Edward Trumbull; walls and arches clad in Travertine; and a terrazzo floor. The interior of the vestibule/lobby and elevator banks are also richly detailed including Travertine-clad walls, mirrors with bronze work above, and a ceiling with a brightly painted geometric Moorish design.

The building was one of 23 buildings erected over the Grand Central Terminal (GCT) track network owned by the New York Central and Hudson River Railroad. The railroad company raised revenues for the construction of the GCT through the selling and leasing of air rights above the tracks to allow for the construction of revenue-producing office and apartment buildings, and hotels. The area, known as Terminal City, was a progressive attempt at creating a planned business district within the city on such an ambitious scale and with an integrated design – it remained unmatched until the design and construction of Rockefeller Center (1931-1940).

The building retains a relatively high degree of architectural integrity and is a significant example of Sloan & Robertson's work.

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

Source: Building-Structure Inventory Form on the Graybar Building, Oct. 1999, by Claudia Cooney, Allee King Rosen & Fleming, Inc.

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE

Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 11/10/99 STAFF: Kathy Howe

PROPERTY: Signal Tower F MCD: Queens

ADDRESS: Sunnyside Yard, west of Thomson Ave. viaduct COUNTY: Queens Co.

PROJECT REF: 95 PR 1757 USN: 08101.009219

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The former Signal Tower F in the Sunnyside Yard in Queens is significant under Criterion C as an intact example of an early twentieth century signal tower. Historic railroad signal towers are becoming a rare surviving building type due to changes in technology. The building is also important for its association with transportation history.

Signal towers are structures containing track switching and signaling equipment. When the switches were manned, operators needed to actually see the tracks and switches. Above-ground towers were usually located along side tracks in the yards. Signal towers are becoming

more rare as manual switches have been replaced by remote control panels and automatic devises, many now placed in rooms within stations or consolidated into master towers in yards.

This building is one of three surviving signal cabins erected in Sunnyside Yard by the Pennsylvania Railroad Company in 1910. Historic documents describe the cabin to be of "standard Pennsylvania Railroad type." The small brick building is two-stories with a slate-clad hipped roof and stone sills and lintels. It has a bay window on the south façade.

The former Signal Tower F houses now communication wires and appears to be in fair condition, although some of the entrances and windows have been bricked or boarded up and modern windows have been installed. On the whole, the tower appears to maintain a sufficient level of historic architectural integrity. It is not known what elements of the historic equipment survive in this signal tower. Any future documentation of the building should include an investigation of the equipment.

In 1901, the Pennsylvania Railroad adopted a plan to lay out a large railroad yard at Sunnyside and to build a system of tunnels from New Jersey to Manhattan and out to Queens. Sunnyside Yard opened in 1910, with Long Island Rail Road (LIRR) service commencing in September and Pennsylvania Railroad service in November of that year. The New York Tunnel Extension project provided an all-rail line to a centrally located Penn Station in New York City. The purpose of the Sunnyside Yard was to furnish facilities for the storage and care of passenger train equipment.

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

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NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 11/10/99 STAFF: Kathy Howe

PROPERTY: Signal Cabin Q/Yardmaster's Office MCD: Queens
(present Switch Tower Q)

ADDRESS: Sunnyside Yard, east of Queens Blvd. viaduct COUNTY: Queens Co.

PROJECT REF: 95 PR 1757 USN: 08101.009218

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The former Signal Cabin Q/Yardmaster's Office (now known as Switch Tower Q) in the Sunnyside Yard in Queens is significant under Criterion C as an intact example of an early twentieth century signal tower. Historic railroad signal towers are becoming a rare surviving building type due to changes in technology. The building is also important for its association with transportation history.

Signal towers are structures containing track switching and signaling equipment. When the switches were manned, operators needed to actually see the tracks and switches. Above-

ground towers were usually located along side tracks in the yards. Signal towers are becoming more rare as manual switches have been replaced by remote control panels and automatic devises, many now placed in rooms within stations or consolidated into master towers in yards.

This building is one of three surviving signal cabins erected in Sunnyside Yard by the Pennsylvania Railroad Company in 1910. It was built for combined use as a signal cabin and yardmaster's office. Historic documents pertaining to the construction of Sunnyside Yard describe it as "special" and different from the "standard Pennsylvania Railroad type" due to its design with extensions to contain the yardmaster's offices and tool rooms.

The brick building consists of a two-story block flanked by one-story wings. It has slate-clad hipped roofs, stone lintels and sills, and a bay window on the north façade. The structure is still in use as a switch tower and appears to be in fair condition, although some of the entrances and windows have been bricked or boarded up and modern windows have been installed. On the whole, the tower appears to maintain a sufficient level of historic architectural integrity. It is not known what elements of the historic equipment survive in this signal tower. Any future documentation of the building should include an investigation of the equipment.

In 1901, the Pennsylvania Railroad adopted a plan to lay out a large railroad yard at Sunnyside and to build a system of tunnels from New Jersey to Manhattan and out to Queens. Sunnyside Yard opened in 1910, with Long Island Rail Road (LIRR) service commencing in September and Pennsylvania Railroad service in November of that year. The New York Tunnel Extension project provided an all-rail line to a centrally located Penn Station in New York City. The purpose of the Sunnyside Yard was to furnish facilities for the storage and care of passenger train equipment.

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

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NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 11/9/99 STAFF: Kathy Howe

PROPERTY: Vanderbilt Concourse Building MCD: Manhattan

ADDRESS: 52 Vanderbilt Avenue COUNTY: New York Co.

PROJECT REF: 99 PR 1757 USN: 06101.010660

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Vanderbilt Concourse Building at 52 Vanderbilt Avenue is architecturally significant under Criterion C as an intact representative example of an early twentieth century Renaissance Revival style commercial building in New York City. It was built by the Vanderbilt Concourse Corporation in 1914 to house stores, offices, and lofts. The corporation acquired the site under a long-term lease from the New York Central & Hudson River Railroad. The building is also historically significant under Criterion A for its association with Terminal City, a planned commercial district built over the Grand Central Terminal track network. It gains additional significance as a fine example of the work of the prominent architecture firm of Warren & Wetmore.

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The 20-story building consists of a buff-colored brick façade above a six-story limestone base. Characteristic features of the Renaissance Revival style include the three-part composition, ornate carved panels, three-story round-arched window openings at the upper floors with keystones and a balcony, and prominent cornice. In the interior, the vestibule/elevator bank area also appears to retain original detailing, including a gilded plaster barrel vault ceiling and ornate bronze elevator doors.

The firm of Warren & Wetmore is noted for their design of railroad stations, including their joint design of Grand Central Terminal with Reed & Stem. The firm is also well known for hotel designs, including several hotels built in the Grand Central Terminal area. Other buildings designed by Warren & Wetmore within Terminal City included the Grand Central Terminal Post Office, the New York Central Building, Grand Central Palace (demolished), and the Vanderbilt Avenue Building. Many of the firm's designs reflected the Beaux Arts Classical tradition.

The Vanderbilt Concourse Building was one of 23 buildings erected over the Grand Central Terminal (GCT) track network owned by the New York Central and Hudson River Railroad. The railroad company raised revenues for the construction of the GCT through the selling and leasing of air rights above the tracks to allow for the construction of revenue-producing office and apartment buildings, and hotels. The area, known as Terminal City, was a progressive attempt at creating a planned business district within the city on such an ambitious scale and with an integrated design – it remained unmatched until the design and construction of Rockefeller Center (1931-1940).

The building retains a relatively high degree of architectural integrity and is a significant example of the work of Warren & Wetmore.

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

Source: Building-Structure Inventory Form on the Graybar Building by Claudia Cooney, Allee King Rosen & Fleming, Inc., Oct. 1999.

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL. 212/696-0670
FAX 212/447-5546

October 27, 1999

Memo No.: 99.6021.10.27
Reply Requested: Yes

Ms. Kathleen A. Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Re: **MTA/Long Island Rail Road East Side Access Project**
Sunnyside Yard, Queens County
95PR1757

Dear Kathy:

Enclosed are **Building Structure Inventory Forms** ("Blue Forms") for the properties listed below for your review and comment, in connection with the above referenced project. These properties have been identified as potential historic resources in Sunnyside Yard in Queens and may be affected by the proposed project. We would like to include your determination on the buildings described in the Blue Forms in the Environmental Impact Statement. We will be sending you Blue Forms for additional such properties in Manhattan and Queens in the next few weeks.

- Stores & Lavatory Building (Building #3)
- Electric Battery/Machine Repair Building (Building #4)
- Switch Tower Q
- Former Signal Cabin F

Please let me know if you have any questions at (212) 340-9745.

Sincerely,

ALLEE KING ROSEN & FLEMING, INC.

Claudia Cooney
Historian

cc: Audrey Hefferman, Bechtel/URS Greiner
Julia Cowing, Allee King Rosen & Fleming, Inc. ✓
File

cc/wp

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL 212/696-0670
FAX 212 447-5546

November 23, 1999

Memo No.: 99.6021.11.23
Reply Requested: Yes

Ms. Kathleen A. Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island, Delaware Avenue
Waterford, NY 12188-0189

Re: **MTA/Long Island Rail Road East Side Access Project**
Queens County
95PR1757

Dear Kathy:

Enclosed are **Building Structure Inventory Forms** ("Blue Forms") for the following properties in Queens that may be affected by the above referenced project, for your review and comment.

- Building #5, Sunnyside Yard
- 2950-2970 Northern Boulevard, Long Island City
- 3856-3864 43rd Street, Long Island City
- Barnett Avenue garages, 44-11 through 43-05 Barnett Avenue, Sunnyside
- 44-15 Barnett Avenue, Sunnyside
- 44-25 Barnett Avenue, Sunnyside
- 45-15 Barnett Avenue, Sunnyside
- 4701/4707/4715 Barnett Avenue, Sunnyside

Please let me know if you have any questions at (212) 340-9745.

Sincerely,

ALLEE KING ROSEN & FLEMING, INC.

Claudia Cooney
Historian

cc: Audrey Heffernan, Bechtel/URS Greiner
Julia Cowing, Allee King Rosen & Fleming, Inc. ✓
File

cc/wp

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189
518-237-8643

November 29, 1999

Claudia Cooney
Historian
Allee King Rosen & Fleming, Inc.
Environmental Consultants
117 East 29th Street
New York, New York 10016-8022

RE: MTA/Long Island Rail Road East Side Access Project
Queens County
95PR1757

Dear Claudia:

Thank you for requesting the comments of the Office of Parks, Recreation and Historic Preservation (OPRHP) concerning your project's potential effect upon historic and cultural resources in the proposed project area. I have reviewed the information you submitted in accordance with the provisions of Section 106 of the National Historic Preservation Act of 1966.

Based upon the documentation provided, the following properties do not appear to meet the criteria for inclusion in the National Register of Historic Places:

*Building #5, Sunnyside Yard
*2950-2970 Northern Boulevard, Long Island City
*3856-3864 43rd Street, Long Island City
*Barnett Avenue garages, 44-11 through 43-05 Barnett Avenue, Sunnyside
*44-15 Barnett Avenue, Sunnyside
*44-25 Barnett Avenue, Sunnyside
*45-15 Barnett Avenue, Sunnyside
*4701/4707/4715 Barnett Avenue, Sunnyside.

Please note that while the Barnett Avenue garages are not eligible, they are located directly across the street from the National Register listed Sunnyside Gardens. Therefore, we will need to review the project's plans for that site for any potential effect.

If you have any questions, please don't hesitate to call me at (518) 237-8643, ext. 3266. When responding, please be sure to refer to the OPRHP Project Review (PR) number noted above.

Sincerely,

Kathleen A Howe

Kathleen A. Howe
Historic Preservation Specialist

cc: Gina Santucci, NYCLPC

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ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

Memo No.: 99.2080.12.29
Reply Requested: Yes

December 29, 1999

Ms. Kathleen A. Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island, P. O. Box 189
Waterford, NY 12188-0189

Re: **MTA/Long Island Rail Road East Side Access Project**
New York, Bronx, Queens Counties
95PR1757

Dear Kathy:

Enclosed for your review are the Archaeological Resources chapter of the Preliminary Draft Environmental Impact Statement (PDEIS) for the MTA/LIRR East Side Access Project, together with the Stage 1A Archaeological Assessment on which it is based.

As you know, we submitted a memorandum identifying areas of potential effect (APEs) for historic and archaeological resources for the project to the New York State Office of Parks, Recreation and Historic Preservation for review in May 1999, and OPRHP concurred in comments dated June 21, 1999.

We would like to include your comments on the Archaeological Resources chapter in the Draft Environmental Impact Statement, and therefore, request comments by the end of January.

Please let me know if you have any questions, or if a meeting with you and appropriate OPRHP staff to discuss the project would be helpful.

Thank you for your assistance in this matter.

Sincerely,
AKRF, INC.

Claudia Cooney
Historian

cc: Gina Santucci, New York City Landmarks Preservation Commission
Pamela Burford, Long Island Rail Road
Audrey Heffernan, Bechtel/URS Greiner
Historical Perspectives, Inc.
Julia Cowing, AKRF, Inc. ✓

THE CITY OF NEW YORK LANDMARKS PRESERVATION COMMISSION
100 Old Slip, New York, NY 10005 (212) 487-6800

ENVIRONMENTAL REVIEW

MTA/SEQRA-Y — PROJECT NUMBER

01/03/00 — DATE RECEIVED

PROJECT MTA/LIRR EAST SIDE ACCESS

[ ] No architectural significance

[ ] No archaeological significance

[X] Designated New York City Landmark or Within Designated Historic District

[X] Listed on National Register of Historic Places

[ ] Appears to be eligible for National Register Listing and/or New York City Landmark Designation

[X] May be archaeologically significant; requesting additional materials

Stage IA Archaeo. Assessment

COMMENTS The SHPO is the lead agency in archeology for this project. The Commission will consult with the SHPO about their findings.

SIGNATURE

01/20/00 — DATE

OFFICE OF PARKS, RECREATION, HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

January 12, 2000

Ms. Claudia Cooney
Historian
AKRF, Inc., Environmental Consultants
117 East 29th Street
New York, New York 10016-8022

RE: MTA/Long Island Rail Road East Side Access Project
New York, Bronx, Queens Counties
95PR1757

Dear Claudia:

Thank you for requesting the comments of the State Historic Preservation Office (SHPO) concerning your project's potential effect upon historic and cultural resources in the proposed project area. We have reviewed the Historic Resources and Archaeological Resources chapters of the Preliminary Draft Environmental Impact Statement and the Stage 1A report for the MTA/LIRR East Side Access Project submitted in accordance with the provisions of Section 106 of the National Historic Preservation Act of 1966.

We concur with the information in the Historic Resources chapter but would like the opportunity to review the following four buildings that were included in Table 7-1 for National Register eligibility:

New York Central (Helmsley) Building, 230 Park Avenue
Waldorf-Astoria Hotel, 301 Park Avenue
Seagram Building, 375 Park Avenue
Four Seasons Restaurant, 99 East 52nd Street.

Copies of the NYC LPC designation reports on these buildings should provide us with enough information to determine eligibility for these buildings.

As discussed, we are awaiting your inventory forms for the Roosevelt Hotel, Postum Building and the Barclay Hotel and will review those buildings for National Register eligibility.

Based upon a review of the Stage 1A Archaeological Assessment Report, the SHPO concurs with the archeological recommendations of the report. Upon completion of soil borings, all of the Project Areas of Potential Effect (APE) should be evaluated based on a

Based upon a review of the Stage 1A Archaeological Assessment Report, the SHPO concurs with the archeological recommendations of the report. Upon completion of soil borings, all of the Project Areas of Potential Effect (APE) should be evaluated based on a determination of potential sensitivity and appropriate archeological testing strategies developed. This evaluation should be conducted in consultation with the SHPO.

If you have any questions concerning historic resources please contact me at (518) 237-8643, ext. 3266, or any archeological questions please call Robert Kuhn at ext. 3255.

Sincerely,

Kathleen A Howe

Kathleen A. Howe
Historic Preservation Specialist

cc: Gina Santucci, NYC LPC

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL 212/696-0670
FAX 212/447-5546

January 21, 2000

Letter No.: 00.6021.01.21
Reply Requested: Yes

Ms. Kathleen A. Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Re: **MTA/Long Island Rail Road East Side Access Project**
New York, New York County
95PR1757

Dear Kathy:

As requested in your letter of January 12th, enclosed are the following New York City Landmarks Preservation Commission designation reports for your review of State and National Register eligibility, in connection with the above referenced project:

- New York Central Building (exterior and interior designations)
- Waldorf-Astoria Hotel
- Seagram Building (exterior and interior designations)
- Four Seasons Restaurant

Also enclosed for your review and comment are **Building Structure Inventory Forms** ("Blue Forms") for the Roosevelt Hotel at 45 East 45th Street, Postum Building at 250 Park Avenue, and the former Barclay Hotel (now Hotel Intercontinental) at 111 East 48th Street, which have been identified as potential historic resources in the Historic Resources chapter of the Preliminary Draft Environmental Impact Statement.

Thank you for all your help with this project. Please let me know if you have any questions at (212) 340-9745.

Sincerely,

AKRF, INC.

Claudia Cooney
Historian

cc: Audrey Heffernan, Bechtel/URS Greiner
Julia Cowing, AKRF Inc. ✓
File

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

February 4, 2000

Ms. Claudia Cooney
Historian
AKRF, Inc. Environmental Consultants
117 East 29th Street
New York, New York 10016-8022

RE: MTA/LIRR East Side Access Project
95PR1757

Dear Claudia:

Thank you for providing the additional information requested in my letter of January 12, 2000. I have reviewed the information you submitted in accordance with the provisions of Section 106 of the National Historic Preservation Act of 1966.

Based on the documentation provided, the following properties appear to meet the criteria for inclusion in the National Register of Historic Places:

- Barclay Hotel (present Hotel Intercontinental) at 111 East 48th Street, Manhattan.
- New York Central Building (present Helmsley Building), 230 Park Avenue, Manhattan.
- Postum Building at 250 Park Avenue, Manhattan.
- Roosevelt Hotel at 45 East 45th Street, Manhattan.
- Seagram Building at 375 Park Avenue, Manhattan.
- Waldorf-Astoria Hotel and Tower at 301-319 Park Avenue, Manhattan.

If you have any questions concerning these determinations please contact me at (518) 237-8643, extension 3266. When responding please be sure to refer to the project review (PR) number noted above. Thanks for such a thorough submittal.

Sincerely,

Kathleen A Howe

Kathleen A. Howe
Historic Preservation Specialist

cc: Gina Santucci, NYCLPC ✓

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Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 2/4/00 STAFF: Kathy Howe

PROPERTY: Barclay Hotel (former) MCD: Manhattan

(present Hotel Intercontinental)

ADDRESS: 111 East 48th Street COUNTY: New York

PROJECT REF: 95 PR 1757 USN: 06101.010694

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The former Barclay Hotel (present Hotel Intercontinental) bounded by Lexington Avenue, Park Lane (now closed off as a service road), East 48th and 49th Streets, was built in 1927 to the design of Cross & Cross. It is architecturally significant under Criterion C as an example of a Renaissance Revival style hotel. The H-shaped buff-colored brick clad building sits on a two-story granite and limestone base. Renaissance elements include the rusticated stonework; the balustrade; beltcourses; attic story with decorative shields and panels; and modillioned cornice. The building appears to retain a relatively high degree of period integrity including significant interior elements.

The Barclay was built as an apartment hotel, a building type which became popular in New York City in the 1920s. The apartment hotel catered to both transient and permanent residents who wanted the luxury of housekeeping services provided by a hotel and the option to cook their own food in their apartments. Height restrictions imposed by the Tenement House Law on apartment houses made the construction of the apartment hotel profitable enterprise, since zoning permitted a greater height for hotel buildings than the typical "housekeeping" apartment house.

The building is historically significant under Criterion A for its association with Terminal City, a planned commercial district built over the Grand Central Terminal (GCT) track network. It was one of 23 buildings erected over the GCT track network. The New York Central and Hudson River Railroad Company raised revenues for the construction of the GCT through the selling and leasing of air rights above the tracks to allow for the construction of revenue-producing offices and hotels. The area, known as Terminal city, was a progressive attempt at creating a planned business district within the city on such an ambitious scale and with an integrated design – it remained unmatched until the design and construction of Rockefeller Center (1931-40).

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 2/4/00 STAFF: Kathy Howe

PROPERTY: New York Central Building MCD: Manhattan
(now Helmsley Building)

ADDRESS: 230 Park Avenue COUNTY: New York

PROJECT REF: 95PR1757 USN: 06101.010697

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The New York Central Building (now Helmsley Building) at 230 Park Avenue, just north of Grand Central Terminal, was built in 1927-29 by architects Warren & Wetmore as part of the planned enclave known as Terminal City. The building is significant under Criterion A in the area of city planning and development as part of one of the finest legacies of the City Beautiful Movement in New York. It meets Criterion C as an outstanding example of a Beaux-Arts style skyscraper. The 34-story building consists of a three-story base clad in Indiana limestone and Texas pink granite; an 11-story office block clad in buff-colored brick; and a slender office tower above. Of special interest are the lobby and vestibules which have remained substantially intact.

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The design of the building, constructed over double-level railroad tracks, is an extraordinary engineering achievement of the period.

> The New York Central Building was the linchpin of the Terminal City complex of hotels and office buildings sponsored by the New York Central Railroad. Designed by the same architects responsible for the exterior of the railroad terminal, this tower once dominated Park Avenue and the surrounding Midtown business district with its distinctive design and monumental pyramidal roof capped by an ornate cupola. The impressive lobby, planned as a corridor connecting East 45th and 46th Streets, echoes the magnificence of the exterior. The building's design and ornamentation celebrate the prowess of the New York Central Railroad, which had its headquarters on the premises.[1]

The building has a high degree of period integrity and remains one of the most recognizable skyscrapers in New York. It was designated a local landmark by the NYC Landmarks Preservation Commission in 1987.[2]

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

---

[1] Andrew Dolkart *Guide to New York City Landmarks* (New York: New York City Landmarks Preservation Commission), p. 97

[2] See NYC Landmarks Preservation Commission's designation reports on the New York Central Building, March 31, 1987. The LPC designated the exterior as well as the main floor interior.

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NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 2/4/00 STAFF: Kathy Howe

PROPERTY: Postum Building MCD: Manhattan

ADDRESS: 250 Park Avenue COUNTY: New York

PROJECT REF: 95 PR 1757 USN: 06101.010693

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Postum Building, bounded by Park and Vanderbilt Avenues between East 46th and 47th Streets in Manhattan, was built in 1924 to the design of Cross & Cross. It is architecturally significant under Criterion C as an example of a classical inspired office tower. The U-shaped brick building has a three-story limestone base. The contrasting colored brick sections help to define the vertical components of the building. Classical ornamentation includes decorative panels, swags, engaged columns, balustrades, and a denticulated cornice. The building retains much of its historic fabric and design although some alterations have been made including the replacement of the windows in the upper stories and enlargements of some window openings at the base.

The building is historically significant under Criterion A for its association with Terminal City, a planned commercial district built over the Grand Central Terminal (GCT) track network. It was one of 23 buildings erected over the GCT track network. The New York Central and Hudson River Railroad Company raised revenues for the construction of the GCT through the selling and leasing of air rights above the tracks to allow for the construction of revenue-producing offices and hotels. The area, known as Terminal city, was a progressive attempt at creating a planned business district within the city on such an ambitious scale and with an integrated design – it remained unmatched until the design and construction of Rockefeller Center (1931-40).

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 2/4/00 STAFF: Kathy Howe

PROPERTY: Roosevelt Hotel MCD: Manhattan

ADDRESS: 45 East 45th Street COUNTY: New York

PROJECT REF: 95 PR 1757 USN: 06101.010692

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Roosevelt Hotel, bounded by East 45th and 46th Streets and Madison and Vanderbilt Avenues in Manhattan, was completed in 1924 by noted New York architect George B. Post & Sons. The Roosevelt Hotel is significant under Criterion C as a fine example of the Italian Renaissance style as illustrated by the use of classical elements including the rusticated stone base with rusticated quoins; use of arcading; balustrades; denticulated cornice; arched pediments (at fifth story windows); and the articulation of the three-story attic with rusticated quoins, detailed string course, stone window surrounds, and prominent bracketed cornice. The interior, designed by Lyman W. Cleveland and George B. Post, is notable for its Adamesque and Federal inspired ornamentation. The hotel retains a relatively high degree of period integrity

The Roosevelt Hotel was the first large-scale hotel building constructed in accordance with New York City's 1916 zoning law, thus establishing its form and geometry as a standard for much of the large-scale hotel construction which predominated in New York City before the Depression.

The building is historically significant under Criterion A for its association with Terminal City, a planned commercial district built over the Grand Central Terminal (GCT) track network. It was one of 23 building erected over the GCT track network. The New York Central and Hudson River Railroad Company raised revenues for the construction of the GCT through the selling and leasing of air rights above the tracks to allow for the construction of revenue-producing offices and hotels. The area, known as Terminal City, was a progressive attempt at creating a planned business district within the city on such an ambitious scale and with an integrated design – it remained unmatched until the design and construction of Rockefeller Center (1931-40).

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

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NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 2/4/00 STAFF: Kathy Howe

PROPERTY: Seagram Building MCD: Manhattan

ADDRESS: 375 Park Avenue COUNTY: New York

PROJECT REF: 95 PR 1757 USN: 06101.010696

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☐ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☐ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Seagram Building at 375 Park Avenue is exceptionally significant under Criterion C as a seminal example of the International Style which has inspired the work of many twentieth-century architects. It was designed in 1954-55 by architectural master Ludwig Mies van der Rohe, with Philip Johnson and Kahn & Jacobs, and constructed in 1956-58. It is Mies's only building in New York City and considered to be the greatest of the International Style skyscrapers erected in the postwar era, when this style became a symbol of corporate America. The juxtaposition of the extruded bronze frame with the rectangular bronze spandrels and transparent glass surfaces of the curtain wall creates the tight geometry and the contrast

between solid and void that typify the International Style.[1] The granite and marble plaza is inherently bound to the design of the tower.

The design of the interior is also of exceptional significance as shown by the fine materials and careful detailing in the lobby and in the Four Seasons Restaurant interior, designed by Philip Johnson. The lobby has travertine walls and floor, bronze mullions, and elevator cabs with stainless steel and bronze mesh panels. The restaurant interior has an array of rich materials such as bronze, white Carrara and travertine marbles, French walnut and ebonized oak, and anondized aluminum.

The Seagram Building retains an exceptionally high degree of period integrity. It was designated a local landmark by the NYC Landmarks Preservation Commission in 1989.[2]

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

---

[1] See Andrew S. Dolkart *Guide to New York City Landmarks* (New York: New York City Landmarks Preservation Commission, 1998), pp. 99-100.

[2] See LPC designation reports on the Seagram Building, October 3, 1989.

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NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RESOURCE EVALUATION

DATE: 2/4/00 STAFF: Kathy Howe

PROPERTY: Waldorf-Astoria Hotel and Tower MCD: Manhattan

ADDRESS: 301-319 Park Avenue COUNTY: New York

(aka 538-556 Lexington Avenue)

PROJECT REF: 95PR1757 USN: 06101.008326

I. ☐ Property is individually listed on SR/NR:
name of listing:

☐ Property is a contributing component of a SR/NR district:
name of district:

II. ☒ Property meets eligibility criteria.

☐ Property contributes to a district which appears to meet eligibility criteria.

Pre SRB: ☒ Post SRB: ☐ SRB date

Criteria for Inclusion in the National Register:

A. ☒ Associated with events that have made a significant contribution to the broad patterns of our history;

B. ☒ Associated with the lives of persons significant in our past;

C. ☒ Embodies the distinctive characteristics of a type, period or method of construction; or represents the work of a master; or possess high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction;

D. ☐ Have yielded, or may be likely to yield information important in prehistory or history.

STATEMENT OF SIGNIFICANCE:

The Waldorf-Astoria Hotel and Towers at 301-319 Park Avenue was built in 1929 by Lloyd Morgan of the firm of Schultze & Weaver. The building meets Criterion C as an outstanding intact example of the Art Deco style. The twin-towered skyscraper has a gray limestone base with matching brick above, vertical rows of windows and modernistic spandrels, and bronze entryways, marquees, lanterns, and other ornament. The Waldorf-Astoria was built as part of the major commercial redevelopment of Park Avenue north of Grand Central Terminal as a district of skyscraper office buildings. The building was novel at the time for combining a residential tower included in but separate from the transient hotel.

The Waldorf-Astoria may also be significant under Criterion A for its association with the social history of New York. It may also meet Criterion B as the home of some of the world's most famous figures, including presidents, kings, and other prominent individuals. Tower residents have included the Duke and Duchess of Windsor, General Douglas MacArthur, former President Herbert Hoover, William Randolph Hearst, Jr., Cole Porter, and Henry Cabot Lodge.

The modernistic twin towers of the Waldorf-Astoria still form a very visible part of the skyline of midtown Manhattan. Though the interior has undergone alterations, the exterior has changed little over the decades and retains a relatively high degree of period integrity. The Waldorf-Astoria Hotel was designated a local landmark by the NYC Landmarks Preservation Commission in 1993.[1]

If you have any questions concerning this Determination of Eligibility, please call Kathy Howe at (518) 237-8643, ext. 3266.

[1] See Anthony W. Robins designation report on the Waldort-Astoria Hotel, January 5, 1993.

HISTORICAL PERSPECTIVES INC.

April 5, 2000

Kathleen A. Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island
P.O. Box 189
Waterford, NY 12188-0189

Re: MTA/Long Island Rail Road East Side Access Project
Highbridge Yard Archaeological Assessment
Historic Period Archaeological Resources

Dear Ms. Howe:

The Stage 1A Archaeological Assessment prepared for the MTA/LIRR East Side Access Project (December 29, 1999) for Highbridge Yard in the Bronx (Section 4.0) documented about 37 potential historical structures and features which formerly stood within the Highbridge Yard project area. Most of these were related to the site's use as a rail yard, and none predate 1879. In fact, most of the buildings which formerly stood on the property date to the early 20th century, and stood for less than four decades. Because of the project's potential subsurface construction impacts to the locations of these former structures, it is proposed that a topic intensive study on the development of the entire yard be undertaken to determine the research value and potential significance of the potential resources, as follows.

The topic intensive study would provide a detailed historical record of the yard's development, utilizing available cartographic and documentary sources. Early railroad and engineering records would be sought, and informant interviews would be pursued. It is anticipated that such a study would reveal information on the yard itself and its role within the greater railroad system. A comprehensive report will be completed detailing the yard's evolution over the last century and how these physical changes reflected economic and technological fluctuations through time.

In addition to this historical documentation, the archaeological research potential of each resource type would be further explored. It may be that some identified resources would provide little information through archaeological investigations, or could better be researched through the documentary record. For example, archaeological investigations on early 20th century coal sheds and

sand storage areas may provide little information of historical significance. Through this process, some resource types may be carried forward for further study while others may be eliminated.

However, if some resource types are determined to have the potential to archaeologically address significant research issues, they will be carried forward to another stage of investigation. This could include Stage 1B subsurface investigations to determine resource integrity, defined as whether they have remained undisturbed and still have the ability to address the research questions formulated through the topic intensive study. It is expected that most buildings were dismantled and their contents removed prior to razing, and that in some cases all that archaeologically remains are the footprints of former structures which have little research potential. At this stage, standing structures, such as signage and signaling equipment, would be documented and assessed for research potential as well.

Please advise if you concur with the above proposed methodology. Your comments will be incorporated as an addendum to the Stage 1A Archaeological Assessment and the corresponding Archaeological Resources chapter of the Draft Environmental Impact Statement will be revised accordingly.

Sincerely,

Faline Schneiderman-Fox

Faline Schneiderman-Fox, RPA
Project Director, HPI

Allee
King
Rosen &
Fleming, Inc.

Environmental and Planning Consultants
117 East 29th Street • New York, New York 10016-8022

TEL: 212/696-0670
FAX: 212/213-3191

File No: 00.6021.0419

April 19, 2000

Ms. Kathleen Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island
Delaware Avenue
Cohoes, NY 12047

Re: **MTA/Long Island Rail Road East Side Access Project**
New York, Bronx, Queens, Nassau, Suffolk Counties
95PR1757

Dear Kathy:

Enclosed for your review is the Archaeological Resources chapter of the Preliminary Draft Environmental Impact Statement (PDEIS) for the MTA/LIRR East Side Access Project. This chapter was revised to reflect the comments of the FTA. Revisions are indicated by double underlining. Also enclosed are the addenda to the Stage 1A Archaeological Assessment. I believe that you discussed these with Claudia.

I have enclosed two additional copies of both the PDEIS Archaeological Resources chapter and the addenda. Please forward one set of each to Bob Kuhn and Julian Adams for their review in preparation of our Programmatic Agreement meeting on April 26th. I am also forwarding a copy of the Archaeological Resources chapter to Jim Warren under separate cover.

Thank you for your assistance. If you have any questions, please contact me at 212-340-9748 or Julie Cowing at 212-340-9733.

Sincerely,

AKRF, Inc.

Susan De Vries
Historian

cc:
Pamela Burford, Long Island Rail Road
Audrey Heffernan, East Side Access Project
Julie Cowing, AKRF, Inc.

Allee
King
Rosen &
Fleming, Inc.

Environmental and Planning Consultants
117 East 29th Street • New York, New York 10016-8022

TEL: 212/696-0670
FAX: 212/213-3191

File No: 00.6021.0419

July 17, 2000

Ms. Kathleen Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island
Delaware Avenue
Cohoes, NY 12047

Re: **MTA/Long Island Rail Road East Side Access Project**
New York, Bronx, Queens, Nassau, Suffolk Counties
95PR1757

Dear Kathy:

Enclosed for your review is the addendum to the Stage 1A Archaeological Assessment. The addenda reflects the extended APE for Yard A. I have enclosed three additional copies of the addenda. Please forward one to Bob Kuhn, Julian Adams, and Jim Warren for their review.

Thank you for your assistance. If you have any questions, please contact me at 212-340-9748 or Julie Cowing at 212-340-9733.

Sincerely,

AKRF, Inc.

Susan De Vries
Historian

cc:

Pamela Burford, Long Island Rail Road
Audrey Heffernan, East Side Access Project
Julie Cowing, AKRF, Inc.

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE

Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

August 4, 2000

Julie Cowing, AICP
Vice President
AKRF, Inc.
117 East 29th Street
New York, New York 10016-8022

Re: FTA - MTA East Side Access
Long Island Yards
Suffolk & Nassau Counties
95PR1757

Dear Ms. Cowing:

Thank you for your letter of May 4, 2000 providing additional documentation of several sites now under consideration as new or expanded overnight storage yards for Long Island Rail Road rolling stock. As the State Historic Preservation Office (SHPO), we have reviewed this and previously submitted material in accordance with Section 106 of the National Historic Preservation Act of 1966 and the relevant implementing regulations as part of our continuing evaluation of the East Side Access project.

Based on the information provided and on information in our files, we concur with the identified areas of potential effect for the proposed yard sites and with your assessment that yard construction at the proposed Hazeltine, Cerro Wire, Riverhead, Ronkonkoma and Babylon locations will not impact historic above-ground resources.

National Register of Historic Places eligible resources have been identified at the proposed Pilgrim Hospital site and may be impacted if this site is developed. The National Register listed Almhouse Barn at the former Suffolk County Farm, Yaphank, is in the vicinity of the proposed Yaphank East and Yaphank West yard sites; based on the distance between yard sites and the Almshouse and on intervening modern construction, it is the SHPO opinion that development of the Yaphank sites will not adversely impact this historic property.

We look forward to further consultation regarding archeological or other project impacts when final sites for yard expansion have been selected. If you have any questions regarding our review of proposed Long Island yard sites, please call me at (518) 237-8643, extension 3283. Please refer to the project number (PR) above in any correspondence.

Sincerely,

James Warren

James Warren
Historic Preservation
Program Analyst

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NEW YORK STATE

Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

August 8, 2000

Susan De Vries
Historian
Allee King Rosen & Fleming, Inc.
117 East 29th Street
New York, New York 10016-8022

Dear Ms. DeVries:

Re: FTA/MTA
LIRR East Side Access
Manhattan/Brooklyn/Queens
New York/Kings/Queens Counties
95PR1757

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the Stage 1A Archaeological Assessment Addenda for the MTA/Long Island Rail Road East Side Access Project in accordance with Section 106 of the National Historic Preservation Act of 1966 and the relevant implementing regulations.

The Addenda concludes that the Arch Street yard section of the APE is considered to have a low potential for archeology and that no further study is recommended for this part of the APE. The SHPO concurs with this conclusion.

When responding please be sure to refer to the SHPO project review (PR) number noted above. If you have any questions, please feel free to call me at (518) 237-8643 ext. 3255.

Sincerely,

Robert D. Kuhn
Assistant Director

RDK:bsd

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RECEIVE
AUG 14 2000
cc: A. Heffernan.

THE CITY OF NEW YORK LANDMARKS PRESERVATION COMMISSION
100 Old Slip, New York, NY 10005 (212) 487-6800

ENVIRONMENTAL REVIEW

MTA/SEQRA-Y — PROJECT NUMBER
05/22/00 — DATE RECEIVED

PROJECT MTA/LIRR EAST SIDE ACCESS

[ ] No architectural significance

[ ] No archaeological significance

w/in project area

[X] Designated New York City Landmark or Within Designated Historic District

[X] Listed on National Register of Historic Places

[ ] Appears to be eligible for National Register Listing and/or New York City Landmark Designation

[X] May be archaeologically significant; requesting additional materials

COMMENTS

Comments for May, 2000 DEIS are as follows. (Archaeology review under separate cover (attached). The SHPO is lead agency for architectural review. LPC will consult with the SHPO with regard to their findings for this project. The DEIS text appears adequate for architecture. Any work on New York City designated landmark properties requires a permit from the LPC preservation department.

cc: SHPO

Gregory Sanders — SIGNATURE
08/03/00 — DATE

THE CITY OF NEW YORK LANDMARKS PRESERVATION COMMISSION
100 Old Slip, New York, NY 10005 (212) 487-6800

ENVIRONMENTAL REVIEW

MTA/SEQRA-Y — PROJECT NUMBER
05/22/00 — DATE RECEIVED

PROJECT MTA/LIRR EAST SIDE ACCESS

[ ] No architectural significance

[ ] No archaeological significance

[X] Designated New York City Landmark or Within Designated Historic District

[X] Listed on National Register of Historic Places

within project study area

[ ] Appears to be eligible for National Register Listing and/or New York City Landmark Designation

[X] May be archaeologically significant; requesting additional materials

DEIS, 5/2000

COMMENTS The SHPO is the lead agency for archaeological review. LPC will consult with the SHPO with regard to their findings for this project.

SIGNATURE

05/26/00
DATE

Cc: SHPO

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

Letter No.: 00.4030.0915
Reply Requested: Yes

September 15, 2000

Ms. Kathleen A. Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

Re: **MTA/Long Island Rail Road East Side Access Project**
Highbridge Yard, Bronx County
95PR1757

Dear Kathy:

Enclosed for your review is the Archaeological Resource Evaluation Topic Intensive Study of Highbridge Yard. As proposed in Historical Perspectives, Inc.'s April 5, 2000 proposal letter to you, and as approved by Bob Kuhn, this report assesses the potential significance of historic-period archaeological resources at Highbridge Yard identified in the Stage 1A Documentary Study prepared for the East Side Access Project on December 29, 1999.

I will call you within the next few weeks to discuss the report. In the meantime, please let me know if you have any questions at (212) 340-9745.

Sincerely,

AKRF, INC.

Claudia Cooney/jpc

Claudia Cooney
Historian

cc: Audrey Heffernan, Bechtel/URS Greiner
Julia Cowing, AKRF, Inc.
File

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

October 5, 2000

Claudia Cooney
Historian
AKRF, Inc.
117 East 29th Street
New York, New York 10016-8022

Dear Ms. Cooney:

Re: FTA/MTA
LIRR East Side Access
Manhattan/Brooklyn/Queens
New York/Kings/Queens Counties
95PR1757

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the Archaeological Resource Evaluation Report for Highbridge Yard in accordance with Section 106 of the National Historic Preservation Act of 1966 and the relevant implementing regulations.

Based upon this review, the SHPO concurs with the recommendations and conclusions of the report. The SHPO has no archeological concerns regarding Highbridge Yard and does not recommend archeological testing.

When responding please be sure to refer to the SHPO project review (PR) number noted above. If you have any questions, please feel free to call me at (518) 237-8643 ext. 3255.

Sincerely,

Robert D. Kuhn
Assistant Director

RDK:bsd

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ARCHEOLOGY COMMENTS

95PR1757

Based upon a review of the April 3, 2000 Addendum Archaeological Assessment for the Highbridge Yard the Office of Parks, Recreation and Historic Preservation (OPRHP) concurs with the archeological recommendations of the report. OPRHP has no concerns regarding potential project impacts on archeological resources within the Highbridge Yard project area.

If you have any questions concerning archeology, please call Robert Kuhn at (518) 237-8643 ext. 3255.

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

File No. 00.6021.1101
Response Requested: Yes

November 1, 2000

Kathleen A. Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island, P.O. Box 189
Waterford, NY 12188-0189

RE: MTA/Long Island Railroad East Side Access Project
Queens County
95PR1757

Dear Kathy:

Enclosed for your review is the Fresh Pond Yard Prehistoric Resources Addendum to the *MTA/Long Island Rail Road East Side Access Project Stage 1A Archaeological Assessment* of December 29, 1999.

This addendum reflects changes to the assessment of potential archaeological sensitivity stated in Section 8.0 of the Stage 1A, based on two sets of soil borings that were completed in Fresh Pond Yard in May and June 2000 subsequent to the preparation of the original Stage 1A. As indicated in the attached addendum, the borings indicate that there is no potential for prehistoric resources to be present at Fresh Pond Yard (potential-historic period resources were assessed in the original Stage 1A).

I have enclosed two copies of the addenda, one for you and one for Bob Kuhn.

Thank you for your assistance. If you have any questions, please contact me at (212) 340-9745.

Sincerely,

AKRF, Inc.

Claudia Cooney
Historian

cc: Pamela Burford, Long Island Rail Road
Audrey Heffernan, East Side Access Project
Julie Cowing, AKRF, Inc.
File

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

November 17, 2000

Claudia Cooney
Historian
AKRF, Inc.
117 East 29th Street
New York, New York 10016-8022

Dear Ms. Cooney:

Re: FTA/MTA
LIRR East Side Access
Manhattan/Brooklyn/Queens,
New York/Kings/Queens Counties
00PR4431/Also 95PR1757

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the Addendum Stage 1A Archaeological Assessment for the Fresh Pond Yard in accordance with Section 106 of the National Historic Preservation Act of 1966 and the relevant implementing regulations.

Based upon this review, the SHPO concurs with the conclusions of the assessment. We have no concerns regarding project impacts to prehistoric resources at the Fresh Pond Yard, since the potential for intact prehistoric resources is low.

When responding please be sure to refer to the SHPO project review (PR) number noted above. If you have any questions, please feel free to call me at (518) 237-8643 ext. 3255.

Sincerely,

Robert D. Kuhn
Assistant Director

RDK:bsd

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OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

December 11, 2000

Claudia Cooney
Allee King Rosen & Fleming, Inc.
117 East 29th Street
New York, New York 10016

Dear Mr. Cooney:

Re: FTA/MTA
LIRR East Side Access
Manhattan/Brooklyn/Queens,
New York/Kings/Queens Counties
00PR4431

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). In order to clarify the SHPO position regarding a number of Stage 1A Archaeological Assessment Addenda submissions, we have reviewed the project in accordance with Section 106 of the National Historic Preservation Act of 1966 and the relevant implementing regulations.

Based upon this review, the SHPO approves the Stage 1A Archaeological Assessment Addendum submitted on February 28, 2000, March 24, 2000, and March 29, 2000.

When responding please be sure to refer to the SHPO project review (PR) number noted above. If you have any questions, please feel free to call me at (518) 237-8643 ext. 3255.

Sincerely,

Robert D. Kuhn
Assistant Director

RDK:bsd

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AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

January 24, 2001

Kathleen A. Howe
Historic Preservation Specialist
New York State Office of Parks, Recreation and Historic Preservation
Bureau of Historic Preservation
Peebles Island, Delaware Avenue
Cohoes, NY 12047

RE: MTA/LIRR East Side Access Project
New York, Bronx, Queens, Nassau, Suffolk Counties
95PR1757

Dear Kathy:

Enclosed are two addenda—one for East 55th Street in Manhattan and the other for Roosevelt Island—to the *Stage 1A Archaeological Assessment* prepared in December 1999 for the East Side Access Project. They refer respectively to Section 2.0 *Manhattan Archaeological Resources Evaluation* and *Section 5.0 Roosevelt Island Resource Evaluation* of that report. I have enclosed two copies of each addendum so that you may forward a set to Bob Kuhn for his review.

Thank you for your assistance. Please let me know if you have any questions at (212) 340-9745.

Sincerely,

AKRF, INC.

Claudia Cooney
Historian

cc: Pamela Burford, Long Island Rail Road
Audrey Heffernan, East Side Access Project
Julie Cowing, AKRF, Inc.
File

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

February 16, 2001

Claudia Cooney
Historian
AKRF, Inc.
Environmental Consultants
117 East 29th Street
New York, New York 10016-8022

Dear Ms. Cooney:

Re: FTA/MTA
LIRR East Side Access
Manhattan/Brooklyn/Queens
New York/Kings/Queens
00PR4431/97PR1757

Thank you for requesting the comments of the State Historic Preservation Office (SHPO). We have reviewed the two Stage 1A addenda for the MTA/LIRR East Side Access Project in accordance with Section 106 of the National Historic Preservation Act of 1966 and the relevant implementing regulations.

Based upon this review, we concur with the recommendations of the assessments. Therefore, no additional archeological investigations are warranted for the East 55th Street project area in Manhattan, or the Roosevelt Island project area.

When responding please be sure to refer to the SHPO project review (PR) number noted above. If you have any questions, please feel free to call me at (518) 237-8643 ext. 3255.

Sincerely,

Robert D. Kuhn
Assistant Director

RDK:bsd

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Appendix C: Ridership Forecasting Results Report

LIRR East Side Access Project
Final Environmental Impact Statement

Ridership Forecasting Results Report

July 13, 1999

Submitted by:

KPMG LLP

MTA Long Island Rail Road

Version 1.1

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1. INTRODUCTION

This report documents the results of the ridership forecasting process for the Long Island Rail Road East Side Access (LIRR ESA) Draft Environmental Impact Statement (DEIS). The ridership forecasting procedures for the LIRR ESA DEIS are based process embodied in the Metropolitan Transportation Authority Regional Transit Forecasting (MTA RTF) Model. This model was developed as part of the LIRR DEIS project and other on-going MTA transit development projects in the region. The model is a modified 4-step model with trip generation and distribution replaced by a Census/Survey-derived trip table. The model is based on the following sources of information:

- MTA 1995 and 2020 transit networks
- New York City Transit (NYCT) 1995 and 2020 transit networks (inside New York City)
- New York Metropolitan Transportation Council (NYMTC) Interim Analysis Method highway networks and congested speeds
- New York Metropolitan Transportation Council (NYMTC) adopted couny-level forecasts of population, employment, and journey-to-work.
- Sub-county forecasts of population and employment developed by Allee King Rosen and Fleming for Manhattan, Long Island City, and the Brooklyn CBD
- MTA forecasts of sub-county population and employment (elsewhere)
- Mode choice procedures originally developed by KPMG for NJ TRANSIT and customized for the East-of-Hudson market using stated preference research conducted by MVA Consultancy for the Lower Manhattan Access Study
- Transit Network assignment procedures calibrated to match observed travel patterns

A summary of the ridership forecasting methodology is presented in Chapter 2 of this report.

These ridership forecasting procedures were used to study the following alternatives:

- **Future Year No-Build.** The no-build represents the future condition assuming that the LIRR-to-Grand Central project is not-built. It does include the existing and committed projects that will occur between the model base year (1995) and the forecast years (2010 and 2020). Selected key projects that are assumed to exist in the No-Build include NYCT's Queens Boulevard Connection to the 63rd Street Tunnel, the LIRR Dual-Mode Program, and the LIRR Penn 42 Program.
- **Future Year TSM.** The TSM project was defined as part of the LIRR East Side Access Major Investment Study. It includes LIRR passenger capacity improvements, increased service to Hunterspoint Avenue, and extension of the existing (in-bound only) contra-flow bus lanes on the Long Island Expressway.
- **Future Year LIRR-to-Grand Central Terminal Build.** The build project involves construction of the LIRR East Side Access Project to Grand Central Terminal. In this alternative, 24 trains in the AM Peak Hour are operated to Grand Central. Service to Penn Station is reduced from 42 peak hour trains in the No-Build to 37 trains. This alternative also includes the construction of a new LIRR passenger station at Sunnyside Yard in Queens.

The definition of each alternative is defined in Chapter 3 of this report.

Chapters 4 and 5 present an overview of the results of the ridership forecasting methodology. Chapter 4 presents the results for the different 2010 alternatives and Chapter 5 presents an overview of the different 2020 alternatives.

Chapter 6 presents an assessment of the risks associated with the forecast. This chapter discusses what is how changes to the assumptions affect the forecasted outcomes. It also includes a discussion of how the key results from the model (i.e., LIRR-to-GCT patronage) have been assessed for reasonableness.

The appendix to this report include detailed tables of results including station volumes, station access vehicle trips, station parking demand, and impacts on NYCT services.

2. DEMAND FORECASTING METHODOLOGY

This chapter provides an brief description of the travel demand forecasting methodology used to prepare forecasts for the Long Island Rail Road East Side Access (LIRR ESA) Draft Environmental Impact Statement (DEIS). The methodology is based on a model that was jointly developed for the LIRR ESA DEIS project in conjunction with other on-going regional transit projects, most notably the Metropolitan Transportation Authority (MTA) Lower Manhattan Access Study (LMAS). The resulting model has been designated as the Metropolitan Transportation Authority Regional Transit Forecasting (MTA RTF) Model and will also be used to analyze the ridership implications associated with other ongoing Long-Range Planning Framework projects including:

- MTA Lower Manhattan Access Study
- Port Authority of NY and NJ/MTA/NJ Transit Access to the Region's Core (ARC) Phase 3 (East-of-Hudson)
- Metro-North Railroad (MNR) Penn Station Access Project

A more complete discussion of the methodology appears in *Metropolitan Transportation Authority Regional Transit Forecasting Model Methods Report* dated June 10, 1999. This chapter describes the key elements of the model to assist the reader in interpreting the forecasts that appear later in this document.

2.1 Overview of Demand Forecasting Methodology

The ridership forecasting methodology for the LIRR ESA DEIS is based on the data and models developed as part of the Metropolitan Transportation Authority Long-Range Planning Framework. It represents the synthesis of three different elements of the framework:

- **Long Island Rail Road East Side Access Major Investment Study (LIRR ESA MIS)/Access to the Region's Core (ARC) Model.** The basic design and programming for the MTA RTF Model is based on the model originally developed for the East Side Access Major Investment Study Project and also applied for the Access to the Region's Core Project. Much of the model data relating to suburban conditions is also obtained from this model.

- **New York City Transit Manhattan East Side Alternatives (MESA) Project.** The MTA RTF Model borrows New York City-specific data and procedures from MESA—an ongoing effort to improve subway and other transit services on Manhattan's East Side. In particular, the networks and New York City Transit validation data have been updated to be consistent with the most recent information from the MESA model. Furthermore, information on the sub-county distribution of population and employment in Manhattan for the MTA RTF model have been developed from an updated version of the forecasts originally developed by AKRF for the MESA project.

- **Metropolitan Transportation Authority Long-Range Travel Forecast Study (MTA LRTFS).** Regional population, household, and employment data (outside Manhattan) at a detailed sub-county level have been developed from the MTA LRTFS. This information is used to project changes in the overall demand for travel beyond the model's 1995 base.

The MTA RTF Model is similar in functional design to a conventional four-step demand forecasting model. In the traditional model, the four steps are defined as:

1. **Trip Generation.** Determine the number of total person trips produced in and attracted to each geographic area (zone) in the region.

2. **Trip Distribution.** Link trip productions (the home end of a trip) to trip attractions (the non-home end) to develop a zone-to-zone table of travel. This table projects the total demand (or total market) for travel via all modes between every combination of zones in the region.

3. **Mode Choice.** Determine the mode of travel (e.g., automobile versus transit) and transit sub-modes (e.g., commuter rail, subway, or bus). This sub-model projects the mode (or market) share for each travel mode in the region. This share is determined for each zone-to-zone combination in the region based on the characteristics of each travel mode and the characteristics of the users.

4. **Assignment.** Determine the travel path (e.g., which highways or trains) are used. This is done separately for each submode estimated in mode choice. The choice of path is based on a weighted combination of travel time, out-of-vehicle time, fare, transfers, and congestion.

To better represent the potential demand for transit, the MTA RTF Model bypasses the first two steps of the four-step model and substitutes an alternative survey- and Census-based approach for developing person trip tables. This survey/Census approach has been used for the MTA RTF Model (and for most other transit models in the region) since traditional trip generation/distribution models typically do a relatively poor job of replicating observed zone-to-zone travel demand patterns. Knowledge of actual zone-to-zone travel patterns is particularly important for transit planning since customers are sensitive to the availability of direct transit services with a minimum of transfers. To be able to guide the design of the most effective transit services, models must replicate, as closely as possible, the true origin and destination of travel. Experience in the New York metropolitan area has shown that survey- and Census-derived trip tables are most effective for representing these travel patterns.

The utilization of survey/Census-derived person trip tables rather than trip generation and distribution models means that an alternative approach is required for developing projections of total travel demand for the forecast years. In the MTA RTF Model, the forecast year person trip tables are developed by factoring (or "growing") the base year person trip table based on the relative growth in population, households, employment, and journey-to-work travel in each portion of the metropolitan area.

2.2 Travel Markets

The MTA RTF Model represents most regional travel in the New York Metropolitan area and, in particular, is designed to estimate trips for the following markets:

1. LIRR and MNR Commuters to Manhattan

2. NYCT Subway and Bus customers, particularly those attracted to destinations in Manhattan

3. Automobile travelers from the New York and Connecticut portions of the region to Manhattan who currently choose not to use the transit because the locations of the city terminals (Grand Central, Penn Station, Hunterspoint, Long Island City, or Flatbush Avenue) are not convenient to the traveler's trip origin or destination or because the connections to their destination are inconvenient.

4. Transit customers from New Jersey to Manhattan

The major trip purposes to be considered include:

- Home-based work
- Home-based other
- Non-home-based

The data and procedures used to develop these projections do not include:

1. Air travelers with a place residence outside of the New York portion of the New York metropolitan area.
2. Automobile travelers to or from New Jersey.
3. Trips or travel that is made entirely by non-motorized forms of transportation or entirely by taxi.

Because air travelers may have some impact on the regional commuter rail system particularly after the construction of the JFK LRS system connecting Kennedy Airport to the LIRR at Jamaica, and because forecasts are now being prepared for this system as part of the ongoing MTA One-Seat Ride project, these passengers will be manually assigned to the LIRR system as a post-model activity.

2.3 Geographic Area System

The geographic area system for the MTA RTF Model consists of the entire MTA service area and includes all of the following counties:

- **New York State**
  - New York (Manhattan)
  - Bronx
  - Kings (Brooklyn)
  - Queens
  - Richmond (Staten Island)
  - Nassau
  - Suffolk
  - Westchester
  - Putnam
  - Dutchess
  - Rockland
  - Orange
- **Connecticut**
  - Fairfield
  - New Haven
  - Litchfield

Geographic subdivisions are as follows:

- MESA zones (tracts and selected sub-tract subdivisions) in Manhattan
- Census Tracts in Nassau, Suffolk, and Fairfield Counties

- Aggregated Census Tracts mostly based on NYMTC Traffic Analysis Zones in Bronx, Brooklyn, Queens, and Westchester Counties
- Port Authority of NY and NJ/NJ Transit zones in Richmond, Orange, and Rockland Counties
- Minor Civil Divisions in Putnam and Dutchess Counties
- Counties for New Haven and Litchfield Counties

2.4 Highway Networks

The regional highway system is characterized using a network representation of all expressways, parkways, and arterial roadways in the geographic area described above. Highway networks representing peak congested conditions in 1990, 1996, 2015, and 2020 were obtained from the Interim Analysis Methods model developed by Parsons Brinckerhoff for the New York Metropolitan Transportation Council.

Congested speeds for that network are a combination of:

- PPAQ (Post Processor for Air Quality) estimated travel speeds (expressway and arterial links) and
- TRANPLAN congested speeds (for all other links).

Since PPAQ speeds were available for 1990 and 2015 only, 1990 speeds were posted to the 1996 network and 2015 speeds were posted to the 2020 network. Given that relatively few changes to the highway system have occurred between 1995 and 1996, the 1996 NYMTC network is assumed to be representative of 1995 conditions for purposes of estimating 1995 transit travel demand.

2.5 Year 1995 Transit Networks

The transit networks for the MTA RTF Model are derived from two basic sources:

- The TRANSCAD 2.1 transit network prepared by MTA and URS Greiner for the MTA Long Range Travel Forecast Study (LRTFS).
- The TRANSCAD 2.1 networks developed by New York City Transit for the MESA project with updated and refined representations of NYCT transit services, Manhattan sidewalk links, and NYCT access, egress, and transfer links.

Key elements of the MTA RTF Networks are described in the following subsections.

2.5.1 Network Scope

The MTA RTF Model transit networks include representations of most AM Peak Hour services in the New York metropolitan area (east of the Hudson River) and all of the existing (Year 1995) transit service relevant to the on-going LRPF projects. Coded services were obtained from the MTA LRTFS and NYCT MESA networks and include:

- All AM Peak Hours Long Island Rail Road (LIRR) and Metro-North Railroad (MNR) services (shown in Figure 2-1)
- AM Peak Hour NYCT Subway and PATH routes (shown in Figure 2-2)
- AM Peak Hour Staten Island Ferry (dashed line in Figure 2-2) and New Jersey ferry services

- AM Peak Hour NYCT, MSBA/LI Bus, and other regional bus services (shown in Figure 2-3)

2.5.2 Zonal Access and Egress Links

Zonal access (and egress) links are used to describe the means by which travelers can access the regional transit system either on foot or by car. In the MTA RTF model, these links are based on the access and egress links originally coded in the MTA LRTFS and NYCT MESA transit networks and converted to the Geographic System used in the MTA RTF Model. Access and egress links to commuter rail stations were manually recoded as part of the MTA RTF development to better represent expected station capture areas.

The distance on each link is computed based on the straight-line distance between the zone centroid and the transit node. An assumed speed of 1.6 mph was used to compute the travel time over all walk links. To account for situations where access to transit is predominantly made by automobile, travel times on links serving park-and-ride stations were adjusted to represent realistic automobile travel times as shown in Table 2-1.

Table 2-1 Drive Connect Speed Assumptions

(Applied to Centroid-to-PNR Connectors)

County	State	Assumed Speed (mph)
New York	NY	15
Kings	NY	15
Queens	NY	15
Nassau	NY	25
Suffolk	NY	35
Bronx	NY	15
Westchester	NY	25
Putnam	NY	35
Dutchess	NY	45
Fairfield	CT	35
Richmond	NY	15
Rockland	NY	35
Orange	NY	35
Litchfield	CT	35
New Haven	CT	35

Source: Parsons Brinckerhoff, LIRR Network Strategy Study

Figure 2-1 Commuter Rail Network

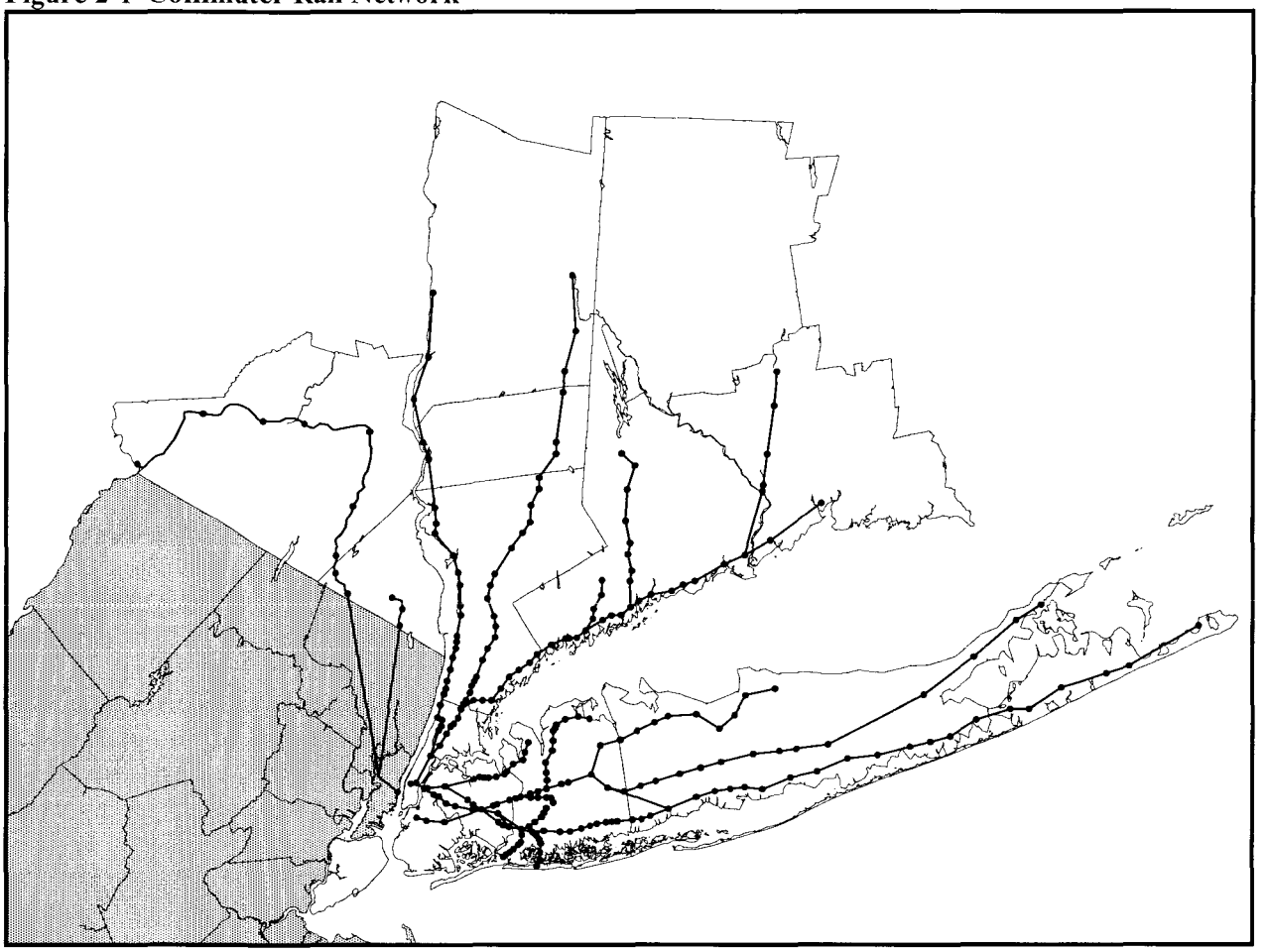


Figure 2-2 Subway, PATH and Ferry Network

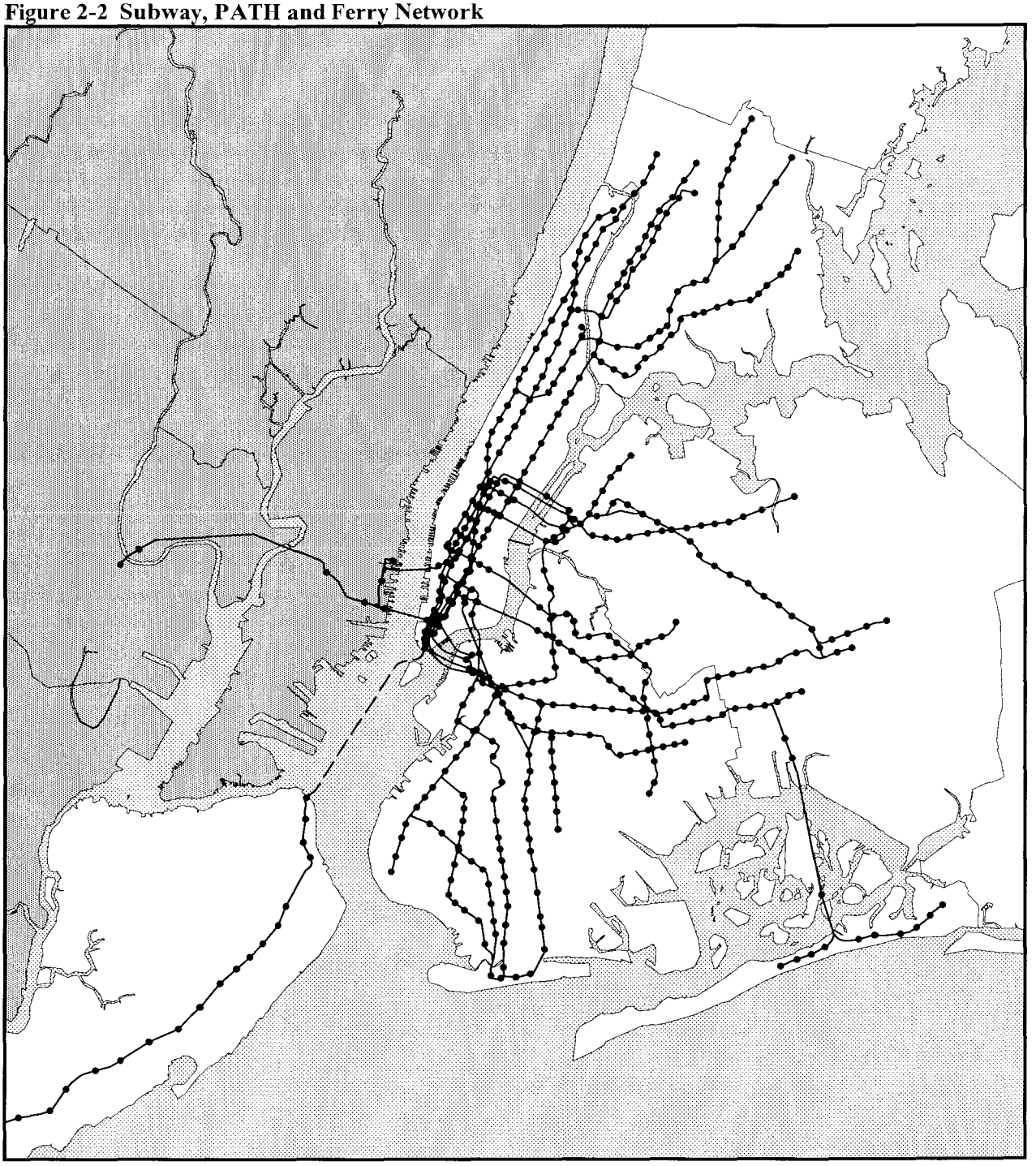
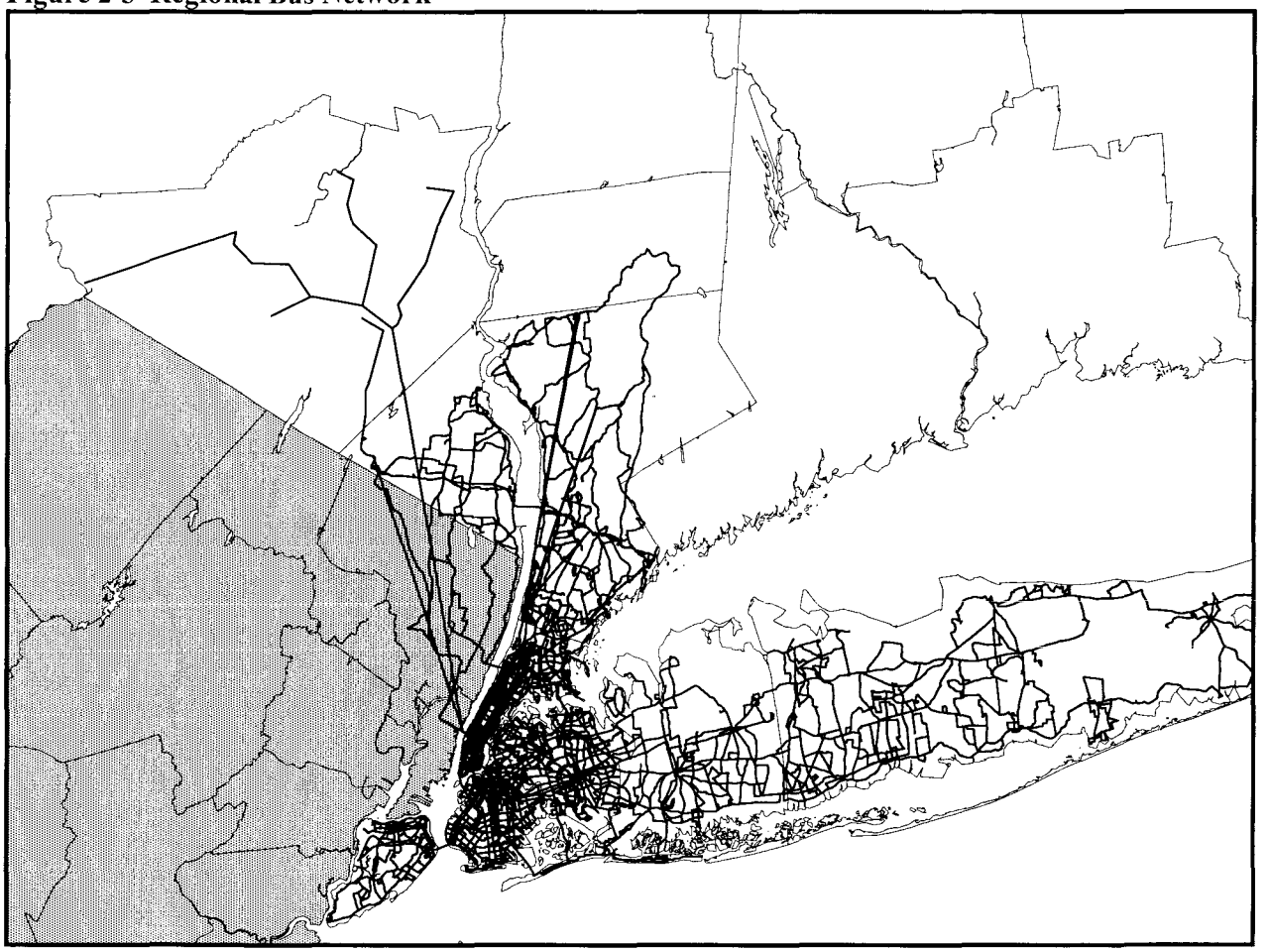


Figure 2-3 Regional Bus Network



2.5.3 In-Vehicle Times

Transit in-vehicle times are based on the coded values provided by MTA for each route. In cases where one route represents several trains, the coded time represents the average for all trains. In-vehicle travel times for LIRR and MNR services were compared to scheduled times as discussed later in this section and adjusted as necessary to assure that the network representation of running time matches the scheduled times.

2.5.4 Out-of-Vehicle Travel Times

With the exception of drive-to-transit centroid connectors and subway-to-subway transfer links, out-of-vehicle times are based on the distance coded on the link and an assumed travel speed of 1.6 miles per hour. Drive-to-transit speeds are described in Section 2.5.2 and subway-to-subway transfer times are based on platform-to-platform walking times collected by NYCT.

2.5.5 Waiting Times

With the exception of commuter rail services, waiting times are set equal to the "combined waiting time" field which represents the combined effect of all routes or services on the line. This field was calculated by the MTA/NYCT by analyzing all routes that connect each node to the Manhattan CBD, counting the number of trains/buses per hour providing that service, dividing total trains/buses into 60 minutes to determine the combined headway, and dividing by 2 to determine the average waiting time.

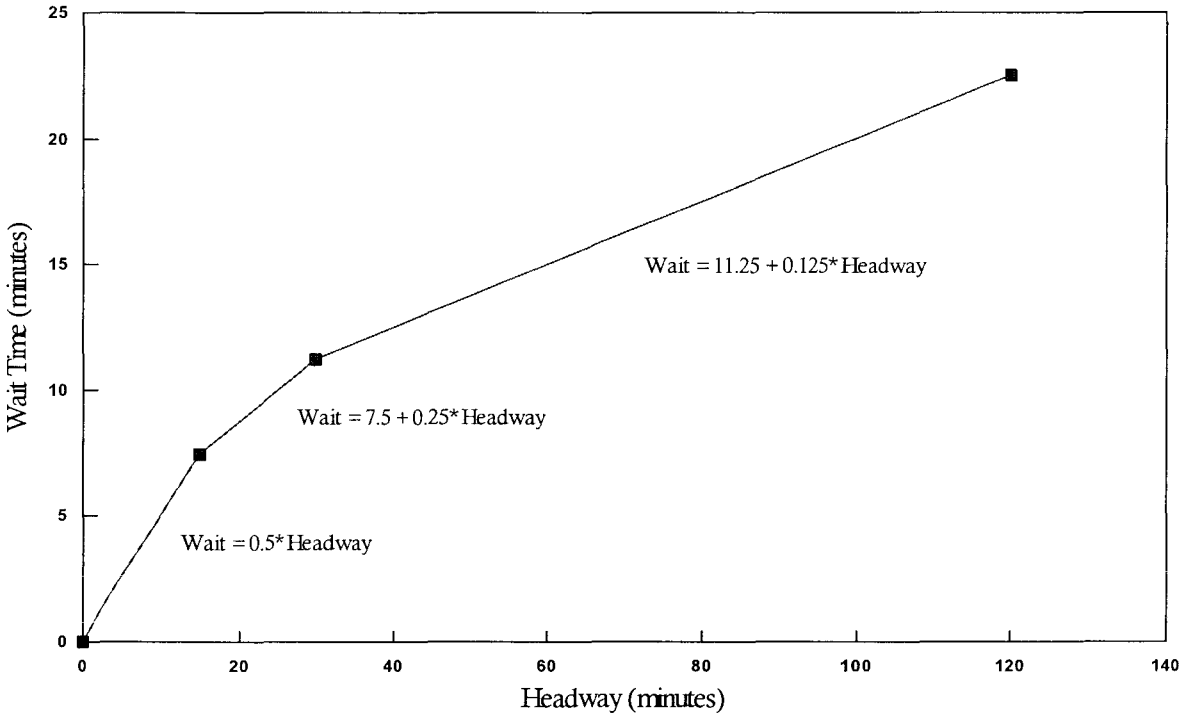
LIRR waiting times were computed using an automated procedure that calculates the number of trains connecting each LIRR station to each of the five existing or proposed terminal stations: New York Penn Station, Grand Central Terminal, Hunterspoint Avenue, Long Island City, and Flatbush Avenue. The combined headway is computed separately for each origin station/terminal station/direction (inbound/outbound) as 60 minutes divided by the total number of trains in the peak hour. The average waiting time is computed from the combined headway based on the relationship developed by Parsons Brinckerhoff for the LIRR Network Strategy Study and shown in Figure 2-4.

A similar procedure is applied for each MNR station using the combined frequency of trains traveling to either Grand Central Terminal or a new MNR Terminal in Manhattan.

2.5.6 Manhattan Sidewalk Network

A sidewalk network is provided in the Manhattan CBD and portions of Brooklyn to provide walk access between each zone and all transit facilities in the region. Out-of-vehicle travel time on all sidewalk links is computed assuming an average speed of 1.6 miles per hour.

Figure 2-4 Computation of Waiting Time for Commuter Rail Services



Source: Parsons Brinckerhoff, LIRR Network Strategy Study

2.5.7 Year 1995 Fare Coding

Fares are based on the coding approach established by MTA to represent Year 1995 (before the November 12 fare increase) tariffs and are expressed in 1995 cents. The procedures used for coding fares are different for each mode and are described below.

- **Commuter Rail.** Fares are computed by coding a fare value on all station access links, station egress links, and on links where trains cross one or more fare zone boundaries. The commuter rail fare is the sum of all three components. The coded fares for 1995 are displayed in Tables 2-2, 2-3, and 2-4.

Table 2-2 LIRR 1995 Fare Calculation (in Year 1995 Cents)

Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to Zone 1
14	63	62	62	622
12	50	62	62	559
11	36	62	62	509
10	45	62	62	473
9	49	62	62	428
7	47	56	56	373
4	90	56	56	326
3	55	101	101	281
1	N/A	125	125	250

Note: Fares effective for 1995 before 11/12/95 and represent a weighted average of the cost of different fare media.

Table 2-3 Metro-North Hudson/Harlem Line 1995 Fare Calculation (in Year 1995 Cents)

Hudson Fare Zone	Harlem Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to GCT
Poughkeepsie	Dover Plains-Harlem Vy	55	36	36	607
New Hamburg-Beacon	Appl. Trail-Patterson	57	36	36	552
Breakneck Ridge-Manitou	Brewster North-Purdy's	43	36	36	495
Crugers-Peekskill	Golden's Br-Mt Kisco	60	36	36	452
Tarrytown-Croton Harmon	Chappaqua-Valhalla	55	36	36	392
Hastings-Irvington	N White Plains-Scarsdale	36	36	36	337
Ludlow-Graystone	Crestwood-Mt Vernon W	32	36	36	301
Morris Heights-Riverdale	Wakefield-Melrose	120	25	25	258
125th Street	125th Street	0	113	113	226
Grand Central Terminal	Grand Central Terminal	N/A	113	113	N/A

Note: Coded fares represent a weighted average of the cost of different fare media.

Table 2-4 Metro-North New Have Line 1995 Fare Calculation (in Year 1995 Cents)

Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to GCT
Derby Shelton-Waterbury (branch at Bridgprt)	68	35	35	704
Branchville-Danbury	68	35	35	611
Merrit 7-Cannondale (branch at S Norwalk)	3	35	35	543
Glenbrook-New Caanan (branch at Stamford)	0	35	35	504
New Haven	86	35	35	722
Bridgeport-Milford	60	35	35	636
Westport-Fairfield	36	35	35	576
South Norwalk-East Norwalk	36	35	35	540
Noroton Heights-Rowayton	0	35	35	504
Stamford	52	35	35	504
Greenwich-Old Greenwich	67	35	35	452
Rye-Port Chester	28	15	15	365
Larchmont-Harrison	37	15	15	337
Mount Vernon-New Rochelle	52	15	15	300
Fordham	120	25	25	258
125th Street	0	113	113	226
Grand Central Terminal	n/a	113	113	N/A

Note: Coded fares represent a weighted average of the cost of different fare media.

- **NYCT Subway.** Fares are computed by coding a $1.50 fare on all subway station access links (zone connectors and intermodal transfer links-to/from-subway station). No fare is charged on station egress links. Likewise, no charge is assessed for 3rd Avenue (Bronx) buses with a free transfer in 1995 to the 3rd Avenue-149th Street subway station.

- **Bus.** Fares are computed as a combination of boarding and fare zone charges. For NYCT buses, a flat $1.50 charge is coded on bus access links and on transfers from subway-to-bus. MTA-provided fares were used for all other bus operators.

2.5.8 Commuter Rail Service Coding Review

Coded LIRR and MNR commuter rail services were compared to published 1995 schedules to confirm the appropriateness of the network for evaluating the alternative projects for each railroad. This comparison is presented in Table 2-5 (LIRR) and 2-6 (MNR) and indicates that the networks properly represent each carrier's passenger services.

Table 2-5 Comparison of Coded and Scheduled Base Year AM Peak Hour LIRR Services

Branch	Service	Scheduled			Coded		
		Train #	Trains/ Hour	Running time	Route #	Trains/Hr	Running Time
Port Washington	Port Wash-Great Neck Express to NYPS	419,421,425, 427	3-4	34-41	501	3-4	36.7
	Port Wash-Manhasset Local to NYPS	423	1	47	502	1	47.5
	Great Neck/Little Neck-Bayside Express to NYPS	303,305	1-2	33	503	1-2	33.5
	Great Neck Local to NYPS	307	1	34	504	1	33.5
Port Jefferson	Port Jeff-Syosset Express to Hunterspoint	609	1	106	505	1	106
	Port Jeff-Huntington Express to Jamaica/Hunterspoint	607,611	1-2	107-109	506	1-2	107
	Hicksville Local to Jamaica/NYPS	1209,1213	1-2	44-48	507	1-2	47
	Hicksville-Carle Place Express to NYPS	1211	1	47	508	1	47
	Huntington-Syosset Express to NYPS	1619,1623	2	54-57	509	2	55.5
	Huntington Local to Jamaica/Flatbush	1621	1	60	510	1	59.5
Ronkonkoma	Greenport-Hicksville Express to NYPS	201/2017	1	159	511	1	159
	Ronkonkoma-Brentwood Express to NYPS	2019	1	63	512	1	63
	Ronkonkoma-Bethpage Express to Jamaica/NYPS	2021	1	75	513	1	78
	Ronkonkoma Local to Jamaica and Flatbush	2099	1	76	514	1	75.5
Oyster Bay	Oyster Bay Local to Jamaica/Long Island City	507	1	n/a	515	1	89.5
	Oyster Bay Local to Jamaica/Hunterspoint	509	1	80	516	1	80
	E Williston Local to Jamaica/NYPS	1501	1	45	517	1	46
Hempstead	Hempstead Local to Jamaica/Flatbush	719,721	1-2	50-54	518	1-2	52
	Hempstead Local to Jamaica/NYPS	717,723	1-2	46-47	519	2	47
West Hempstead	West Hempstead Local to Jamaica/Flatbush	905	1	46	520	1	44.5
	West Hempstead Local to Jamaica/NYPS	907	1	51	521	1	50
Far Rockaway	Far Rockaway Local to Jamaica/Flatbush	3011,3013	1-2	48-57	522	1-2	50
	Far Rockaway Local to Jamaica/NYPS	3203,3013	1-2	53-56	523	1-2	57
	Valley Stream Local to Jamaica/NYPS	1901	1	37	524	1	45
Long Beach	Long Beach-Valley Stream-Laurelton Express to NYPS	815	1	52	525	1	52
	Long Beach--Lynbrook Express to NYPS (schedule shows additional stop at Valley Stream)	817	1	52	526	1	47
	Long Beach Local to Jamaica/NYPS	819	1	50	527	1	52
	Long Beach Local to Jamaica/Flatbush	820	1	48	528	1	47.5
Babylon	Babylon-Rockville Center Local to Jamaica/Flatbush	1011,107, 1017, 113	2	69-73	529	2	68.5
	Babylon-Baldwin to Jamaica/NYPS	109,111	1	72	530	1	73
	Babylon-Baldwin Express to NYPS	1013,1199, 1015,1099, 1019,115, 1105,117	2-3	70	531	2-3	65.5
Babylon thru Montauk	Patchogue to Jamaica/Long Island City	41	1	N/A	532	1	109.5
	Montauk-Sayville Express to Jamaica/Hunterspoint	13	1	182	533	1	181
	Speonk to Jamaica/NYPS	11/111	1	132	534	1	132

Table 2-6 Comparison of Coded and Scheduled Base Year AM Peak Hour MNR Services

Branch	Service	Scheduled			Coded		
		Train #	Trains/Hr	Running time	Route #	Trains/Hr	Running Time
Pascack Valley	Spring Valley/Pearl River to Hoboken	1604,1606, 1608,1610	4	59-65	206	4	59.00
Port Jervis	Port Jervis/Suffern to Hoboken	52,54	2	135-134	207	2	134.50
New Haven	Waterbury Local to Bridgeport	1933	1	54	205	1	54.00
	New Haven/East Norwalk to GCT	1427-1529	1-2	95	551	1-2	95.50
	New Canaan/Stamford to GCT	1723	1	69	552	1	69.00
	New Canaan/Glenbrook to GCT	1731	1	67	553	1	67.00
	Harrison Local to GCT	1319,1327,1231	3	40-41	554	3	40.50
	Stamford Local to GCT	1217,1321, 1225,1229	1-4	74	555	1-4	74.00
	New Haven/Harrison to GCT	1323,1325, 1331,1629	1-3	118	556	1-3	116.50
	New Haven/Stamford to GCT	1521,1533	1-2	107	557	1-2	104.50
	Danbury/Stamford to GCT	1429,1833	1-2	119	558	1-2	120.00
	Danbury/South Norwalk to GCT	1819	1	108	559	1	108.00
Harlem	Fleetwood Local to GCT	316,324,328	1-3	33-38	561	1-3	34.50
	Scarsdale Local to GCT	518,524,632	1-3	53	562	1-3	53.00
	Hartsdale/Scarsdale to GCT	520,526,532	3	38-39	563	3	38.50
	Dover Plains/White Plains to GCT	922,3928,528, 928	1-4	113-126	564	1-4	122.00
	Brewster North/White Plains to GCT	918,924,930	2-3	78-90	565	2-3	80.50
Hudson	Croton-Harmon/Marble Hill to GCT	420,730,430	1-3	69	571	1-3	74.00
	Croton-Harmon/Morris Heights to GCT	722	1	70	572	1	68.00
	Croton-Harmon/Tarrytown Express to GCT	718,720,726, 728,736	1-4	51	573	2-4	50.00
	Irvington/Greystone to GCT	724,734	1-2	44	574	1-2	43.50
	Poughkeepsie/Croton-Harmon to GCT	730,836	2	106	575	2	106.00
	Poughkeepsie/Beacon Express to GCT	832	1	90	576	1	90.00

2.6 Year 2010 and 2020 No-Build Transit Networks

2.6.1 Year 2010 and 2020 Physical and Service Characteristics

The 2010 and 2020 no-build transit networks are identical and are based on the MTA and NYCT MESA 2020 AM Peak Hour no-build networks. These networks are generally similar to the 1995 AM Peak Hour base network and incorporate the following committed system improvements:

1. Bus service modifications to represent expected future year operations
2. NYCT coding of the Year 2020 No-Build Subway Network. The 2020 Network includes completion of the 63rd Street tunnel and revision of operating plans to utilize this facility
3. Improvements to the LIRR increasing the train capacity into Penn Station from 36 trains in the peak hour to 42 trains per hour
4. LIRR service given acquisition of dual-mode locomotives. This equipment will enable operation of six peak-hour trains from non-electrified branches direct to New York Penn Station
5. Minor changes to MNR operations and the extension of the Harlem Line to Wassaic
6. Free Bus-Subway Transfers
7. Secaucus Transfer in New Jersey which will enable a direct transfer from the MNR Port Jervis and Spring Valley Lines to NJ Transit Northeast Corridor service to Penn Station

2.6.2 Year 2010 and 2020 Fare Coding

Year 2010 and 2020 fares are identical and are based on the representation of MTA fare policies included in the 2020 LRPF network. These policies are based on the assumption that all non-commuter rail fares rise at the rate of inflation. Commuter rail fares in New York are assumed constant between November 1995 and December 1999 at which time they rise at the same rate as inflation. Coding for each mode is as described below.

- **Commuter Rail.** The coded fares were developed from the MTA Long Range Planning Framework Year 2020 fares and adjusted to convert from 1990 dollars (used in the LRPF network) to 1995 dollars (used in the MTA RTF Networks). The resulting boarding, alighting, and zone fares are generally represent a small decrease in fares (in constant dollars) between 1995 and 2020 in New York. Fares from Connecticut rise slightly between 1995 and 2020. Year 2020 Commuter rail fare parameters are as follows:

Table 2-7 LIRR 2020 Fare Calculation (in Year 1995 Cents)

Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to Zone 1
14	62	61	61	603
12	49	61	61	541
11	35	61	61	492
10	43	61	61	457
9	48	61	61	414
7	45	54	54	359
4	86	54	54	314
3	53	97	97	271
1	N/A	121	121	242

Table 2-8 Metro-North Hudson Harlem Line 2020 Fare Calculation (in Year 1995 Cents)

Hudson Fare Zone	Harlem Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to GCT
Poughkeepsie	Dover Plains-Harlem Vy	55	36	36	594
New Hamburg-Beacon	Appl. Trail-Patterson	56	36	36	539
Breakneck Ridge-Manitou	Brewster North-Purdy's	42	36	36	483
Crugers-Peekskill	Golden's Br-Mt Kisco	60	36	36	441
Tarrytown-Croton Harmon	Chappaqua-Valhalla	53	35	35	380
Hastings-Irvington	N White Plains-Scarsdale	34	35	35	327
Ludlow-Graystone	Crestwood-Mt Vernon W	31	35	35	293
Morris Heights-Riverdale	Wakefield-Melrose	116	24	24	251
125th Street	125th Street	0	111	111	222
Grand Central Terminal	Grand Central Terminal	n/a	111	111	N/A

Table 2-9 Metro-North New Have Line 2020 Fare Calculation (in Year 1995 Cents)

Fare Zone	Charge to Next Fare Zone	Boarding Charge	Alighting Charge	Total Fare to GCT
Derby Shelton-Waterbury (branch at Bridgprt)	78	40	40	745
Branchville-Danbury	67	40	40	627
Merrit 7-Cannondale (branch at S Norwalk)	3	40	40	560
Glenbrook-New Caanan (branch at Stamford)	0	40	40	516
New Haven	99	40	40	766
Bridgeport-Milford	69	40	40	667
Westport-Fairfield	41	40	40	598
South Norwalk-East Norwalk	41	40	40	557
Noroton Heights-Rowayton	0	40	40	516
Stamford	60	40	40	516
Greenwich-Old Greenwich	77	40	40	456
Rye-Port Chester	27	15	15	354
Larchmont-Harrison	35	15	15	327
Mount Vernon-New Rochelle	50	15	15	292
Fordham	116	24	24	251
125th Street	0	111	111	222
Grand Central Terminal	N/A	111	111	N/A

Note: Equivalent to monthly pass cost/38 trips per month.

- **NYCT Subway.** Year 2020 Fares are computed by coding a $1.50 fare (1995 dollars) on all subway station access links (zone connectors and intermodal transfer links-to/from-subway station). No fare is charged on station egress links. To represent the Metro Card free bus-to-subway transfer, no fare is charged on bus-to-subway transfer links.

- **Bus.** Fares are computed as a combination of boarding and fare zone charges. For NYCT buses, a flat $1.50 fare is charged on boarding. No fare is charged on subway-to-bus transfers or bus-to-bus.

2.7 Socioeconomic Projections

Projections of population and employment are a fundamental element of the travel forecasting process and are used for "growing" or "factoring" 1995 travel patterns to represent expected Year 2020 travel.

Socioeconomic projections are based on NYMTC and MTA adopted forecasts and comprise three types of information:

1. NYMTC forecasts of county-level attributes such as population, labor force, and employment

2. NYMTC forecasts of county-to-county journey-to-work flows

3. MTA forecasts of sub-county population and employment

Each element is discussed below.

2.7.1 NYMTC County-Level Forecasts of Population, Labor Force and Employment

Forecasts of county-level population, labor force and employment are both directly used in the MTA RTF Model procedures and are also used in the development of the underlying NYMTC county-to-county journey-to-work flows and MTA subcounty forecasts of population and employment. This section does not document the methodology used to develop these forecasts (available from NYMTC and MTA) but instead documents results of these forecasting methodologies.

Projected population by county between 1970 and 2020 (in 5-year increments after 1990) is presented in Table 2-10. As shown in this table, population in the region is expected to grow from 20.2 million in 1995 to 22.8 million in 2020, an increase of 13.2 percent. Population in New York City, Long Island, and Mid-Hudson is expected to grow by 8.1 percent, 16.7 percent, and 14.4 percent, respectively between 1995 and 2020.

Projected labor force by county represents a key input to the journey-to-work projections and is shown in Table 2-11. As shown in this table, labor force in the region is expected to grow from 10.4 million in 1995 to 12.8 million in 2020, an increase of 22.4 percent. The fact that the percentage growth in labor force is 70 percent higher than the growth rate for population suggests that the labor force participation rates are expected to continue to grow between 1995 and 2020. The labor force residing in New York City, Long Island, and Mid-Hudson is expected to grow by 13.8 percent, 29.5 percent, and 25.4 percent, respectively between 1995 and 2020.

Projected total employment by county is presented in Table 2-12. As shown in this table, total employment in the region is expected to grow from 10.5 million in 1995 to 13.0 million in 2020, an increase of 23.8 percent. Total regional employment is very similar in magnitude to the projected total labor force. The distribution among counties, however, is different and represents the difference between place of residence and place of employment for all workers. Total employment in Manhattan (New York County) is expected to grow from 2.3 million in 1990 to 2.7 million in 2020, an increase of 18.6 percent. Employment in all of New York City, Long Island, and Mid-Hudson is expected to grow by 18.2 percent, 30.1 percent, and 27.4 percent, respectively between 1995 and 2020.

Payroll employment represents those employees recorded on the payroll of a company and excludes sole proprietors. Projected payroll employment by county is presented in Table 2-13. As shown in this table, payroll employment in the region is expected to grow from 8.9 million in 1990 to 10.7 million in 2020, an increase of 20.7 percent. The fact that payroll employment is expected to grow less rapidly than total employment represents expectations that an increasing share of all employment will be sole proprietor employment. Payroll employment in Manhattan (New York County) is expected to grow from 2.1 million in 1990 to 2.4 million in 2020, an increase of 14.4 percent.

Table 2-10 Population Projections by County

(Population in 1,000s)

County	1970	1980	1990	1995	2000	2005	2010	2015	2020
Bronx	1,471.7	1,169.0	1,203.8	1,192.6	1,203.8	1,223.4	1,240.3	1,260.0	1,289.8
Kings	2,602.0	2,231.0	2,300.7	2,275.7	2,285.5	2,300.8	2,333.7	2,370.0	2,412.4
New York	1,539.2	1,428.3	1,487.5	1,510.0	1,520.4	1,540.8	1,556.7	1,565.2	1,575.0
Queens	1,986.5	1,891.3	1,951.6	1,970.3	1,999.0	2,029.4	2,062.4	2,124.0	2,189.2
Richmond	295.4	352.0	379.0	400.0	413.7	428.4	441.5	455.0	475.0
NEW YORK CITY	7,894.8	7,071.6	7,322.6	7,348.6	7,422.4	7,522.8	7,634.6	7,774.2	7,941.4
Nassau	1,428.1	1,321.6	1,287.3	1,302.3	1,318.8	1,329.6	1,349.8	1,379.9	1,433.6
Suffolk	1,125.0	1,284.2	1,321.9	1,347.1	1,367.3	1,423.3	1,495.2	1,571.0	1,658.1
LONG ISLAND	2,553.1	2,605.8	2,609.2	2,649.4	2,686.1	2,752.9	2,845.0	2,950.9	3,091.7
Dutchess	222.3	245.1	259.5	259.8	263.6	278.4	289.9	301.1	315.6
Orange	221.7	259.6	307.6	319.5	336.9	361.5	384.7	407.1	431.5
Putnam	56.7	77.2	83.9	89.2	91.8	95.2	98.8	102.3	106.3
Rockland	229.9	259.5	265.5	274.8	280.0	286.9	295.5	305.3	315.0
Sullivan	52.6	65.2	69.3	70.0	71.0	74.9	79.0	83.2	87.7
Ulster	141.2	158.2	165.3	165.9	169.2	173.1	177.1	186.6	200.1
Westchester	894.1	866.6	874.9	885.6	891.0	892.9	897.7	900.0	905.0
MID-HUDSON	1,818.5	1,931.4	2,026.0	2,064.8	2,103.5	2,162.9	2,222.7	2,285.6	2,361.2
NY SUBURBS	4,371.6	4,537.2	4,635.2	4,714.2	4,789.6	4,915.8	5,067.7	5,236.5	5,452.9
NY METRO	12,266.4	11,608.8	11,957.8	12,062.8	12,212.0	12,438.6	12,702.3	13,010.7	13,394.3
Bergen	898.0	845.4	825.4	846.9	847.6	851.2	857.3	858.9	859.2
Essex	930.0	851.3	778.2	770.1	777.8	782.2	782.4	779.9	779.7
Hudson	609.3	557.0	553.1	556.0	567.9	588.1	612.5	638.4	652.1
Hunterdon	69.7	87.4	107.8	117.9	127.3	136.8	146.4	156.0	165.6
Mercer	304.0	307.9	325.8	330.8	343.5	361.3	383.1	400.4	411.7
Middlesex	583.8	595.9	671.8	701.5	729.6	763.9	797.5	838.8	889.6
Monmouth	459.4	503.2	553.1	586.6	601.6	633.1	656.6	680.1	703.6
Morris	383.5	407.6	421.4	445.5	460.4	460.4	460.5	465.2	475.2
Ocean	208.5	346.0	433.2	466.5	508.5	559.9	606.9	653.9	703.5
Passaic	460.8	447.6	453.1	463.8	463.6	463.5	463.4	463.3	463.2
Somerset	198.4	203.1	240.3	267.7	288.7	292.0	312.3	348.6	371.1
Sussex	77.5	116.1	130.9	140.6	149.7	157.6	167.2	178.1	185.2
Union	543.1	504.1	493.8	499.0	502.0	502.5	503.8	515.5	523.1
Warren	73.9	84.4	91.6	96.7	106.3	115.0	122.9	131.2	140.8
NEW JERSEY	5,799.9	5,857.0	6,079.5	6,289.6	6,474.5	6,667.5	6,872.8	7,108.3	7,323.6
Fairfield	792.8	807.1	827.6	838.4	846.6	877.8	906.3	945.5	978.1
Litchfield	144.1	156.8	174.1	181.0	190.6	200.4	211.6	223.2	241.0
New Haven	744.9	761.3	804.2	807.6	823.3	839.2	857.5	876.3	903.7
CONNECTICUT	1,681.8	1,725.2	1,805.9	1,827.0	1,860.5	1,917.4	1,975.4	2,045.0	2,122.8
REGION	19,748.1	19,191.0	19,843.2	20,179.4	20,547.0	21,023.5	21,550.5	22,164.0	22,840.7

Source: Urbanomics (9/18/95)

Table 2-11 Labor Force Projections by County

(Labor Force in 1,000s)

County	1970	1980	1990	1995	2000	2005	2010	2015	2020
Bronx	552.4	443.9	501.7	483.5	476.1	471.9	500.7	521.4	554.6
Kings	1,012.4	902.3	1,036.0	1,009.3	991.4	1,028.0	1,065.9	1,101.5	1,139.4
New York	741.7	754.1	837.2	833.2	817.2	858.3	882.2	911.1	910.2
Queens	908.9	907.4	1,015.7	1,010.1	1,001.9	1,049.8	1,082.9	1,115.1	1,169.6
Richmond	115.3	153.6	189.2	193.4	195.6	212.8	227.8	232.5	242.0
NEW YORK CITY	3,330.7	3,161.3	3,579.8	3,529.5	3,482.2	3,620.8	3,759.5	3,881.6	4,015.8
Nassau	585.5	654.8	690.1	719.1	741.3	766.2	795.1	822.2	851.1
Suffolk	403.2	573.8	698.7	700.0	721.8	770.4	838.9	909.8	986.7
LONG ISLAND	988.7	1,228.6	1,388.8	1,419.1	1,463.1	1,536.6	1,634.0	1,732.0	1,837.8
Dutchess	84.9	112.2	133.5	131.2	134.4	137.6	145.1	153.0	165.9
Orange	83.0	111.5	150.0	171.4	188.9	212.4	226.8	242.4	253.7
Putnam	20.7	35.9	46.9	51.0	52.9	55.7	59.3	62.3	65.6
Rockland	86.6	125.0	141.4	149.6	156.8	165.0	174.2	181.8	185.2
Sullivan	21.1	27.3	31.8	37.5	36.8	39.5	42.7	45.7	48.8
Ulster	54.8	72.4	84.4	86.2	88.7	97.0	101.7	109.0	118.3
Westchester	383.1	433.7	468.4	447.6	449.5	456.1	476.3	489.4	510.3
MID-HUDSON	734.2	918.0	1,056.4	1,074.5	1,108.0	1,163.3	1,226.1	1,283.6	1,347.8
NY SUBURBS	1,722.9	2,146.6	2,445.2	2,493.6	2,571.1	2,699.9	2,860.1	3,015.6	3,185.6
NY METRO	5,053.6	5,307.9	6,025.0	6,023.1	6,053.3	6,320.7	6,619.6	6,897.2	7,201.4
Bergen	397.9	442.2	456.7	463.9	479.3	505.1	516.8	517.1	510.6
Essex	392.0	391.6	399.9	407.6	428.9	450.2	469.8	476.3	489.6
Hudson	267.3	262.8	294.8	315.2	321.8	338.2	360.7	382.9	388.3
Hunterdon	28.3	42.6	60.1	65.3	73.2	79.7	88.1	96.1	99.9
Mercer	132.1	151.6	175.5	163.9	172.3	180.6	193.7	208.2	219.7
Middlesex	247.4	307.6	379.6	404.6	440.8	469.5	506.3	532.4	567.5
Monmouth	169.8	230.4	290.2	302.4	319.3	345.6	368.9	395.0	407.5
Morris	157.1	209.0	243.1	235.3	256.9	263.1	269.7	280.2	288.4
Ocean	69.1	131.7	192.8	223.6	223.0	247.1	266.6	295.7	323.8
Passaic	201.1	215.0	242.9	257.9	263.3	267.2	277.7	289.3	290.7
Somerset	83.4	106.5	141.5	150.1	160.0	165.6	176.2	199.7	214.6
Sussex	30.3	54.8	70.5	81.3	86.1	89.1	96.8	105.1	107.0
Union	242.3	256.9	268.6	290.5	304.1	306.9	315.1	324.1	322.0
Warren	30.2	39.4	47.9	55.3	58.0	63.8	69.4	75.1	79.7
NEW JERSEY	2,448.3	2,842.1	3,264.1	3,416.9	3,587.0	3,771.7	3,975.8	4,177.2	4,309.3
Fairfield	340.1	404.7	455.0	457.8	462.5	494.8	526.8	561.7	573.3
Litchfield	62.2	79.5	98.3	102.6	109.9	116.5	124.1	128.5	144.6
New Haven	321.6	375.5	432.5	430.5	452.8	474.2	495.7	516.7	542.5
CONNECTICUT	723.9	859.7	985.8	990.9	1,025.2	1,085.5	1,146.6	1,206.9	1,260.4
REGION	8,225.8	9,009.7	10,274.9	10,430.9	10,665.5	11,177.9	11,742.0	12,281.3	12,771.1

Source: Urbanomics (9/21/95)

Table 2-12 Total Employment Projections by County

(Employment in 1,000s)

County	1970	1980	1990	1995	2000	2005	2010	2015	2020
Bronx	251.3	217.0	245.6	250.6	258.7	266.0	278.4	292.0	303.3
Kings	631.8	516.4	540.4	559.1	557.6	554.4	568.4	585.3	611.8
New York	2,550.3	2,277.6	2,455.2	2,276.9	2,378.3	2,491.5	2,580.4	2,638.4	2,701.4
Queens	586.0	536.7	618.6	598.8	613.8	635.8	663.7	698.2	731.8
Richmond	47.1	66.4	97.6	101.1	105.6	109.2	114.0	120.1	125.8
NEW YORK CITY	4,066.5	3,614.1	3,957.4	3,786.5	3,914.0	4,056.9	4,204.9	4,334.0	4,474.1
Nassau	575.2	661.0	729.6	724.6	757.2	786.9	812.4	832.6	854.6
Suffolk	287.4	432.2	590.5	586.1	600.1	642.0	704.1	770.3	850.4
LONG ISLAND	862.6	1,093.2	1,320.1	1,310.7	1,357.3	1,428.9	1,516.5	1,602.9	1,705.2
Dutchess	92.1	110.2	139.5	123.9	134.9	146.8	155.3	159.4	163.5
Orange	80.3	95.5	127.8	135.9	151.7	162.0	173.8	186.2	198.6
Putnam	11.7	17.0	25.6	27.1	30.1	32.4	34.7	37.6	42.9
Rockland	73.1	98.1	122.2	123.2	128.5	135.5	142.6	150.3	159.3
Sullivan	22.8	26.8	31.5	30.6	32.5	34.1	35.7	37.7	40.6
Ulster	48.8	58.3	75.6	72.6	80.3	84.8	88.7	93.1	99.3
Westchester	363.2	419.5	479.3	452.5	461.1	474.0	490.1	507.2	526.7
MID-HUDSON	692.0	825.4	1,001.5	965.8	1,019.1	1,069.6	1,120.9	1,171.5	1,230.9
NY SUBURBS	1,554.6	1,918.6	2,321.6	2,276.5	2,376.4	2,498.5	2,637.4	2,774.4	2,936.1
NY METRO	5,621.1	5,532.7	6,279.0	6,063.0	6,290.4	6,555.4	6,842.3	7,108.4	7,410.2
Bergen	370.0	454.2	528.1	522.5	541.7	558.5	578.1	601.6	624.8
Essex	452.0	427.7	425.1	412.8	429.8	437.5	442.0	446.7	452.3
Hudson	278.9	247.9	272.2	273.5	280.9	298.6	315.1	331.4	349.8
Hunterdon	23.9	32.3	51.2	60.5	65.2	72.0	81.4	91.6	99.4
Mercer	147.5	176.4	222.5	225.9	230.5	242.8	259.3	279.0	297.3
Middlesex	235.2	312.4	407.0	418.8	440.0	471.8	506.5	531.8	551.4
Monmouth	141.0	194.8	262.3	274.9	282.2	299.8	323.6	347.4	359.6
Morris	124.9	212.0	293.9	298.1	318.7	340.6	362.1	383.6	405.3
Ocean	53.9	96.4	143.9	155.5	170.4	181.2	194.5	212.1	226.6
Passaic	203.1	208.8	222.5	214.3	214.4	219.5	228.8	234.8	233.4
Somerset	68.6	108.9	166.0	186.8	205.4	222.5	238.3	253.8	266.1
Sussex	20.2	29.9	41.1	42.2	44.3	47.6	51.2	56.2	60.4
Union	299.0	291.7	300.1	291.6	299.5	312.8	324.1	333.2	334.8
Warren	29.5	34.7	41.6	42.0	45.3	48.5	50.9	53.3	56.8
NEW JERSEY	2,447.7	2,828.1	3,377.5	3,419.4	3,568.3	3,753.7	3,955.9	4,156.5	4,318.0
Fairfield	345.4	434.3	503.5	505.9	527.1	558.1	580.9	598.0	613.2
Litchfield	51.4	67.2	81.9	84.6	91.3	98.4	105.8	113.8	123.6
New Haven	330.6	367.8	431.5	409.7	420.2	440.0	464.2	493.0	513.9
CONNECTICUT	727.4	869.3	1,016.9	1,000.2	1,038.6	1,096.5	1,150.9	1,204.8	1,250.7
REGION	8,796.2	9,230.1	10,673.4	10,482.6	10,897.3	11,405.6	11,949.1	12,469.7	12,978.9

Source: Urbanomics (9/20/95)

Table 2-13 Payroll Employment Projections by County

(Employment in 1,000s)

County	1970	1980	1990	1995	2000	2005	2010	2015	2020
Bronx	216.8	192.4	218.0	217.8	224.3	227.3	234.3	246.0	262.8
Kings	537.6	434.7	459.2	461.3	454.9	450.3	466.8	482.7	509.7
New York	2,454.5	2,171.4	2,282.1	2,073.2	2,161.7	2,256.1	2,322.5	2,356.0	2,371.1
Queens	499.3	450.4	527.0	492.9	503.3	519.8	540.9	566.1	601.5
Richmond	37.3	52.9	79.8	82.3	87.0	90.4	94.9	100.1	106.5
NEW YORK CITY	3,745.5	3,301.8	3,566.1	3,327.5	3,431.2	3,543.9	3,659.4	3,750.9	3,851.6
Nassau	486.5	554.0	621.9	586.7	608.5	634.4	658.2	674.9	692.1
Suffolk	239.1	361.5	501.7	481.9	488.3	519.3	567.3	615.7	672.4
LONG ISLAND	725.6	915.5	1,123.6	1,068.6	1,096.8	1,153.7	1,225.5	1,290.6	1,364.5
Dutchess	82.5	97.6	121.1	103.0	113.3	123.7	130.5	132.5	134.7
Orange	68.7	80.9	108.0	112.5	124.9	132.0	140.6	149.8	159.0
Putnam	8.8	12.3	18.9	19.3	21.3	22.7	24.0	25.6	28.4
Rockland	62.4	81.5	102.0	99.8	104.3	110.9	116.5	121.9	127.1
Sullivan	18.3	21.5	25.7	24.3	25.8	26.9	27.8	28.9	30.6
Ulster	41.6	48.7	61.8	56.6	63.2	67.0	70.2	73.3	77.8
Westchester	304.0	352.2	406.7	372.8	378.5	390.5	405.9	419.2	431.2
MID-HUDSON	586.3	694.7	844.2	788.3	831.3	873.7	915.5	951.2	988.8
NY SUBURBS	1,311.9	1,610.2	1,967.8	1,856.9	1,928.1	2,027.4	2,141.0	2,241.8	2,353.3
NY METRO	5,057.4	4,912.0	5,533.9	5,184.4	5,359.3	5,571.3	5,800.4	5,992.7	6,204.9
Bergen	324.0	394.9	452.5	436.2	451.2	461.3	471.0	482.6	495.7
Essex	413.7	392.0	379.5	363.1	376.4	381.9	385.5	388.8	392.9
Hudson	259.5	227.8	246.0	242.9	247.8	262.3	274.6	286.0	299.7
Hunterdon	19.0	25.4	37.8	44.6	47.2	51.9	58.7	65.8	71.5
Mercer	135.4	162.2	198.0	197.3	200.0	210.2	223.2	238.7	252.3
Middlesex	217.2	287.9	362.5	365.7	381.2	408.3	437.9	459.0	475.5
Monmouth	119.9	165.0	217.9	222.6	228.1	242.1	260.3	278.6	287.4
Morris	108.5	187.6	256.1	253.3	268.4	284.9	301.2	317.6	334.2
Ocean	42.5	77.3	113.4	120.6	132.3	140.3	150.7	164.6	175.5
Passaic	184.4	189.0	195.5	183.5	181.0	183.3	189.7	193.9	193.0
Somerset	59.8	96.5	142.8	158.4	173.8	187.5	199.5	211.0	219.4
Sussex	16.1	23.2	29.7	28.6	29.1	30.7	32.6	35.8	39.1
Union	273.1	266.2	265.2	250.6	254.1	263.3	270.5	276.1	276.4
Warren	25.2	29.4	34.2	33.3	35.8	38.3	40.2	41.9	44.6
NEW JERSEY	2,198.3	2,524.4	2,931.1	2,900.7	3,006.4	3,146.3	3,295.6	3,440.4	3,557.2
Fairfield	302.9	372.4	419.9	405.3	414.9	437.3	452.8	464.6	475.2
Litchfield	42.9	54.4	63.8	63.6	68.1	72.8	77.6	82.9	89.6
New Haven	298.8	326.3	372.1	344.9	349.5	362.9	380.5	402.7	416.5
CONNECTICUT	644.6	753.1	855.8	813.8	832.5	873.0	910.9	950.2	981.3
REGION	7,900.3	8,189.5	9,320.8	8,898.9	9,198.2	9,590.6	10,006.9	10,383.3	10,743.4

Source: Urbanomics (9/29/95)

2.7.2 2.8.2 NYMTC Journey-to-Work Forecasts

The NYMTC Journey-to-Work forecasts represent existing and projected county-to-county flows of journey-to-work travel. These forecasts were prepared by Urbanomics for NYMTC using existing journey-to-work travel patterns from the 1990 Census and projections of county-level labor force and employment. The growth rates implied by a comparison of 1995 and 2010 journey-to-work travel were used to adjust 1995 work-related travel patterns to represent expected 2010 conditions. A similar adjustment was used to create the Year 2020 trip tables. The process used to develop the future year trip tables is described later in this chapter.

Table 2-14 presents the NYMTC County-to-County Journey-to-Work Forecasts for 1990. Tables 2-15, 2-16, and 2-17 present the forecasts for 1995, 2010, and 2020, respectively.

Table 2-14 1990 Journey-to-Work Flows

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Fairfield	Litchfield	New Haven	Dutchess	Orange	Putnam	Rockland	Westchester
Fairfield	332,026	2,742	18,650	742	110	1,118	320	15,654
Litchfield	8,552	49,109	11,982	514	10	192	20	636
New Haven	46,961	7,772	299,143	87	27	69	20	757
CONNECTICUT	387,539	59,623	329,775	1,343	147	1,379	360	17,047
Bergen	859	-	101	78	234	22	5,475	5,005
Essex	163	-	5	-	41	-	370	504
Hudson	43	-	16	17	-	-	321	857
Hunterdon	19	-	2	-	8	-	-	10
Mercer	10	-	33	23	32	-	5	65
Middlesex	45	-	26	37	31	7	85	290
Monmouth	64	-	7	9	46	-	50	280
Morris	116	-	34	6	9	-	192	297
Ocean	10	-	3	-	-	-	51	102
Passaic	171	-	25	16	302	-	1,088	701
Somerset	32	-	11	-	-	-	19	53
Sussex	-	-	14	-	771	2	84	85
Union	86	-	20	12	13	-	112	249
Warren	-	-	-	-	-	-	18	21
NEW JERSEY	1,618	-	297	198	1,487	31	7,870	8,519
Dutchess	1,345	982	171	93,079	2,287	3,135	365	11,270
Orange	463	6	32	5,634	91,447	276	8,710	4,421
Putnam	2,476	91	50	1,466	364	11,764	278	19,564
Rockland	827	14	20	238	1,287	74	70,648	10,074
Sullivan	2	-	-	167	4,110	-	173	128
Ulster	75	-	51	9,971	6,559	58	365	614
Westchester	14,892	56	433	1,125	549	1,678	3,274	268,758
MID-HUDSON	20,080	1,149	757	111,680	106,603	16,985	83,813	314,829
Nassau	675	-	77	125	192	20	240	3,983
Suffolk	338	19	80	95	244	65	67	1,389
LONG ISLAND	1,013	19	157	220	436	85	307	5,372
Bronx	1,432	-	22	157	140	122	1,072	26,390
Kings	438	-	68	120	132	39	942	5,296
Manhattan	9	23	121	212	133	106	1,198	8,677
Queens	1,109	11	85	329	102	58	1,170	10,339
Richmond	25	-	-	19	26	9	103	809
NEW YORK CITY	3,013	34	296	837	533	334	4,485	51,511
RES IN REGION	413,263	60,825	331,282	114,278	109,206	18,814	96,835	397,278
RES OUT WK IN	7,854	5,012	27,506	3,868	2,996	175	641	3,588
TOT TRIP-BASED	421,117	65,837	358,788	118,146	112,202	18,989	97,476	400,866

(Continued)

Table 2-14 1990 Journey-to-Work Flows
(Continued)

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Nassau	Suffolk	Bronx	Kings	New York	Queens	Richmond	Region
Fairfield	667	163	1,235	517	24,285	1,481	18	399,728
Litchfield	29	36	71	26	984	163	3	72,327
New Haven	83	7	80	141	1,307	252	17	356,723
CONNECTICUT	779	206	1,386	684	26,576	1,896	38	828,778
Bergen	1,354	214	6,130	3,830	60,013	3,681	1,183	88,179
Essex	578	110	777	1,929	25,750	1,303	626	32,156
Hudson	1,066	186	1,628	3,026	52,292	1,774	2	61,228
Hunterdon	16	3	59	48	937	65	189	1,356
Mercer	44	11	78	297	4,963	134	114	5,809
Middlesex	442	102	575	2,817	24,030	997	2,013	31,497
Monmouth	361	74	150	2,717	19,050	971	2,334	26,113
Morris	173	69	356	611	9,385	468	6	11,722
Ocean	102	41	104	438	2,870	224	2	3,947
Passaic	214	62	562	815	7,796	541	9	12,302
Somerset	95	40	54	343	5,064	143	360	6,214
Sussex	26	8	59	224	1,474	172	66	2,985
Union	354	56	203	1,237	14,414	612	18	17,386
Warren	23	-	38	18	417	40	26	601
NEW JERSEY	4,848	976	10,773	18,350	228,455	11,125	6,948	301,495
Dutchess	147	50	633	270	2,814	244	14	116,806
Orange	291	48	1,976	794	7,032	648	85	121,863
Putnam	129	43	1,647	326	3,418	391	58	42,065
Rockland	467	126	6,704	1,586	17,369	1,343	246	111,023
Sullivan	57	47	55	130	465	115	20	5,469
Ulster	58	23	136	116	925	140	31	19,122
Westchester	2,149	434	27,227	4,179	80,628	6,418	836	412,636
MID-HUDSON	3,298	771	38,378	7,401	112,651	9,299	1,290	828,984
Nassau	370,979	48,205	6,216	28,430	97,205	68,213	1,066	625,626
Suffolk	98,515	455,018	3,072	9,730	38,505	26,605	379	634,121
LONG ISLAND	469,494	503,223	9,288	38,160	135,710	94,818	1,445	1,259,747
Bronx	3,035	690	173,214	16,283	170,318	18,450	944	412,269
Kings	10,080	2,253	10,641	436,222	343,762	53,832	5,824	869,649
Manhattan	6,118	1,739	21,043	26,955	594,659	20,160	1,934	683,087
Queens	58,565	7,710	20,677	84,350	344,001	351,726	4,036	884,268
Richmond	962	205	1,116	25,256	54,292	3,894	72,972	159,688
NEW YORK CITY	78,760	12,597	226,691	589,066	1,507,032	448,062	85,710	3,008,961
RES IN REGION	557,179	517,773	286,516	653,661	2,010,424	565,200	95,431	6,227,965
RES OUT WK IN	4,459	2,298	1,786	6,623	19,493	7,081	3,742	97,122
TOT TRIP-BASED	561,638	520,071	288,302	660,284	2,029,917	572,281	99,173	6,325,087

Table 2-15 1995 Journey-to-Work Flows

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Fairfield	Litchfield	New Haven	Dutchess	Orange	Putnam	Rockland	Westchester
Fairfield	334,008	2,700	17,052	587	102	1,171	322	16,734
Litchfield	9,406	51,725	11,756	410	10	220	22	748
New Haven	50,046	8,028	292,547	73	27	76	21	850
CONNECTICUT	393,460	62,452	321,355	1,071	139	1,467	366	18,332
Bergen	889	-	95	63	223	24	5,666	5,484
Essex	173	-	5	-	40	-	393	566
Hudson	47	-	16	14	-	-	350	987
Hunterdon	18	-	2	-	7	-	-	10
Mercer	8	-	23	15	24	-	4	55
Middlesex	47	-	25	31	30	8	88	317
Monmouth	65	-	6	7	43	-	51	302
Morris	113	-	30	5	8	-	187	307
Ocean	12	-	3	-	-	-	59	125
Passaic	195	-	26	14	313	-	1,236	836
Somerset	31	-	10	-	-	-	19	55
Sussex	-	-	16	-	859	3	103	109
Union	96	-	21	11	13	-	125	289
Warren	-	-	-	-	-	-	20	25
NEW JERSEY	1,693	-	278	161	1,562	34	8,301	9,467
Dutchess	1,555	1,083	181	82,719	2,392	3,734	421	13,692
Orange	559	7	35	5,153	98,992	343	10,488	5,600
Putnam	2,496	89	45	1,117	336	12,418	281	21,135
Rockland	836	14	18	186	1,197	78	71,477	10,860
Sullivan	3	-	-	205	5,818	-	279	212
Ulster	92	-	57	9,235	7,212	73	448	793
Westchester	12,377	48	318	713	434	1,516	2,780	246,490
MID-HUDSON	17,919	1,241	656	99,327	116,382	18,162	86,174	298,782
Nassau	636	-	64	89	167	20	227	4,057
Suffolk	288	16	59	59	193	59	57	1,308
LONG ISLAND	924	16	123	148	360	79	284	5,365
Bronx	1,123	-	14	85	102	105	848	23,385
Kings	340	-	44	62	94	33	739	4,684
Manhattan	8	20	95	144	110	100	1,071	8,406
Queens	961	10	64	209	82	54	1,019	9,857
Richmond	21	-	-	11	20	8	87	758
NEW YORK CITY	2,453	30	217	511	409	300	3,764	47,090
RES IN REGION	416,449	63,740	322,629	101,217	118,851	20,043	98,890	379,036
RES OUT WK IN	7,174	4,600	23,450	3,075	2,646	166	587	3,447
TOT TRIP-BASED	423,623	68,339	346,079	104,293	121,497	20,208	99,477	382,482

(Continued)

Table 2-15 1995 Journey-to-Work Flows
(Continued)

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Nassau	Suffolk	Bronx	Kings	New York	Queens	Richmond	Region
Fairfield	709	180	1,382	574	25,505	1,586	20	402,634
Litchfield	34	44	87	31	1,137	190	4	75,823
New Haven	93	8	93	161	1,447	282	20	353,771
CONNECTICUT	836	232	1,561	766	28,088	2,058	44	832,227
Bergen	1,477	241	6,982	4,317	64,693	4,028	1,372	95,553
Essex	647	127	901	2,209	28,477	1,456	740	35,734
Hudson	1,227	220	1,930	3,536	59,374	2,030	2	69,734
Hunterdon	16	3	64	52	941	67	207	1,387
Mercer	36	10	74	284	6,223	118	108	6,983
Middlesex	481	114	650	3,152	25,870	1,087	2,313	34,212
Monmouth	388	82	169	3,032	20,211	1,048	2,673	28,078
Morris	177	74	387	660	9,516	486	7	11,955
Ocean	125	51	129	531	3,472	270	3	4,779
Passaic	256	76	680	970	9,190	637	11	14,440
Somerset	98	43	59	372	5,179	149	398	6,413
Sussex	34	10	75	279	1,874	216	86	3,665
Union	412	66	240	1,438	16,570	704	22	20,006
Warren	27	-	45	21	487	47	32	704
NEW JERSEY	5,402	1,118	12,383	20,853	252,077	12,342	7,972	333,643
Dutchess	179	62	780	327	3,378	292	18	110,815
Orange	370	62	2,520	991	8,812	806	111	134,850
Putnam	138	48	1,874	367	3,619	423	67	44,454
Rockland	500	140	7,581	1,777	18,377	1,450	283	114,773
Sullivan	97	78	86	196	772	182	33	7,962
Ulster	75	30	176	147	1,182	177	41	19,741
Westchester	1,954	424	27,710	4,297	76,035	6,100	866	382,062
MID-HUDSON	3,314	845	40,727	8,101	112,176	9,431	1,419	814,656
Nassau	373,441	51,157	6,783	30,868	96,676	70,175	1,181	635,541
Suffolk	90,901	452,299	3,202	10,150	35,112	25,630	400	619,734
LONG ISLAND	464,342	503,456	9,985	41,018	131,789	95,805	1,580	1,255,275
Bronx	2,615	654	174,991	16,536	144,971	16,913	963	383,303
Kings	8,659	2,137	10,789	444,560	291,474	49,313	5,965	818,896
Manhattan	5,833	1,764	22,166	28,364	560,801	19,866	2,061	650,810
Queens	54,793	7,743	21,708	88,543	318,051	342,367	4,288	849,748
Richmond	882	203	1,164	26,377	49,179	3,739	77,048	159,499
NEW YORK CITY	72,781	12,502	230,819	604,380	1,364,476	432,199	90,325	2,862,255
RES IN REGION	546,674	518,152	295,476	675,119	1,888,605	551,835	101,342	6,098,057
RES OUT WK IN	4,237	2,272	1,813	6,733	18,416	6,891	3,820	89,327
TOT TRIP-BASED	550,911	520,424	297,289	681,852	1,907,021	558,726	105,162	6,187,384

Table 2-16 2010 Journey-to-Work Flows

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Fairfield	Litchfield	New Haven	Dutchess	Orange	Putnam	Rockland	Westchester
Fairfield	377,532	3,245	19,033	938	113	1,547	365	19,379
Litchfield	10,897	64,970	13,431	744	11	309	26	893
New Haven	57,516	9,778	332,397	118	30	102	25	999
CONNECTICUT	445,945	77,993	364,860	1,800	154	1,958	415	21,271
Bergen	991	-	105	100	244	31	6,327	6,274
Essex	202	-	6	-	45	-	458	673
Hudson	53	-	18	23	-	-	394	1,141
Hunterdon	21	-	2	-	8	-	-	12
Mercer	8	-	24	21	25	-	4	59
Middlesex	54	-	28	49	34	10	102	374
Monmouth	75	-	7	12	49	-	59	358
Morris	119	-	31	7	9	-	199	334
Ocean	12	-	3	-	-	-	63	137
Passaic	214	-	28	22	339	-	1,364	946
Somerset	33	-	10	-	-	-	20	59
Sussex	-	-	18	-	954	3	117	127
Union	100	-	21	15	14	-	131	312
Warren	-	-	-	-	-	-	22	28
NEW JERSEY	1,883	-	302	249	1,721	44	9,259	10,834
Dutchess	1,292	1,014	143	100,738	2,024	3,772	353	12,091
Orange	758	10	48	10,252	129,453	545	14,211	7,700
Putnam	2,727	106	48	1,822	361	16,211	307	23,837
Rockland	989	17	21	318	1,379	109	84,679	13,132
Sullivan	4	-	-	340	6,466	-	316	248
Ulster	86	-	52	12,939	6,744	83	421	779
Westchester	12,997	55	326	1,140	449	1,917	2,929	268,361
MID-HUDSON	18,853	1,201	639	127,549	146,877	22,636	103,216	326,147
Nassau	711	-	71	149	183	26	254	4,661
Suffolk	369	22	76	118	238	91	74	1,696
LONG ISLAND	1,080	22	147	267	421	117	327	6,357
Bronx	1,176	-	15	152	105	137	892	25,609
Kings	388	-	49	126	105	47	844	5,513
Manhattan	8	23	97	223	114	125	1,118	9,065
Queens	1,056	11	69	360	88	72	1,124	11,196
Richmond	27	-	-	24	25	13	112	983
NEW YORK CITY	2,656	35	229	884	437	393	4,090	52,366
RES IN REGION	470,416	79,251	366,177	130,750	149,609	25,148	117,308	416,975
RES OUT WK IN	6,264	4,326	19,958	3,319	2,363	162	516	3,123
TOT TRIP-BASED	476,680	83,577	386,135	134,069	151,972	25,310	117,824	420,097

(Continued)

Table 2-16 2010 Journey-to-Work Flows
(Continued)

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Nassau	Suffolk	Bronx	Kings	New York	Queens	Richmond	Region
Fairfield	805	197	1,526	592	29,936	1,769	22	456,998
Litchfield	40	49	98	32	1,379	217	4	93,098
New Haven	107	9	103	168	1,724	319	22	403,417
CONNECTICUT	952	254	1,727	793	33,039	2,305	48	953,513
Bergen	1,656	261	7,644	4,422	74,956	4,446	1,471	108,925
Essex	756	142	1,016	2,321	34,384	1,665	819	42,487
Hudson	1,387	240	2,130	3,633	69,504	2,258	3	80,781
Hunterdon	19	4	71	54	1,121	76	227	1,614
Mercer	39	10	77	284	6,828	124	111	7,614
Middlesex	559	128	729	3,312	30,987	1,236	2,552	40,157
Monmouth	451	92	190	3,177	24,299	1,193	2,947	32,909
Morris	189	76	408	659	10,465	514	7	13,016
Ocean	134	53	136	528	3,839	287	3	5,194
Passaic	283	81	740	987	10,526	698	12	16,241
Somerset	103	44	61	368	5,597	156	407	6,857
Sussex	38	11	84	290	2,207	242	94	4,186
Union	434	68	252	1,427	18,020	739	22	21,556
Warren	30	-	49	21	550	51	33	784
NEW JERSEY	6,079	1,210	13,587	21,481	293,281	13,684	8,707	382,321
Dutchess	152	53	708	283	2,979	257	15	125,876
Orange	502	79	3,189	1,145	12,361	1,050	139	181,443
Putnam	152	51	2,026	370	4,135	460	71	52,684
Rockland	594	159	8,636	1,878	22,583	1,678	316	136,491
Sullivan	110	86	97	202	912	205	36	9,019
Ulster	71	28	172	135	1,167	171	39	22,888
Westchester	2,070	435	29,124	4,230	83,765	6,420	887	415,105
MID-HUDSON	3,651	892	43,953	8,244	127,902	10,241	1,503	943,506
Nassau	419,490	55,193	7,424	31,451	112,706	77,499	1,263	711,081
Suffolk	116,139	541,264	3,807	11,062	46,625	31,354	466	753,401
LONG ISLAND	535,629	596,457	11,231	42,513	159,331	108,853	1,729	1,464,482
Bronx	2,769	667	184,121	16,122	161,125	17,804	982	411,676
Kings	9,908	2,318	11,910	450,178	350,198	55,138	6,399	893,122
Manhattan	6,123	1,798	23,173	27,827	611,464	20,762	2,101	704,020
Queens	60,659	8,228	23,497	89,026	366,818	373,320	4,525	940,048
Richmond	1,125	243	1,382	28,623	65,300	4,565	89,586	192,005
NEW YORK CITY	80,584	13,253	244,082	611,775	1,554,905	471,589	103,593	3,140,871
RES IN REGION	626,895	612,066	314,581	684,806	2,168,458	606,672	115,580	6,884,694
RES OUT WK IN	3,739	2,027	1,687	6,141	16,635	6,270	3,475	80,003
TOT TRIP-BASED	630,634	614,093	316,268	690,947	2,185,093	612,942	119,055	6,964,697

Table 2-17 2020 Journey-to-Work Flows

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Fairfield	Litchfield	New Haven	Dutchess	Orange	Putnam	Rockland	Westchester
Fairfield	403,880	3,708	22,501	831	128	1,799	434	21,285
Litchfield	11,925	76,940	16,651	646	13	371	32	1,007
New Haven	58,168	10,632	368,344	99	32	112	28	1,042
CONNECTICUT	473,972	91,280	407,497	1,577	173	2,282	493	23,334
Bergen	920	-	106	77	243	31	6,548	6,064
Essex	208	-	6	-	50	-	525	715
Hudson	54	-	20	20	-	-	452	1,209
Hunterdon	22	-	2	-	9	-	-	13
Mercer	9	-	28	19	28	-	5	65
Middlesex	60	-	35	46	39	12	126	428
Monmouth	85	-	9	11	57	-	73	410
Morris	120	-	34	6	9	-	220	345
Ocean	16	-	5	-	-	-	88	174
Passaic	216	-	31	19	362	-	1,527	984
Somerset	39	-	13	-	-	-	25	71
Sussex	-	-	20	-	1,012	4	130	131
Union	102	-	24	13	15	-	147	327
Warren	-	-	-	-	-	-	26	30
NEW JERSEY	1,849	-	334	210	1,824	47	9,893	10,965
Dutchess	1,717	1,395	217	108,792	2,766	5,357	522	16,131
Orange	802	11	56	8,850	145,769	633	16,869	8,412
Putnam	2,888	121	57	1,562	406	18,796	367	26,012
Rockland	960	18	23	254	1,431	116	92,124	13,237
Sullivan	4	-	-	314	7,747	-	400	288
Ulster	114	-	78	13,719	9,251	118	622	1,036
Westchester	13,406	61	380	943	494	2,173	3,422	286,062
MID-HUDSON	19,892	1,606	811	134,433	167,865	27,192	114,325	351,178
Nassau	725	-	81	123	199	30	292	4,920
Suffolk	397	26	92	101	273	107	90	1,882
LONG ISLAND	1,122	26	173	224	472	137	382	6,801
Bronx	1,254	-	18	124	121	162	1,104	28,232
Kings	393	-	58	96	116	54	1,000	5,831
Manhattan	8	25	107	179	120	136	1,248	9,308
Queens	1,073	13	79	290	96	80	1,302	11,807
Richmond	26	-	-	18	26	14	125	1,000
NEW YORK CITY	2,754	38	262	707	480	445	4,780	56,178
RES IN REGION	499,589	92,949	409,077	137,151	170,813	30,103	129,872	448,457
RES OUT WK IN	5,862	4,265	19,559	2,811	2,309	160	513	2,995
TOT TRIP-BASED	505,451	97,215	428,636	139,962	173,122	30,263	130,385	451,452

(Continued)

Table 2-17 2020 Journey-to-Work Flows
(Continued)

	EMPLOYED LABOR FORCE WORKING IN:							
EMPLOYED LF RESIDING IN:	Nassau	Suffolk	Bronx	Kings	New York	Queens	Richmond	Region
Fairfield	889	231	1,703	649	32,502	2,025	26	492,589
Litchfield	45	59	112	36	1,533	258	5	109,633
New Haven	112	10	111	178	1,774	348	24	441,015
CONNECTICUT	1,046	300	1,926	864	35,809	2,631	55	1,043,238
Bergen	1,595	272	7,743	4,458	71,169	4,539	1,537	105,303
Essex	805	162	1,107	2,493	36,016	1,851	925	44,863
Hudson	1,474	273	2,320	3,902	72,617	2,512	3	84,855
Hunterdon	20	4	78	58	1,191	85	257	1,739
Mercer	42	12	84	304	7,388	138	125	8,245
Middlesex	643	155	839	3,730	35,079	1,463	3,050	45,706
Monmouth	520	112	219	3,587	27,554	1,419	3,539	37,597
Morris	195	84	433	690	10,671	554	7	13,369
Ocean	173	72	172	646	4,875	378	3	6,602
Passaic	295	90	794	1,045	10,790	761	13	16,927
Somerset	125	56	73	426	6,704	193	504	8,228
Sussex	40	13	90	306	2,247	263	104	4,360
Union	456	76	270	1,512	18,642	807	25	22,415
Warren	33	-	54	23	593	57	38	855
NEW JERSEY	6,417	1,381	14,275	23,180	305,536	15,020	10,131	401,062
Dutchess	206	74	913	352	3,967	350	21	142,781
Orange	550	94	3,586	1,268	13,311	1,208	162	201,581
Putnam	167	60	2,256	405	4,452	526	82	58,156
Rockland	599	173	9,052	1,950	22,388	1,785	343	144,452
Sullivan	128	107	115	236	1,047	250	44	10,680
Ulster	97	40	224	170	1,545	234	54	27,301
Westchester	2,216	500	31,732	4,539	87,993	7,180	1,006	442,106
MID-HUDSON	3,963	1,049	47,878	8,919	134,703	11,533	1,713	1,027,059
Nassau	444,003	62,843	8,054	33,638	117,188	85,986	1,424	759,507
Suffolk	129,648	649,553	4,304	12,273	51,011	36,550	551	886,858
LONG ISLAND	573,652	712,397	12,358	45,911	168,200	122,536	1,975	1,646,365
Bronx	3,079	801	206,516	17,735	174,946	20,700	1,155	455,946
Kings	10,521	2,694	13,021	484,586	363,338	62,079	7,332	951,118
Manhattan	6,293	1,992	24,575	29,168	617,751	22,443	2,310	715,663
Queens	64,175	9,410	25,501	95,220	380,610	415,297	5,117	1,010,072
Richmond	1,145	270	1,468	30,055	65,196	4,943	99,163	203,449
NEW YORK CITY	85,213	15,167	271,081	656,764	1,601,840	525,462	115,078	3,336,248
RES IN REGION	670,290	730,294	347,518	735,637	2,246,087	677,181	128,952	7,453,971
RES OUT WK IN	3,572	2,032	1,672	6,088	15,770	6,220	3,497	77,326
TOT TRIP-BASED	673,863	732,326	349,190	741,726	2,261,857	683,401	132,449	7,531,297

2.7.3 MTA/AKRF Sub-County Forecasts of Population and Establishment Employment

Sub-county forecasts of population and employment are used to provide detail on where population and employment growth is expected to occur within each County. This data was assembled for each MTA Planning District (Planning Districts are shown in Figures 2-5, 2-6, and 2-7). Data on sub-county population and employment outside of Manhattan, Long Island City, and the Brooklyn CBD were obtained from the MTA Long Range Travel Forecast Study. Inside those areas, population and employment forecasts are based on an analysis of building vacancies and anticipated development conducted by AKRF.

Table 2-18 displays the resulting estimates of population and establishment employment. It should be noted that the MTA/AKRF forecasts of establishment employment are somewhat different from the official NYMTC county-level estimates of employment. This difference is due to the different original sources of information used to prepare the 1990 estimates of employment. The MTA/AKRF forecasts are based on information from the CTPP while the NYMTC forecasts are based on the Department of Labor's Bureau of Economic Analysis.

To assure that these models are faithful to the official, adopted NYMTC forecasts, the MTA RTF Model uses the MTA/AKRF forecasts of establishment employment solely as a means for disaggregating forecasted employment or journey-to-work travel from the county to the sub-county level.

Figure 2-5 MTA Transportation Planning Districts in Manhattan

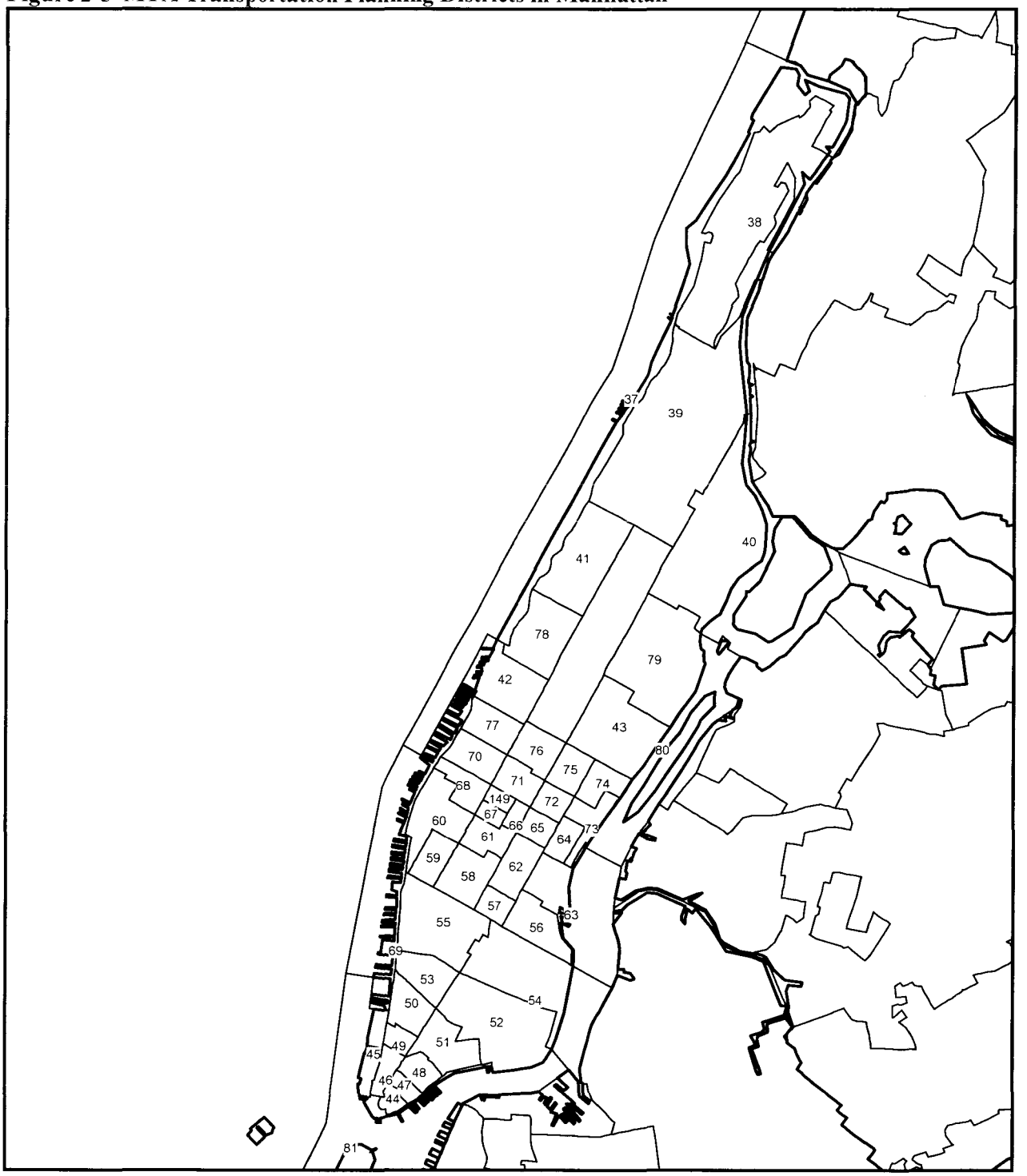


Figure 2-6 MTA Transportation Planning Districts in New York City Outside Manhattan

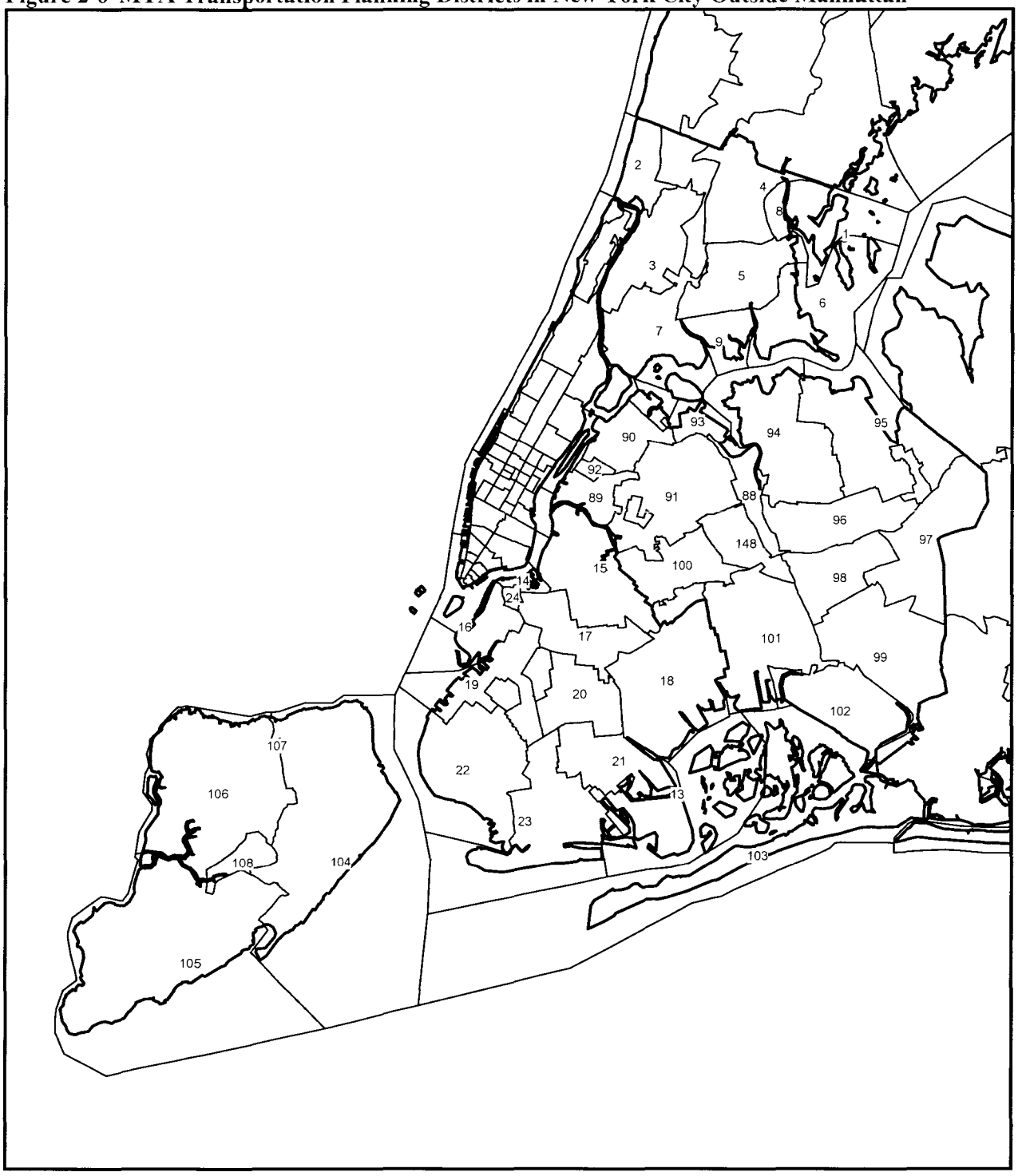


Figure 2-7 MTA Transportation Planning Districts in Region Outside New York City

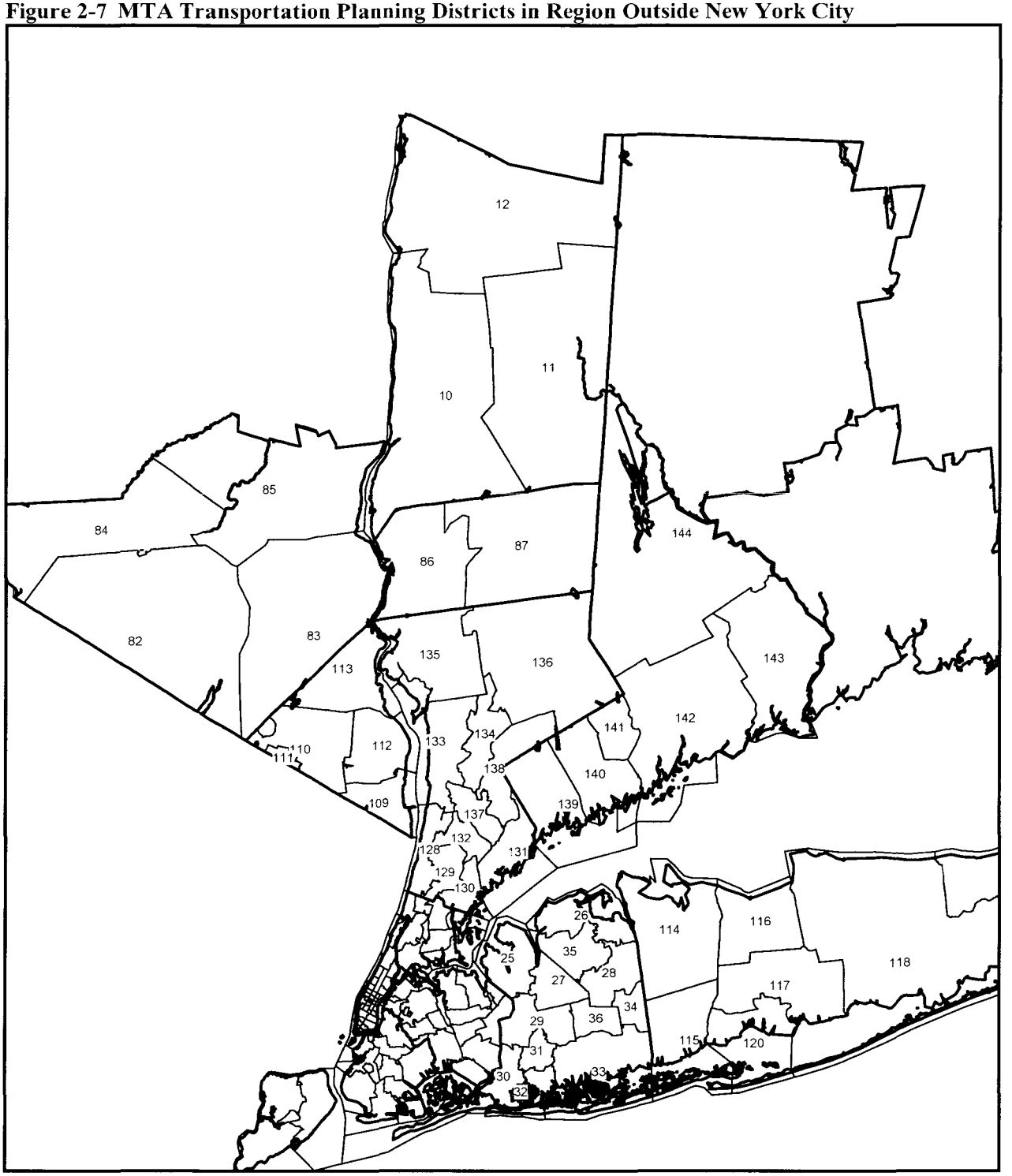


Table 2-18 MTA/AKRF Forecasts of Population and Employment by Sub-County Planning District

		Population			Establishment Employment		
County	MTA PD#	1995	2010	2020	1995	2010	2020
Bronx	1	73	111	140	569	604	680
	2	77,824	80,391	83,384	19,596	21,014	23,023
	3	372,427	389,133	405,667	84,482	89,227	98,116
	4	178,071	185,345	192,650	30,930	33,047	36,115
	5	178,743	183,917	190,126	51,161	54,243	59,343
	6	39,846	40,538	41,676	6,293	6,690	7,312
	7	259,641	272,982	285,618	90,490	95,205	103,723
	8	32,708	33,368	34,340	3,506	3,660	4,033
	9	53,275	54,513	56,196	9,498	9,995	10,894
	Total	1,192,608	1,240,298	1,289,797	296,525	313,685	343,239
Dutchess	10	190,028	211,822	230,360	80,492	101,817	104,724
	11	37,981	42,543	46,543	12,408	15,916	17,327
	12	31,793	35,536	38,699	10,335	12,303	12,974
	Total	259,802	289,901	315,602	103,235	130,036	135,025
Brooklyn	13	94	93	97	4,693	4,726	4,947
	14	411	411	420	9,044	10,189	13,951
	15	340,860	351,893	364,893	99,874	100,581	105,227
	16	73,654	73,996	75,748	81,018	81,453	84,835
	17	256,819	268,921	280,854	61,086	62,626	68,916
	18	323,412	333,370	345,639	63,365	63,795	66,717
	19	174,381	177,373	182,531	62,148	63,533	69,372
	20	278,315	288,216	299,250	55,078	55,468	58,058
	21	133,283	134,446	137,834	30,069	30,282	31,696
	22	367,819	373,909	384,939	94,981	95,981	101,459
	23	317,957	322,499	331,459	68,984	69,778	73,965
	24	8,702	8,571	8,725	44,022	52,539	62,539
	Total	2,275,707	2,333,698	2,412,389	674,363	690,952	741,733
Nassau	25	87,382	90,744	96,460	60,871	68,363	71,651
	26	53,996	56,388	60,059	18,350	20,361	21,149
	27	88,917	91,102	96,182	50,793	56,474	59,065
	28	107,752	110,553	116,734	66,905	75,579	80,215
	29	225,014	238,818	257,055	134,445	151,975	161,533
	30	95,312	97,324	102,526	31,417	35,067	36,787
	31	81,382	83,158	87,640	28,392	32,035	33,781
	32	92,342	96,058	102,123	27,026	30,492	32,208
	33	288,616	297,592	315,055	66,019	73,208	76,486
	34	53,563	55,301	58,579	26,253	29,680	31,711
	35	25,068	27,185	29,705	14,567	16,262	16,975
	36	102,950	105,573	111,487	25,734	28,490	29,924
	Total	1,302,294	1,349,796	1,433,605	550,772	617,986	651,485

(Continued)

Table 2-18 MTA/AKRF Forecasts of Population and Employment by Sub-County Planning District (continued)

		Population			Employment		
County	MTA PD#	1995	2010	2020	1995	2010	2020
Manhattan	37	515	515	515	7,338	7,652	7,652
	38	211,453	211,845	211,938	37,980	38,474	38,629
	39	207,439	215,198	217,026	50,472	56,549	58,048
	40E	50,840	52,925	53,416	8,321	10,484	10,639
	40W	52,863	54,926	55,411	17,960	23,336	23,491
	41	116,044	116,602	116,733	25,184	25,273	25,273
	42	29,600	35,080	36,864	31,884	39,754	43,045
	43E	45,557	46,651	47,291	35,307	37,855	38,688
	43W	24,826	25,158	25,236	43,744	47,071	47,690
	44	798	1,415	1,560	53,698	66,608	66,917
	45	6,599	12,896	14,379	15,627	27,184	27,184
	46	407	754	836	69,078	75,609	76,227
	47	174	215	225	68,615	84,287	84,906
	48	5,494	6,480	6,712	56,231	58,173	65,592
	49	2,030	2,347	2,422	39,454	42,818	44,756
	50	6,948	7,780	7,976	40,253	45,261	46,808
	51	25,037	25,037	25,037	54,818	55,286	55,441
	52	91,660	92,344	92,505	44,464	49,672	52,819
	53	9,566	9,566	9,566	28,109	35,217	37,013
	54	68,582	70,651	71,139	33,614	36,604	37,223
	55	66,006	66,856	67,057	53,212	56,528	56,683
	56	34,119	34,119	34,119	15,467	15,467	15,507
	57	8,858	8,882	8,888	27,199	31,534	32,462
	58	21,862	23,538	25,247	49,379	58,193	61,221
	59	18,099	18,174	18,234	10,408	11,835	11,838
	60	7,083	7,083	7,083	14,927	28,281	38,708
	61	5,730	5,936	5,985	35,471	45,140	46,686
	62	19,695	20,520	20,714	76,608	88,429	89,976
	63	25,147	26,072	26,290	18,169	18,276	18,276
	64	13,246	13,466	13,850	34,960	40,185	40,825
	65	7,864	7,864	7,864	59,905	73,207	74,445
	66	699	915	966	21,959	26,265	26,643
	67	247	247	247	28,112	32,981	33,290
	68	3,553	6,188	6,809	16,720	20,280	22,967
	69	369	369	369	257	1,214	1,307
	70	18,838	19,620	20,801	17,448	20,023	20,350
	71	3,068	3,556	4,155	94,130	129,565	137,994
	72	1,534	1,534	1,534	108,341	127,268	128,196
	73	15,812	16,139	16,620	27,101	29,200	29,266
	74	22,731	22,805	22,823	34,129	37,307	37,616
	75	3,533	3,776	3,833	115,914	134,368	135,915
	76	11,622	12,051	13,402	115,323	138,833	146,275
	77	19,338	19,534	21,190	20,823	22,760	26,317
	78	69,259	69,259	69,259	25,180	25,350	25,350
	79E	96,098	97,693	98,068	24,276	25,432	25,741
	79W	46,457	46,638	46,680	24,276	24,813	24,967
	80	8,543	11,316	11,969	3,500	3,837	3,837
	81	2,673	2,673	2,673	1,714	1,714	1,714
	149	1,481	1,481	1,481	36,262	53,661	59,517
Total		1,509,996	1,556,692	1,574,996	1,873,319	2,185,114	2,261,887

Table 2-18 MTA/AKRF Forecasts of Population and Employment by Sub-County Planning District
(Continued)

		Population			Employment		
County	MTA PD#	1995	2010	2020	1995	2010	2020
Orange	82	63,531	76,746	86,294	21,728	28,220	32,624
	83	77,993	94,813	106,864	24,859	31,685	36,373
	84	72,433	87,187	97,747	32,224	39,457	44,059
	85	105,542	125,954	140,595	40,780	51,313	57,512
	Total	319,499	384,700	431,500	119,591	150,675	170,568
Putnam	86	19,048	20,205	21,218	3,338	4,450	5,487
	87	70,152	78,596	85,082	16,931	21,029	25,285
	Total	89,200	98,801	106,300	20,269	25,479	30,772
Queens	88	480	673	834	7,418	7,920	8,727
	695	3,925	17,425	17,716	11,871	21,614	25,939
	696	586	1,586	1,630	9,593	25,747	32,919
	692	256	266	285	6,120	6,457	6,607
	697	1,977	2,059	2,206	13,321	14,055	14,381
	699	3,016	3,141	3,365	526	555	568
	698	2,747	2,861	3,065	368	388	397
	707	533	555	594	192	202	207
	90	149,014	154,624	164,021	29,561	31,663	34,843
	91	397,574	419,662	448,956	79,967	85,539	94,512
	92	14,484	14,567	15,236	10,927	10,888	11,900
	93	57	77	92	25,664	27,009	29,794
	94	190,470	200,623	214,356	54,066	58,167	64,380
	95	132,352	136,069	143,683	20,415	22,121	24,665
	96	91,229	92,060	96,330	24,143	26,195	29,406
	97	145,987	150,101	158,491	17,199	18,659	20,921
	98	134,839	143,357	153,902	50,095	53,311	59,354
	99	154,069	158,949	168,128	38,422	40,678	44,870
	100	118,525	122,883	130,287	20,879	22,233	24,405
	101	209,459	218,631	232,672	23,707	25,607	28,388
	102	-	-	-	58,891	61,906	67,926
	103	102,407	104,707	110,299	16,549	18,054	20,275
	148	116,313	117,525	123,051	31,464	33,981	38,027
	Total	1,970,299	2,062,401	2,189,198	550,727	612,948	683,411
Richmond	104	164,164	176,601	187,434	57,988	64,941	72,378
	105	119,567	135,548	147,738	15,863	17,788	19,734
	106	112,723	125,529	135,757	28,042	31,654	35,027
	107	1,780	1,969	2,120	444	490	550
	108	1,768	1,857	1,951	1,009	1,127	1,276
	Total	400,002	441,504	475,000	103,346	116,000	128,965
Rockland	109	48,613	52,149	55,514	30,192	35,538	39,223
	110	84,088	90,238	96,091	23,331	27,848	30,566
	111	15,345	16,401	17,420	6,721	7,914	8,911
	112	79,567	85,478	91,064	26,625	31,003	34,194
	113	47,186	51,234	54,909	12,605	14,636	15,934
	Total	274,799	295,500	314,998	99,474	116,939	128,828

(Continued)

Table 2-18 MTA/AKRF Forecasts of Population and Employment by Sub-County Planning District (continued)

		Population			Employment		
County	MTA PD#	1995	2010	2020	1995	2010	2020
Suffolk	114	195,123	216,617	240,249	101,255	119,821	140,639
	115	206,739	229,565	254,629	80,705	93,175	108,502
	116	115,605	128,309	142,284	45,857	54,224	64,099
	117	229,517	254,708	282,434	88,907	102,862	120,916
	118	407,303	452,200	501,515	120,019	145,432	177,258
	119	108,651	120,283	133,212	48,234	57,631	70,085
	120	84,159	93,514	103,776	28,585	34,338	41,225
	Total	1,347,097	1,495,196	1,658,099	513,562	607,483	722,724
Westchester	128	154,981	157,560	159,083	42,623	46,349	49,350
	129	117,944	117,011	116,642	33,816	37,116	40,016
	130	120,702	121,358	121,762	48,130	52,111	55,097
	131	96,289	96,998	97,404	42,829	46,467	50,057
	132	39,820	38,373	38,258	17,858	19,504	20,940
	133	80,518	83,603	85,295	44,018	47,312	50,192
	134	37,198	37,150	37,135	14,379	15,356	16,169
	135	73,915	74,817	75,317	29,274	32,244	34,368
	136	73,150	76,293	78,143	27,562	29,899	31,856
	137	70,833	72,695	73,712	66,024	71,185	76,417
	138	20,245	21,475	22,245	15,707	16,654	17,751
	Total	885,595	897,333	904,996	382,220	414,197	442,213
Fairfield	139	59,081	62,705	66,996	33,958	39,782	42,282
	140	127,755	139,789	151,710	82,342	93,801	98,720
	141	18,236	19,234	20,499	7,040	8,349	8,937
	142	188,715	202,567	217,832	101,128	115,043	121,085
	143	278,058	299,703	323,067	123,405	135,319	141,549
	144	166,548	182,301	198,003	73,702	81,422	85,193
	Total	838,393	906,299	978,107	421,575	473,716	497,766
Litchfield	150	181,000	211,600	241,000	84,600	105,800	123,600
New Haven	151	807,600	857,500	903,700	409,700	464,200	513,900
Region		13,653,891	14,421,219	15,229,287	6,203,278	7,025,210	7,576,116

2.8 1995 Daily Person Trip Table

The 1995 daily person trip table used in the MTA RTF Model represents nearly all travel in the New York and Connecticut portions of the metropolitan area. It is based on three sources of information:

- 1990 Census Transportation Planning Package (CTPP) data on workers by Census Tract of Residence, Census Tract of Work, and customary mode of travel.

- 1989 MTA Comprehensive Telephone Travel Survey (CTTS) data on total trip-making for 72 zones in the MTA service area.

- Observed 1995 ridership on NYCT, LIRR, and MNR services used as the basis for adjusting the 1990 CTPP/1989 CTTS data to be representative of 1995 conditions.

The first two sources of data were used to construct a Year 1990 trip table that builds on the strengths of each:

- The CTPP data is based on a very large sample of potential trip makers and factored to represent all workers over 16 in the region. It is geographically coded to a very fine level-of-detail: Census Block Groups-subsets of the zones used in the MTA RTF Model. The CTPP data set provides information on the residential location of workers over 16 and their place of employment. It also includes information on the predominate mode-to-work used during the week prior to the 1990 Census.

- The CTTS survey data are based on a telephone survey conducted in 1989 that included complete trip logs for 41,783 trips. The survey is geographically coded at the MTA super zone level; there are 73 super zones in the MTA service area. The super zone system subdivides the New York counties as follows:
    - Manhattan - 25 super zones
    - Bronx - 5 super zones
    - Queens - 8 super zones
    - Brooklyn - 9 super zones
    - Staten Island - 1 super zone
    - Westchester - 8 super zones
    - Putnam - 1 super zone
    - Dutchess - 1 super zone
    - Rockland - 1 super zone
    - Orange - 1 super zone
    - Fairfield/New Haven - 1 super zone
    - Nassau - 9 super zones
    - Suffolk - 3 super zones

  The information included in the CTTS provides insight on total trip-making for all purposes.

Neither data source is adequate by itself to develop a satisfactory Year 1990 trip table, but together these two data sets provide both the detail and the coverage necessary to represent most regional travel. The CTPP provides the necessary detail in terms of both fineness of geographic coding and sample size while the CTTS provides information on all trip purposes and on frequency of travel.

The 1995 person trip tables are based on the Year 1990 CTPP/CTTS Trip Tables with two key adjustments:

1. Trips on zone-to-zone interchanges where a qualified path does not exist are either reassigned to a path that does exist or are eliminated from the trip table. This eliminates potential inconsistencies between the modeled networks and the modeled trip tables.

2. The resulting mode-specific trip tables are assigned to the 1995 base networks and assignment results are compared to observed 1995 ridership data. As necessary, the trip table is adjusted so that assignment results match observed ridership counts.

Table 2-19 summarizes the original 1990 trip tables and the adjusted 1995 person trip tables.

Table 2-19 Base 1990 and 1995 Daily Person Trip Table by Mode

Year 1990 Base Trip Tables

Mode	Purpose			
	Home-Based Work	Home-Based Other	Non-Home-Based	Total
Automobile	4,759,425	6,912,704	1,710,121	13,185,827
Commuter Rail	347,918	161,772	69,176	578,866
Subway	1,932,347	1,242,981	580,527	3,755,855
Bus	700,703	1,174,022	222,019	2,096,744
Total	7,740,393	9,491,479	2,581,843	19,813,715

Year 1995 Corrected Trip Tables

Mode	Purpose			
	Home-Based Work	Home-Based Other	Non-Home-Based	Total
Automobile	4,657,142	6,818,564	1,710,121	13,185,827
Commuter Rail	302,233	167,475	74,404	544,112
Subway	1,847,061	1,092,451	534,507	3,474,019
Bus	470,140	780,349	137,023	1,387,512
Total	7,276,576	8,858,838	2,455,605	18,591,019

2.9 Year 2010 and 2020 Daily Person Trip Table

The Year 2010 and 2020 base daily person trip tables are based on the Year 1995 person trip table, factored to represent expected changes in journey-to-work travel, population, and employment between 1995 and 2010 or 2020, respectively. The factoring process uses different procedures for home-based work and other purposes and is described in the subsections that follow.

2.9.1 Factoring Procedures for Year 2010 and 2020 Home-Based Work Trip Tables

Growth factors for adjusting the Year 1995 Home-Based Work (HBW) trip table to represent Year 2010 and 2020 socioeconomic conditions are based on county-to-county journey-to-work forecasts prepared by Urbanomics and subsequently stratified by KPMG to the MTA Transportation Planning District level. The factoring was performed as follows:

1. Each county of residence in the 1995 journey-to-work table (i.e., each row) is allocated among the different planning districts in the county according to the relative 1995 planning district population. A similar allocation is performed for the 2010 journey-to-work table and the 2020 journey-to-work using 2010 and 2020 population, respectively.

2. Each county of employment in the 1995 journey-to-work table (i.e., each column) is allocated among the different planning districts in the county according to the relative 1995 planning district establishment employment. A similar allocation is performed for the 2010 journey-to-work table and the 2020 journey-to-work using 2010 and 2020 establishment employment, respectively.

3. Year 1995-to-2010 growth factors are computed for each planning district-to-planning district combination by dividing 2010 journey-to-work trips (stratified to planning districts) by 1995 journey-to work trips. Year 1995-to-2020 growth factors are computed using a similar approach with the 2020 journey-to-work trips.

4. Each zone-to-zone entry in the 1995 trip table is multiplied by the appropriate (the corresponding production and attraction planning district) year 1995-to-2010 factor to create the 2010 trip table. A similar procedure is used to create the year 2020 trip table.

2.9.2 Factoring Procedures for Year 2010 and 2020 Home-Based Other and Non-Home-Based Trip Tables

Each zone-to-zone entry in the home-based other and non-home based trip tables are factored by the ratio of 2010 planning district population to 1995 planning district population to create the 2010 Home-Based Other (HBO) and Non-Home-Based (NHB) trip tables. A similar procedure is used to create the 2020 HBO and NHB trip tables. Population was used as the basis for this factoring rather than journey-to-work forecasts since it was felt that most non-work travel to Manhattan (e.g., cultural events and shopping) will continue to grow in rough proportion to the population in each planning district and will not be subject to the balancing between population and employment incorporated in the journey-to-work tables.

2.9.3 Resulting 2010 and 2020 Person Trip Tables

The results of the trip table factoring process are presented in Tables 2-20 through 2-25.

Table 2-20 Year 1995, 2010, and 2020 Home-Based Work Person Trips to All Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	566,829	613,566	677,977	8.2%	19.6%
Kings	1,116,455	1,241,432	1,322,380	11.2%	18.4%
New York	698,249	749,240	764,688	7.3%	9.5%
Queens	1,215,584	1,354,143	1,444,658	11.4%	18.8%
Richmond	290,622	362,369	375,769	24.7%	29.3%
NEW YORK CITY	3,887,739	4,320,750	4,585,472	11.1%	17.9%
Nassau	875,931	976,795	1,041,793	11.5%	18.9%
Suffolk	875,400	1,066,710	1,254,226	21.9%	43.3%
LONG ISLAND	1,751,331	2,043,505	2,296,019	16.7%	31.1%
Dutchess	151,297	174,915	195,996	15.6%	29.5%
Orange	67,377	90,197	101,321	33.9%	50.4%
Putnam	61,526	72,240	79,954	17.9%	30.0%
Rockland	179,293	213,130	226,170	18.9%	26.1%
Westchester	568,430	619,211	659,033	8.9%	15.9%
MID-HUDSON	1,027,923	1,169,693	1,262,474	13.8%	22.8%
Fairfield	532,345	604,110	651,126	13.5%	22.3%
Litchfield	59,358	71,407	83,871	20.3%	41.3%
New Haven	17,881	20,467	21,495	14.5%	20.2%
CONNECTICUT	609,584	695,984	756,492	14.2%	24.1%
REGION	7,276,577	8,229,932	8,900,457	13.1%	22.3%

Table 2-21 Year 1995, 2010, and 2020 Home-Based Other Person Trips to All Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	715,672	742,050	770,846	3.7%	7.7%
Kings	1,273,635	1,304,854	1,348,515	2.5%	5.9%
New York	747,585	766,215	774,329	2.5%	3.6%
Queens	1,328,595	1,387,292	1,472,075	4.4%	10.8%
Richmond	388,536	428,034	460,289	10.2%	18.5%
NEW YORK CITY	4,454,023	4,628,445	4,826,054	3.9%	8.4%
Nassau	1,269,470	1,314,772	1,395,795	3.6%	10.0%
Suffolk	1,248,576	1,385,491	1,536,541	11.0%	23.1%
LONG ISLAND	2,518,046	2,700,263	2,932,336	7.2%	16.5%
Dutchess	244,542	272,694	296,941	11.5%	21.4%
Orange	73,235	87,986	98,613	20.1%	34.7%
Putnam	125,826	139,574	150,271	10.9%	19.4%
Rockland	143,674	154,475	164,667	7.5%	14.6%
Westchester	817,062	828,162	835,436	1.4%	2.2%
MID-HUDSON	1,404,339	1,482,891	1,545,928	5.6%	10.1%
Fairfield	421,106	455,169	491,294	8.1%	16.7%
Litchfield	46,674	54,562	62,123	16.9%	33.1%
New Haven	14,649	15,543	16,378	6.1%	11.8%
CONNECTICUT	482,429	525,274	569,795	8.9%	18.1%
REGION	8,858,837	9,336,873	9,874,113	5.4%	11.5%

Table 2-22 Year 1995, 2010, and 2020 Non-Home-Based Person Trips to All Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	158,479	164,351	170,742	3.7%	7.7%
Kings	311,776	319,467	330,176	2.5%	5.9%
New York	431,463	447,654	454,350	3.8%	5.3%
Queens	323,935	338,794	359,613	4.6%	11.0%
Richmond	61,255	67,491	72,581	10.2%	18.5%
NEW YORK CITY	1,286,908	1,337,757	1,387,462	4.0%	7.3%
Nassau	365,018	378,103	401,438	3.6%	10.0%
Suffolk	246,468	273,465	303,260	11.0%	23.0%
LONG ISLAND	611,486	651,568	704,698	6.6%	15.2%
Dutchess	60,863	67,868	73,901	11.5%	21.4%
Orange	19,349	23,184	25,947	19.8%	34.1%
Putnam	23,291	25,838	27,820	10.9%	19.4%
Rockland	54,687	58,813	62,703	7.0%	14.7%
Westchester	266,288	269,947	272,307	1.4%	2.3%
MID-HUDSON	424,478	445,650	462,678	5.0%	9.0%
Fairfield	98,835	106,832	115,312	8.1%	16.7%
Litchfield	10,726	12,539	14,276	16.9%	33.1%
New Haven	23,172	24,585	25,906	6.1%	11.8%
CONNECTICUT	132,733	143,956	155,494	8.5%	17.1%
REGION	2,455,605	2,578,931	2,710,332	5.0%	10.4%

Table 2-23 Year 1995, 2010, and 2020 Home-Based Work Person Trips to Manhattan Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	279,209	311,479	339,454	11.6%	21.6%
Kings	464,252	560,967	583,112	20.8%	25.6%
New York	486,106	528,233	531,759	8.7%	9.4%
Queens	564,291	660,797	687,051	17.1%	21.8%
Richmond	150,356	201,193	199,827	33.8%	32.9%
NEW YORK CITY	1,944,214	2,262,669	2,379,766	16.4%	22.4%
Nassau	125,961	148,040	154,002	17.5%	22.3%
Suffolk	45,817	61,909	67,972	35.1%	48.4%
LONG ISLAND	171,778	209,949	227,182	22.2%	32.3%
Dutchess	3,369	3,147	4,167	-6.6%	23.7%
Orange	10,615	15,025	16,220	41.5%	52.8%
Putnam	6,183	7,073	7,618	14.4%	23.2%
Rockland	26,460	32,479	32,212	22.7%	21.7%
Westchester	112,390	124,202	129,790	10.5%	15.5%
MID-HUDSON	159,017	181,926	189,940	14.4%	19.4%
Fairfield	25,008	29,641	31,950	18.5%	27.8%
Litchfield	732	942	1,066	28.7%	45.6%
New Haven	1,414	1,697	1,734	20.0%	22.6%
CONNECTICUT	27,154	32,280	35,535	18.9%	30.9%
REGION	2,302,163	2,686,824	2,832,423	16.7%	23.0%

Table 2-24 Year 1995, 2010, and 2020 Home-Based Other Person Trips to Manhattan Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	183,966	190,747	198,179	3.7%	7.7%
Kings	203,765	208,584	215,471	2.4%	5.7%
New York	505,672	519,076	524,688	2.7%	3.8%
Queens	206,898	218,284	231,811	5.5%	12.0%
Richmond	28,942	31,883	34,285	10.2%	18.5%
NEW YORK CITY	1,129,273	1,168,574	1,204,434	3.5%	6.7%
Nassau	110,715	114,808	121,970	3.7%	10.2%
Suffolk	25,715	28,539	31,652	11.0%	23.1%
LONG ISLAND	136,430	143,347	153,622	5.1%	12.6%
Dutchess	7,800	8,701	9,477	11.6%	21.5%
Orange	9,238	11,153	12,533	20.7%	35.7%
Putnam	2,293	2,523	2,704	10.0%	17.9%
Rockland	20,743	22,269	23,718	7.4%	14.3%
Westchester	85,668	86,188	86,708	0.6%	1.2%
MID-HUDSON	125,742	130,834	135,140	4.0%	7.5%
Fairfield	28,982	31,231	33,644	7.8%	16.1%
Litchfield	1,688	1,973	2,246	16.9%	33.1%
New Haven	2,050	2,176	2,292	6.1%	11.8%
CONNECTICUT	32,720	35,380	38,182	8.1%	16.7%
REGION	1,424,165	1,478,135	1,531,378	3.8%	7.5%

Table 2-25 Year 1995, 2010, and 2020 Non-Home-Based Person Trips to Manhattan Attraction Locations

County of Production	1995	2010	2020	Growth % 1995-2010	Growth % 1995-2020
Bronx	21,699	22,480	23,361	3.6%	7.7%
Kings	45,301	46,385	47,921	2.4%	5.8%
New York	229,130	238,838	242,957	4.2%	6.0%
Queens	62,788	65,909	69,953	5.0%	11.4%
Richmond	5,424	5,974	6,423	10.1%	18.4%
NEW YORK CITY	364,342	379,586	390,615	4.2%	7.2%
Nassau	19,246	19,953	21,194	3.7%	10.1%
Suffolk	6,054	6,718	7,450	11.0%	23.1%
LONG ISLAND	25,300	26,671	28,644	5.4%	13.2%
Dutchess	558	622	678	11.5%	21.5%
Orange	126	152	171	20.6%	35.7%
Putnam	93	103	110	10.8%	18.3%
Rockland	237	254	271	7.2%	14.3%
Westchester	11,936	12,027	12,103	0.8%	1.4%
MID-HUDSON	12,950	13,158	13,333	1.6%	3.0%
Fairfield	5,617	6,050	6,517	7.7%	16.0%
Litchfield	132	154	176	16.7%	33.3%
New Haven	262	278	293	6.1%	11.8%
CONNECTICUT	6,011	6,482	6,986	7.8%	16.2%
REGION	408,603	425,897	439,578	4.2%	7.6%

2.10 Mode Choice Model

The mode choice model is one of the most important components of the MTA RTF Model. It is responsible for determining the market share for each mode of travel (i.e., automobile, commuter rail, subway, and bus) and the shifts in market share that result from changes to the transportation network. The model predicts each mode's share of the total travel market for each combination of production zone and attraction zone in the region. These predictions are based on the characteristics of the trip makers and on the zone-to-zone characteristics of each mode including in-vehicle travel time, waiting time, fare, and number of transfers.

The mode choice model developed for the MTA RTF Model is a nested logit-type model. Its structure and coefficients are borrowed from the NJ TRANSIT North Jersey Transit Demand Forecasting Model with adjustments for the MTA RTF based on traveler preference research conducted by MVA Consultancy for the LMAS.

The four modes included in the mode choice model are consistent with the four modes used in the network and path-building steps and are:

1. **Automobile:** Motorized trips that drive from origin to destination without using any transit service.

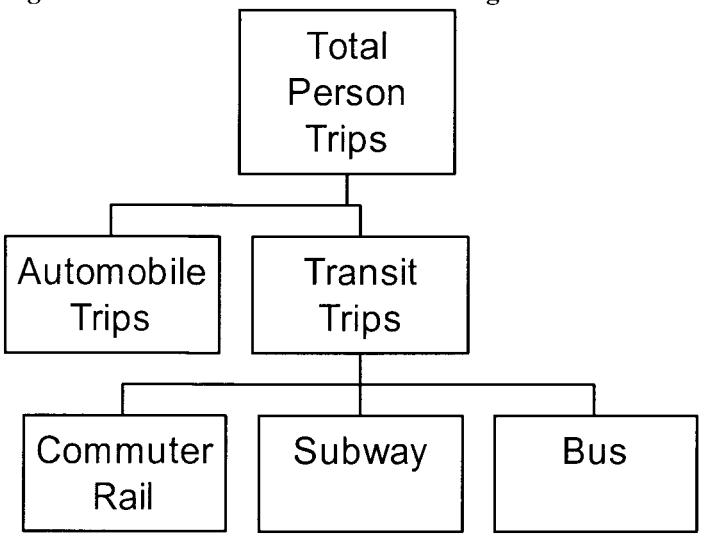
2. **Commuter Rail:** Trips that use commuter rail (e.g., LIRR, Metro-North, or NJ TRANSIT rail during some portion of the trip from origin to destination). As defined in the MTA RTF Model, the commuter rail mode includes bus-to-commuter rail and subway-to-commuter trips.

3. **Subway:** Trips that use the NYCT subway or PATH during some portion of the trip from origin to destination but do *not* use commuter rail (these later trips would be characterized as commuter rail trips). As defined in the MTA RTF Model, the subway mode includes bus-to-subway trips.

4. **Bus:** Trips that use transit but do not use commuter rail or subway during any portion of the trip from origin to destination.

The structure of the modeled modes is shown in Figure 2.8.

Figure 2-8 Mode Choice Model Nesting Structure



A nested logit mode choice model works by computing the "utility" for each of the bottom level choices (i.e., automobile, commuter rail, subway, and bus). This utility represents the total economic "cost" of travel for each mode in terms of time, cost, and other impediments/inducements to travel. It is typically constructed as a linear function of the different components of time and cost as shown below:

$$U_m = (C_1*IVTT_m + C_2*OVTT_m + C_3*WAIT_m + C_4*COST_m + C_5*DATA1_m + \ldots + K_m) * 1/NC_m$$

Where:

U_m = Utility for mode *m*
C_1, C_2, C_3, C_4, C_5 = Calibrated coefficients
$IVTT_m$ = in-vehicle travel time for mode *m*
$OVTT_m$ = out-of-vehicle travel time for mode *m*
$WAIT_m$ = wait time for mode *m*
$COST_m$ = travel cost or fare for mode *m*
$DATA1_m$ ... = other data elements characterizing the mode *m* trip
K_m = mode-specific constant for mode *m*
NC_m = product of the nest coefficients for all upper nests

The utility for an upper level nest (i.e., auto or transit) is computed by taking the log-sum of the lower level nests. For example, the utility for all transit is computed from the utilities for commuter rail, subway, and bus as follows:

$$U_t = NC_t * \ln(\exp(U_c) + \exp(U_s) + \exp(U_b))$$

where:
U_t= Utility for transit
NC_t= Nest coefficient for transit nest

ln() = Natural logarithm
exp() = Exponential function (i.e., e^x)
U_c = Utility for commuter rail
U_s = Utility for subway
U_b = Utility for bus

For any given choice (i.e., auto versus transit or commuter rail versus subway versus bus), the choice is computed using the logit equation:

$$S_m = \frac{e^{U_m}}{\sum_{i=1}^{M} e^{U_i}}$$

where:

S_m = Mode share for mode *m*
U_m = Utility for mode *m*
M = Number of different modes to be chosen among

The basic model structure and coefficients are based on values used in the NJ TRANSIT North Jersey Transit Demand Forecasting Model with adjustments to account for:

1. Research conducted by MVA through a stated preference survey project to determine the preferences of travelers at each commuter rail Manhattan Gateway regarding travel to Lower Manhattan; and

2. Adjustments required to fit the model to explain observed transit travel patterns in the region.

The final model coefficients are presented in Table 2-26.

Table 2-26 Final Mode Choice Coefficients for the MTA RTF Model

Mode	Home-Based Work	Home-Based Other	Non-Home Based
Automobile			
IVTT	-0.04195	-0.00789	-0.00789
Auto Cost (Year 1995 cents)	-0.00315	-0.00059	-0.00059
Commuter Rail			
In-vehicle time – commuter rail (minutes)	-0.03222	-0.02616	-0.02616
In-vehicle time - subway (minutes)	-0.04306	-0.03488	-0.03488
In-vehicle time - bus time (minutes)	-0.04306	-0.03488	-0.03488
Wait time	-0.07733	-0.06278	-0.06278
Fare (Year 1995 cents)	-0.00242	-0.00196	-0.00196
Out-of-vehicle time (minutes)	-0.03544	-0.02878	-0.02878
Transfers (number)	-0.15143	-0.12295	-0.12295
Subway Flag (=1 if subway on path, =0 otherwise)	-0.12888	-0.10464	-0.10464
Bus Flag (=1 if subway on path, =0 otherwise)	-0.12888	-0.10464	-0.10464
Subway			
In-vehicle time (minutes)	-0.04306	-0.03488	-0.03488
Wait time	-0.07733	-0.06278	-0.06278
Fare (Year 1995 cents)	-0.00242	-0.00196	-0.00196
Out-of-Vehicle time (minutes)	-0.03544	-0.02878	-0.02878
Transfers (number)	-0.15143	-0.12295	-0.12295
Bus			
In-vehicle time (minutes)	-0.04306	-0.03488	-0.03488
Wait time	-0.07733	-0.06278	-0.06278
Fare (Year 1995 cents)	-0.00242	-0.00196	-0.00196
Walk time (minutes)	-0.03544	-0.02878	-0.02878
Transfers (number)	-0.15143	-0.12295	-0.12295
Transit Nest Coefficient	0.50000	0.50000	0.50000

Note: All coefficients expressed as equivalent top-nest value. Transit coefficients are divided by the transit nest coefficient prior to computation of the utility function. Mode-specific constants for each alternative were determined during aggregate calibration and are discussed in Section 2.9.1.

2.10.1 Aggregate Calibration

Aggregate calibration is the process of establishing final mode-specific constants so that modeled shares by mode match observed shares. This model has been calibrated for 49 sub-area markets to ensure that the model replicates regional travel patterns. The 49 sub-areas represent the combination of 7 production and 7 attraction areas. These 7 areas are:

- Lower Manhattan (South of Canal)
- Midtown Manhattan (Canal to 60th Street)
- Uptown Manhattan (North of 60th Street)
- Bronx
- Brooklyn
- Queens
- Suburban and Staten Island

Travel in two submarkets (Suburban/Staten Island-to-Lower Manhattan and Suburban/Staten Island-to-Midtown) is further subdivided at the production-end according to the following subdivisions:

- Nassau County
- Western Suffolk County
- Eastern Suffolk County
- Western Westchester County
- Central Westchester County
- Eastern Westchester County
- Northern Westchester County
- Putnam and Dutchess Counties
- Orange and Rockland Counties
- Bridgeport
- Southern Fairfield County
- Northern Fairfield County
- New Haven and Litchfield Counties
- Staten Island

Constants were determined by iteratively running each model (home-based work, home-based other, and non-home-based) and comparing mode split results (trips by mode) for each market segment to market segment summaries from the survey-derived trip tables. The constants are adjusted up or down to improve the comparison between modeled and survey trips by mode and the process is repeated.

2.11 Preparation of AM Peak Period Origin-Destination Trip Tables

The mode choice model estimates the alternative-specific daily production-attraction trip tables stratified by mode and purpose. The next step is to take this information and create a new trip table suitable for assignment to the transit networks. Three conversions are required:

- **Convert the production-attraction trip tables into origin-destination format.** In other words, convert the trip table so that each row represents trip origins and each column represents trip destinations—this change allows the directionality of travel to be properly represented.

- **Select those trips that occur in the AM Peak Period.** The MTA transit networks represent transit services occurring in the peak hour. The selection of just those trips occurring in the peak period means that the assignment considers just those trips that would likely see the service represented in the network.

- **Add New Jersey-Related Travel.** Trans-Hudson travel is added to the trip table using results from the 1990 Base and 2020 No-Build versions of NJ TRANSIT's North Jersey Transit Demand (NJTDFM) Forecasting Model. This was accomplished by converting the NJTDFM representation of New York zones into the equivalent MTA RTF zone. The New Jersey zones were converted into the appropriate external station depending on where each trip crosses the Hudson River. The following external stations were defined:

    - Hudson River Tunnels approaching Penn Station
    - Lincoln Tunnel approaching the Port Authority Bus Terminal
    - George Washington Bridge approaching the George Washington Bridge Bus Terminal
    - PATH North Tube
    - PATH South Tube
    - New Jersey Ferry to Midtown
    - New Jersey Ferry to the World Financial Center

The approach for converting a production-attraction trip table to an origin-destination trip table involves developing and applying a series of multiplicative factors that represent the amount of daily travel occurring in the peak. Separate factors are applied for trips traveling from home (i.e., production-to-attraction) and the transpose (i.e., attraction-to-production). These factors are based on the 1989 MTA Comprehensive Telephone Travel Survey and are shown in Table 2-27.

The AM origin-destination trip tables are computed by multiplying the all-day production-attraction trip table by the production-to-attraction factor and the transpose of the all-day trip table by the attraction-to-production factor. As such, the sum of the production-to-attraction and the attraction-to-production factors represents the fraction of daily travel occurring in the AM Peak. None of the summed factors exceeds 0.5 meaning that 50 percent or less of the daily travel occurs in the AM Peak. In several cases, the sum of the HBW factors approaches or equals 0.5, meaning that 50 percent of the HBW trips occur in the AM Peak Period. This factor is relatively high and is caused by the fact that commuter trips in the afternoon are more likely to make intermediate stops. Thus the afternoon trip home is more likely to consist of a non-home-based trip (e.g., work-to-shop) and a home-based other trip (e.g., shop-to-home) than a single HBW trip. Accordingly, a higher percentage of the HBW trips is expected to occur in the AM Peak.

Table 2-27 Fraction of Travel Occurring in the AM Peak Period

		Production-to- Attraction	Attraction-to-Production
Commuter Rail	HBW	0.494	0.003
	HBO	0.314	0.002
	NHB	0.207	
Subway	HBW	0.479	0.005
	HBO	0.269	0.011
	NHB	0.127	
Bus	HBW	0.492	0.007
	HBO	0.265	0.003
	NHB	0.144	

2.12 AM Peak Period Assignment Procedures

Assignment is performed using the AM peak period origin-destination trip tables developed in the previous step and the TRANSCAD TASSIGN Procedure. This assignment procedure uses a capacity-constrained user-equilibrium assignment approach to assign trips to the transit network. Assignment is conducted in four phases:

1. AM Peak Period Subway Trips
2. AM Peak Period Commuter Rail Trips (trips from Metro-North Territory)
3. AM Peak Period Commuter Rail Trips (trips from LIRR Territory)
4. AM Peak Period Bus Trips

Following each phase of the assignment, the remaining capacity on each link is computed prior to beginning the assignment of the next mode. Accordingly, the commuter rail assignments are performed based on the capacity limitations imposed by the prior assignment of subway trips. Likewise, the assignment of bus trips is constrained by the prior assignment of both subway and commuter rail trips.

3. DEFINITION OF ALTERNATIVES

The ridership model described in Chapter 2 has been used to estimate the ridership implications of different possible configurations of LIRR service. This chapter describes each of the alternative LIRR service scenarios studied and presented in this report.

3.1 Year 1995 Base (NB95)

The Year 1995 Base (designated with the code "NB95" in the tables summarizing the results) represents the highway and transit networks as they existed in 1995 with the demand for travel as it existed in 1995. The results of this scenario are used to both:

- Validate the performance of the model to confirm that it appropriately represents observed conditions; and
- Provide a basis for comparison that shows how ridership is expected to change between the present and the forecast years.

Specific assumptions regarding the LIRR service in 1995 are provided in Tables 3-1 and 3-2.

3.2 Year 2010 and Year 2020 No-Build (NB13 and NB23)

The Year 2010 and 2020 No-Build Scenarios represent conditions given either 2010 or 2020 levels of demand and the future-year No-Build Network. The No-Build network is based on existing conditions with committed changes that are assumed to occur between 1995 and 2010/2020 and are independent of the decision to build or not build the East Side Access Project. These runs are designated as NB13 (2010 No-Build) and NB23 (2020 No-Build). The principal differences between the 1995 and future-year No-Build networks are as follows:

1. **Fare Policy.** As indicated in Chapter 2, the future year fare policy is slightly different from the 1995 fare policy. In constant year dollars, the fares on the LIRR are expected to decline by between 3 and 4 percent between 1995 and either 2010 or 2020. This is consistent with current MTA fare policy that fares would increase in November 1995 and would not increase again until the Year 2000. Following that period, the MTA has assumed for its Long Range Planning Framework projects that fare would rise proportionately with the Consumer Price Index.

   The no-build fare policy assumes that subway and bus fares would rise proportionately with inflation between 1995 and 2020. The free Metro-Card bus-to-subway and bus-to-bus transfers that have been recently implemented are assumed available in 2010 and 2020.

2. **LIRR Service.** The future year No-Build operating scenario is similar to the 1995 service plan but assumes that the LIRR is able to increase the AM Peak Hour Capacity of Penn Station from 36 trains per hour today to 42 trains per hour in the future. The LIRR will utilize this additional capacity to operate 6 new peak hour dual mode trains from its non-electrified territory directly into New York Penn Station. A summary of the assumed LIRR services in the 2020 No-Build is provided in Tables 3-3 and 3-4.

3. **Subway Service.** The future year No-Build includes the construction and operation of NYCT's 63rd Street Tunnel Connection to the Queens Boulevard Line. Direct service from 179th Street to the 63rd Street Tunnel is provided in the No-Build Scenario.

4. **Metro-North Changes.** The future year No-Build also includes minor changes to the Metro-North Network including the extension of the Harlem Line to Wassaic and the Secaucus Transfer in New Jersey which will allow direct transfers from the MNR Port Jervis and Spring Valley Lines to NJ TRANSIT's Northeast Corridor Service to Penn Station.

5. **Bus Service Changes.** The 2010 and 2020 No-Build Networks include the MTA's representation of expected future year bus services.

3.3 Year 2010 and Year 2020 Transportation Systems Management (T310 and TSM3)

The Year 2010 and 2020 Transportation Systems Management (TSM) Alternative represents a low-capital cost scenario for purposes of assessing the effectiveness of the Build Alternatives. The TSM alternatives are based on the scenarios developed for the LIRR ESA MIS project and are designated as T310 (2010 TSM) and TSM3 (2020 TSM). They are similar to the 2010/2020 No-Build Scenarios with the following additional system enhancements:

1. **Additional LIRR Train Capacity.** Additional capacity was assumed for selected trains on the LIRR system by assuming that selected trains would operate with a full 11 or 12 car consist. These changes are as follows.
   - 2,400 additional seats/hour on Babylon Branch
   - 1,680 additional seats/hour on Port Washington Branch
   - 960 additional seats/hour on Long Beach Branch
   - 720 additional seats/hour on Far Rockaway Branch

2. **Increased LIRR service to Hunterspoint Avenue and Long Island City.** Additional LIRR service is provided to Hunterspoint Avenue and Long Island City as follows:
   - One additional peak hour train from Port Jefferson to Hunterspoint Avenue
   - One additional peak hour train from Port Jefferson to Hunterspoint Avenue continuing to Long Island City
   - One additional peak hour train from Yaphank to Hunterspoint Avenue
   - One additional peak hour train from Oyster Bay to Hunterspoint Avenue
   - One additional peak hour train from Pacthogue to Hunterspoint Avenue
   - One additional peak hour train from Speonk to Long Island City

3. **Contra-Flow Lanes on the Long Island Expressway.** The existing contra-flow bus lane on the Long Island Expressway is assumed to be extended to 102nd Street in Queens (near the interchange with the Grand Central Parkway). The facility improves the AM Peak Hour travel time for the Queens Express bus service to Manhattan as follows:
   - Entering the LIE at Main Street: X51 saves 7 minutes
   - Entering the LIE at Van Wyck Expressway: QM2, QM2A, and QM3 save 7 minutes
   - Entering the LIE at Woodhaven Avenue: BQM1, X63, X64, X68, QM1, QM1A, QM1Aext, QM4, QM10, QM11, QM12, QM15, QM16, QM17, QM18, QM21, QM23, QM24, and QM24W save 7 minutes
   - Entering the LIE at 21st Street (Long Island City): QM22 saves 2 minutes

   For purposes of modeling, the express bus time savings quoted above are divided by two to account for the facto that the contra-flow lane operates in the AM peak inbound direction only. No benefit accrues to travelers in the PM peak.

3.4 Year 2010 and Year 2020 Build (G310 and GCT3)

The Year 2010 and 2020 Build Scenarios represent the scenario in which the LIRR East Side Access to GCT is constructed. These alternatives are designated as G310 (Year 2010 Build) and GCT3 (Year 2020 Build). Each scenario is identical to the No-Build Scenarios with the exception that:

- The LIRR operates 24 peak hour trains to Grand Central Terminal; and
- AM Peak Hour Trains operating into Penn Station are reduced from 42 (in the 2020 no-build) to 37 trains (in the 2020 build).
- Local trains to Penn Station (i.e., those previously making a station stop at Jamaica) are assumed to make a stop a new station located at Sunnyside.

A summary of the build train operating plan is presented in Tables 3-5 and 3-6.

Table 3-1 Year 1995 Base AM Peak Hour In-Bound LIRR Service to each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	501	4	2,640	660																		4	2,640	660
	502	1	1,200	1,200																		1	1,200	1,200
	503	2	1,200	600																		2	1,200	600
	504	1	2,160	2,160																		1	2,160	2,160
	Total	8	7,200	900	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	8	7,200	900
Port Jefferson	507	2	2,640	1,320					510	1	1,200	1,200	505	1	720	720						4	4,560	1,140
	508	1	1,200	1,200									506	2	2,160	1,080						3	3,360	1,120
	509	2	2,880	1,440																		2	2,880	1,440
	Total	5	6,720	1,344	Total	0	0		Total	1	1,200	1,200	Total	3	2,880	960	Total	0	0		Total	9	10,800	1,200
Ronkonkoma	511	1	1,440	1,440					514	1	720	720										2	2,160	1,080
	512	1	1,440	1,440																		1	1,440	1,440
	513	1	1,200	1,200																		1	1,200	1,200
	Total	3	4,080	1,360	Total	0	0		Total	1	720	720	Total	0	0		Total	0	0		Total	4	4,800	1,200
Oyster Bay	517	1	1,200	1,200									516	1	600	600	515	1	840	840		3	2,640	880
	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	600	600	Total	1	840	840	Total	3	2,640	880
Hempstead	519	2	960	480					518	2	1,680	840										4	2,640	660
	Total	2	960	480	Total	0	0		Total	2	1,680	840	Total	0	0		Total	0	0		Total	4	2,640	660
West Hempstead	521	1	960	960					520	1	480	480										2	1,440	720
	Total	1	960	960	Total	0	0		Total	1	480	480	Total	0	0		Total	0	0		Total	2	1,440	720
Far Rockaway	523	2	2,160	1,080					522	2	1,440	720										4	3,600	900
	524	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,360	1,120	Total	0	0		Total	2	1,440	720	Total	0	0		Total	0	0		Total	5	4,800	960
Long Beach	525	1	1,440	1,440					528	1	480	480										2	1,920	960
	526	1	960	960																		1	960	960
	527	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,600	1,200	Total	0	0		Total	1	480	480	Total	0	0		Total	0	0		Total	4	4,080	1,020
Babylon	530	2	1,200	600					529	4	3,120	780										6	4,320	720
	531	8	9,120	1,140																		8	9,120	1,140
	Total	10	10,320	1,032	Total	0	0		Total	4	3,120	780	Total	0	0		Total	0	0		Total	14	13,440	960
Montauk	534	1	1,200	1,200									533	1	720	720	532	1	600	600	532	3	2,520	840
	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	720	720	Total	1	600	600	Total	3	2,520	840
GRAND TOTAL		37	39,600	1,070		0	0			12	9,120	760		5	4,200	840		2	1,440	720		56	54,360	971

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

Table 3-2 Year 1995 Base AM Peak Hour Out-Bound LIRR Service from each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	699	2	2,400	1,200																		2	2,400	1,200
	678	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,600	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	3	3,600	1,200
Port Jefferson	680/682	1	1,200	1,200																		1	1,200	1,200
	696	3	1,200	400																		3	1,200	400
	Total	4	2,400	600	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	4	2,400	600
Ronkonkoma	693	1	1,200	1,200																		1	1,200	1,200
	691/694	1	1,200	1,200																		1	1,200	1,200
	Total	2	2,400	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	2	2,400	1,200
Oyster Bay									677/698	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Hempstead									692	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
West Hempstead									690	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Far Rockaway									681	1	1,200	1,200										1	1,200	1,200
									683	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	2	2,400	1,200	Total	0	0		Total	0	0		Total	2	2,400	1,200
Long Beach									684	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Babylon	685	1	1,200	1,200																		1	1,200	1,200
	686	1	1,200	1,200																		1	1,200	1,200
	687	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,600	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	3	3,600	1,200
Montauk	679/688	1	1,200	1,200																	532	1	1,200	1,200
	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	1	1,200	1,200
GRAND TOTAL		13	13,200	1,015		0	0			6	7,200	1,200		0	0			0	0			19	20,400	1,074

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

Table 3-3 Year 2010/2020 No-Build AM Peak Hour In-Bound LIRR Service to each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	501	4	2,640	660																		4	2,640	660
	502	1	1,200	1,200																		1	1,200	1,200
	503	2	1,200	600																		2	1,200	600
	504	1	2,160	2,160																		1	2,160	2,160
	Total	8	7,200	900	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	8	7,200	900
Port Jefferson	505	1	980	980					510	1	1,200	1,200	706	1	720	720						3	2,900	967
	506	2	1,260	630																		2	1,260	630
	507	2	2,640	1,320																		2	2,640	1,320
	508	1	1,200	1,200																		1	1,200	1,200
	509	2	2,880	1,440																		2	2,880	1,440
	Total	6	6,080	1,013	Total	0	0		Total	1	1,200	1,200	Total	1	720	720	Total	0	0		Total	8	8,000	1,000
Ronkonkoma	511	1	1,440	1,440					514	1	720	720	713	1	1,200	1,200						3	3,360	1,120
	512	1	1,440	1,440																		1	1,440	1,440
	513	1	1,200	1,200																		1	1,200	1,200
	Total	3	4,080	1,360	Total	0	0		Total	1	720	720	Total	1	1,200	1,200	Total	0	0		Total	5	6,000	1,200
Oyster Bay	515	1	560	560									716	1	600	600						2	1,160	580
	517	1	1,200	1,200																		1	1,200	1,200
	Total	2	1,760	880	Total	0	0		Total	0	0		Total	1	600	600	Total	0	0		Total	3	2,360	787
Hempstead	519	2	960	480					518	2	1,680	840										4	2,640	660
	Total	2	960	480	Total	0	0		Total	2	1,680	840	Total	0	0		Total	0	0		Total	4	2,640	660
West Hempstead	521	1	960	960					520	1	480	480										2	1,440	720
	Total	1	960	960	Total	0	0		Total	1	480	480	Total	0	0		Total	0	0		Total	2	1,440	720
Far Rockaway	523	2	2,160	1,080					522	2	1,440	720										4	3,600	900
	524	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,360	1,120	Total	0	0		Total	2	1,440	720	Total	0	0		Total	0	0		Total	5	4,800	960
Long Beach	525	1	1,440	1,440					528	1	480	480										2	1,920	960
	526	1	960	960																		1	960	960
	527	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,600	1,200	Total	0	0		Total	1	480	480	Total	0	0		Total	0	0		Total	4	4,080	1,020
Babylon	530	2	2,400	1,200					529	8	3,120	390										10	5,520	552
	531	8	9,120	1,140																		8	9,120	1,140
	Total	10	11,520	1,152	Total	0	0		Total	8	3,120	390	Total	0	0		Total	0	0		Total	18	14,640	813
Montauk	533	1	560	560									734	1	600	600	532	1	600	600	532	3	1,760	587
	534	1	1,200	1,200																		1	1,200	1,200
	535	1	840	840																		1	840	840
	Total	3	2,600	867	Total	0	0		Total	0	0		Total	1	600	600	Total	1	600	600	Total	5	3,800	760
GRAND TOTAL		41	42,120	1,027		0	0			16	9,120	570		4	3,120	780		1	600	600		62	54,960	886

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

Table 3-4 Year 2010/2020 No-Build AM Peak Hour Out-Bound LIRR Service from each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	699	1	2,400	2,400																		1	2,400	2,400
	678	1	1,200	1,200																		1	1,200	1,200
	Total	2	3,600	1,800	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	2	3,600	1,800
Port Jefferson	680/682	1	1,200	1,200																		1	1,200	1,200
	696	2	1,200	600																		2	1,200	600
	Total	3	2,400	800	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	3	2,400	800
Ronkonkoma	693	1	1,200	1,200																		1	1,200	1,200
	691/694	1	1,200	1,200																		1	1,200	1,200
	Total	2	2,400	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	2	2,400	1,200
Oyster Bay									677/698	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Hempstead									692	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
West Hempstead									690	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Far Rockaway									681	1	1,200	1,200										1	1,200	1,200
									683	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	2	2,400	1,200	Total	0	0		Total	0	0		Total	2	2,400	1,200
Long Beach									684	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Babylon	685	1	1,200	1,200																		1	1,200	1,200
	686	1	1,200	1,200																		1	1,200	1,200
	687	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,600	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	3	3,600	1,200
Montauk	679/688	1	1,200	1,200																		1	1,200	1,200
	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	1	1,200	1,200
GRAND TOTAL		11	13,200	1,200		0	0			6	7,200	1,200		0	0			0	0			17	20,400	1,200

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

Table 3-5 Year 2010/2020 Build AM Peak Hour In-Bound LIRR Service to each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	501	3	1,980	660	701	2	2,400	1,200														5	4,380	876
	502	1	1,200	1,200	702	1	1,200	1,200														2	2,400	1,200
	503	1	1,200	1,200	703	1	1,200	1,200														2	2,400	1,200
	504	1	1,200	1,200	704	2	2,400	1,200														3	3,600	1,200
	Total	6	5,580	930	Total	6	7,200	1,200	Total	0	0		Total	0	0		Total	0	0		Total	12	12,780	1,065
Port Jefferson	505	1	980	980	707	3	4,320	1,440					706	1	720	720						5	6,020	1,204
	506	2	1,920	960	709	2	2,880	1,440														4	4,800	1,200
	508	1	1,200	1,200	710	1	1,440	1,440														2	2,640	1,320
	509	2	2,880	1,440																		2	2,880	1,440
	Total	6	6,980	1,163	Total	6	8,640	1,440	Total	0	0		Total	1	720	720	Total	0	0		Total	13	16,340	1,257
Ronkonkoma	511	1	1,440	1,440	712	2	2,880	1,440														3	4,320	1,440
	513	1	1,200	1,200	713	2	2,880	1,440														3	4,080	1,360
	514	1	720	720																		1	720	720
	535	1	840	840																		1	840	840
	Total	3	3,360	1,120	Total	4	5,760	1,440	Total	0	0		Total	0	0		Total	0	0		Total	7	9,120	1,303
Oyster Bay	515	1	960	960									716	1	600	600						2	1,560	780
	Total	1	960	960	Total	0	0		Total	0	0		Total	1	600	600	Total	0	0		Total	2	1,560	780
Hempstead	519	2	960	480	719	2	2,880	1,440	518	2	1,920	960										6	5,760	960
	Total	2	960	480	Total	2	2,880	1,440	Total	2	1,920	960	Total	0	0		Total	0	0		Total	6	5,760	960
West Hempstead	521	1	960	960					520	1	480	480										2	1,440	720
	Total	1	960	960	Total	0	0		Total	1	480	480	Total	0	0		Total	0	0		Total	2	1,440	720
Far Rockaway	523	1	1,080	1,080	723	1	1,440	1,440	522	2	1,440	720										4	3,960	990
	Total	1	1,080	1,080	Total	1	1,440	1,440	Total	2	1,440	720	Total	0	0		Total	0	0		Total	4	3,960	990
Long Beach	524	1	1,200	1,200	727	1	1,440	1,440	528	1	480	480										3	3,120	1,040
	525	1	1,440	1,440																		1	1,440	1,440
	526	1	960	960																		1	960	960
	527	1	1,200	1,200																		1	1,200	1,200
	Total	4	4,800	1,200	Total	1	1,440	1,440	Total	1	480	480	Total	0	0		Total	0	0		Total	6	6,720	1,120
Babylon	530	2	1,920	960	730	2	2,880	1,440	529	4	2,160	540										8	6,960	870
	531	8	9,120	1,140	731	2	2,880	1,440														10	12,000	1,200
	Total	10	11,040	1,104	Total	4	5,760	1,440	Total	4	2,160	540	Total	0	0		Total	0	0		Total	18	18,960	1,053
Montauk	533	1	960	960									734	1	600	600	532	1	600	600	532	3	2,160	720
	534	1	1,200	1,200																		1	1,200	1,200
	Total	2	2,160	1,080	Total	0	0		Total	0	0		Total	1	600	600	Total	1	600	600	Total	4	3,360	840
GRAND TOTAL		36	37,880	1,052		24	33,120	1,380		10	6,480	648		3	1,920	640		1	600	600		74	80,000	1,081

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

Table 3-6 Year 2010/2020 No-Build AM Peak Hour Out-Bound LIRR Service from each Terminal

	New York Penn Station				Grand Central Terminal				Flatbush Avenue				Hunterspoint Avenue				Long Island City				ALL TERMINI			
	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train	ID	#	cap	cap/train		#	cap	cap/train
Port Washington	899	1	1,200	1,200	873	4	4,800	1,200														5	6,000	1,200
	878	1	1,200	1,200																		1	1,200	1,200
	Total	2	2,400	1,200	Total	4	4,800	1,200	Total	0	0		Total	0	0		Total	0	0		Total	6	7,200	1,200
Port Jefferson	880/882	1	1,200	1,200	874	3	4,320	1,440														4	5,520	1,380
	896	2	2,880	1,440																		2	2,880	1,440
	Total	3	4,080	1,360	Total	3	4,320	1,440	Total	0	0		Total	0	0		Total	0	0		Total	6	8,400	1,400
Ronkonkoma	893	1	1,200	1,200	894	1	1,200	1,200														2	2,400	1,200
	891/894	1	1,200	1,200																		1	1,200	1,200
	Total	2	2,400	1,200	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	0	0		Total	3	3,600	1,200
Oyster Bay									877/898	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Hempstead	876	1	1,440	1,440	875	1	1,440	1,440	892	1	960	960										3	3,840	1,280
	Total	1	1,440	1,440	Total	1	1,440	1,440	Total	1	960	960	Total	0	0		Total	0	0		Total	3	3,840	1,280
West Hempstead									890	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Far Rockaway									881	1	1,200	1,200										1	1,200	1,200
									883	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	2	2,400	1,200	Total	0	0		Total	0	0		Total	2	2,400	1,200
Long Beach									884	1	1,200	1,200										1	1,200	1,200
	Total	0	0		Total	0	0		Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	1	1,200	1,200
Babylon	885	1	1,440	1,440	827	3	4,320	1,440														4	5,760	1,440
	886	1	1,200	1,200																		1	1,200	1,200
	887	1	1,200	1,200																		1	1,200	1,200
	Total	3	3,840	1,280	Total	3	4,320	1,440	Total	0	0		Total	0	0		Total	0	0		Total	6	8,160	1,360
Montauk	879/888	1	1,200	1,200																	532	1	1,200	1,200
	Total	1	1,200	1,200	Total	0	0		Total	0	0		Total	0	0		Total	0	0		Total	1	1,200	1,200
GRAND TOTAL		12	15,360	1,280		12	16,080	1,340		6	6,960	1,160		0	0			0	0			30	38,400	1,280

Note: "#" indicates the number of trains of that ID occurring in the AM Peak Hour. "cap" indicates the total coded hourly capacity for all trains of that ID. "cap/train" indicates the implied seated capacity of each train.

4. YEAR 2010 FORECAST RESULTS

This chapter presents the results of the ridership forecasting models for the 2010 forecast year. Similar results for the 2020 forecast year are presented in Chapter 5. The results presented in this chapter include the impacts of the build and TSM projects on total transit and LIRR ridership (linked trip impacts) and on ridership to each LIRR Manhattan terminal. The difference between total LIRR ridership to GCT and the number of new LIRR linked trips is the number of existing riders diverted from Penn Station or some other terminal to the new service to GCT.

This chapter also presents ridership forecasting results that are used in the development of the draft environmental impact statement. This information includes the distribution of LIRR-to-GCT passengers to different Manhattan Zones for purposes of evaluating pedestrian congestion; vehicle-miles of travel impact, and estimates of parking demand for each station.

4.1 Year 2010 Linked Trip Impacts

One of the best indicators of the ability of a transit project to attract new customers and increase market share is the number of linked trips by mode. Linked trips by mode represent the region-wide total travel from each origin to each destination traveling on each mode. The linked trip tables are a direct outcome of the mode choice model and therefore the modes that can be reported are identical to the modes defined in the mode choice model. These modes are:

- Automobile
- Commuter Rail (including commuter rail/subway trips and commuter rail/bus trips)
- Subway (including subway/bus trips)
- Bus

In the case of the transit mode, each trip is counted once, no matter how many transfers are made or how many transit vehicles are boarded. Accordingly, this measure is directly related to the total travel by transit and provides a realistic basis for comparing alternatives the force many transfers to alternatives that force few transfers.

Table 4-1 presents a comparison of the Year 2010 Weekday (All-Day) Linked Trips by Mode for each of the 2010 scenarios discussed in Chapter 3. This table is stratified by trip purpose as follows:

- HBW – Home-Based Work
- HBO – Home-Based Other
- NHB – Non-Home-Based

Table 4-1 also presents the total (all purposes) incremental linked trips as compared to the No-Build Alternative (NB13). As this table shows, the total number of incremental linked trips for all modes of travel is very nearly equal to zero. This is a result of the fact that a fixed person trip table is used in this travel demand forecasting model and that total travel is constrained to the same number of person trips in any given year.

The number of incremental Year 2010 Weekday Automobile Trips shows that the TSM Alternative is able to reduce automobile travel by 3,400 trips per weekday and the LIRR-to-GCT Alternative is able to reduce Automobile Travel by 14,200 trips per weekday. Conversely, the model results also show that the TSM and LIRR-to-GCT Alternatives add 3,400 and 14,200 new weekday transit riders. This is the "New

Riders-as compared to No-Build" statistic included in the FTA Section 5309 *Annual Report on New Starts*. The number of New Riders as Compared to TSM is the difference between these two figures or 10,800 Daily New Riders.

Table 4-1 also presents an estimate of the number of commuter rail linked trips predicted by the mode choice model. This statistic is similar, but not identical, to the total number of LIRR and MNR trips in the region. It is not identical to the assigned commuter rail volumes since commuter rail trips may be assigned to non-commuter rail services and vice-versa in the capacity-constrained assignment. Nevertheless, the number of new commuter rail trips (build versus no-build) predicted by the mode choice model provides an indication of the expected increase in daily LIRR daily trips. In 2010, the mode choice model predicts 29,200 additional daily LIRR linked trips in the LIRR-to-GCT build condition than in the No-Build. In addition, the assignment procedures assign an additional 3,900 non-commuter rail trips in the Build alternative due to the increased availability of LIRR capacity. The number of additional daily LIRR trips is presented in Table 4-2 and is equal to 33,000 additional daily LIRR trips in the Build Alternative as compared to the No-Build.

Table 4-1 Year 1995 and 2010 Weekday (All-Day) Linked Person Trips by Mode and Purpose

		1995 Base Network (NB95)	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
HBW					
	Auto	4,455,549	4,898,639	4,896,172	4,890,530
	Commuter Rail	285,682	368,126	371,172	386,916
	Subway	1,794,233	2,185,990	2,181,888	2,176,926
	Bus	455,831	443,267	446,791	441,652
	Total	6,991,295	7,896,022	7,896,023	7,896,024
HBO					
	Auto	6,450,701	6,763,135	6,762,488	6,757,846
	Commuter Rail	147,258	167,406	169,184	174,621
	Subway	1,065,638	1,198,240	1,197,107	1,197,121
	Bus	758,066	734,394	734,396	733,587
	Total	8,421,663	8,863,175	8,863,176	8,863,175
NHB					
	Auto	1,641,898	1,704,763	1,704,469	1,703,962
	Commuter Rail	57,712	59,383	60,296	62,547
	Subway	489,708	546,901	546,344	544,837
	Bus	128,210	118,854	118,791	118,555
	Total	2,317,528	2,429,901	2,429,901	2,429,901
TOTAL					
	Auto	12,548,148	13,366,537	13,363,129	13,352,338
	Commuter Rail	490,653	594,915	600,652	624,084
	Subway	3,349,579	3,931,131	3,925,339	3,918,884
	Bus	1,342,107	1,296,515	1,299,979	1,293,794
	Total	17,730,486	19,189,098	19,189,099	19,189,100
INCREMENTAL (versus NB13) TOTAL					
	Auto		-	(3,408)	(14,199)
	Commuter Rail		-	5,738	29,169
	Subway		-	(5,793)	(12,247)
	Bus		-	3,464	(2,722)
	Total		-	1	1

Note: Totals may not add due to rounding.

Table 4-2 2010 Incremental (Versus No-Build) Daily LIRR Trips

	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
Commuter Rail Mode	-	5,738	29,169
Other Modes Assigned to Rail	-	(1,027)	3,876
Total	-	4,711	33,045

4.2 Year 2010 Station Utilization

Another important result of the ridership forecasting process is the number of trips utilizing key facilities that will be affected by the project. This statistic is equivalent to a number of riders that could be counted boarding or alighting at each station or the number of persons on-board trains as they travel to or from each terminal station.

Table 4-3 presents AM Peak 4-Hour (6-10 AM) and estimated daily LIRR riders arriving at each terminal. Table 4-4 and Table 4-5 present similar information for LIRR riders departing each terminal and the sum of arrivals plus departures, respectively.

The first two columns of each table represent passenger counts taken by the LIRR in 1990 and 1995 and are used to confirm the accuracy of the model results. The counts can be compared to the column labeled "NB95" which presents the modeled estimates of Year 1995 LIRR activity at each terminal. As this table shows, the model does an excellent job of representing total (all terminals) daily 1995 LIRR arrivals and departures. The model also does reasonably well in replicating the distribution of activity among individual terminals and travel occurring in the AM Peak 4-Hour Period as a fraction of daily activity.

The next three columns represent forecasted model activity at each terminal for the 2010 No-Build (NB13), the 2010 Transportation Systems Management (T310), and 2010 LIRR-to-GCT Build (G310) Alternatives. As shown in these tables, total daily passenger activity (arrivals plus departures) for all LIRR terminals is forecasted to increase from 245,900 daily arriving and departing passengers in 1995 to 288,600 in the 2010 No-Build, an increase of 17 percent. The TSM alternative reduces this to 285,400 daily arriving and departing passengers. This decline is largely due to substantial improvements to bus operations on the Long Island Expressway that attracts riders away from the LIRR and to express bus services.

The 2010 LIRR-to-GCT alternative (G310) increases total (all terminals) daily LIRR arrivals and departures to 329,700, an increase of 41,100 trips (14.3 percent) over the 2010 No-Build. Daily arrivals and departures at Grand Central Terminal will be 151,600 and the new Sunnyside Station will attract 5,100 daily riders. Activity at Penn Station will drop from 259,000 to 151,200, a drop of 107,800 (-42 percent).

The fact that LIRR terminal volumes increase by 41,100 while total LIRR volumes increases by only 33,000 is caused by a greater percentage of passengers utilizing terminal stations in the LIRR-to-GCT Build than in the No-Build. Key examples of this phenomenon are as follows:

- The addition of Sunnyside Station results in a drop of 2,600 daily passengers at Woodside. In effect demand is shifted from LIRR line stations to one of the terminal stations
- About least 1,600 daily reverse peak trips are made between Penn Station and Sunnyside. Each such trip results in *two* arrivals or departures at the terminal stations.
- About 1,000 more trips make a rail-to-rail transfer at a terminal station in the Build Case than in the No-Build. Each such trip results in *two* arrivals or departures at the terminal stations.
- The service plan used to simulate the impact of LIRR service to GCT results in a modest drop in LIRR volumes to other non-terminal stations of approximately 1,200 intra-Long Island trips
- Approximately 1,800 trips are lost due to different peak period-to-daily factors being used at Hunterspoint and Flatbush Avenue represent the low (or non-existent) peak period utilization at these stations.

Table 4-3 Year 1995 and 2010 AM Peak and All-Day LIRR Arrivals by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
AM Peak (6-10 AM)						
Penn Station	86,950	86,630	86,851	103,856	100,348	58,154
Grand Central	0	0	0	0	0	62,334
Hunterspoint Ave	3,457	2,890	3,279	3,260	4,682	514
Long Island City	195	240	137	44	131	40
Flatbush Ave	12,942	11,670	10,610	11,374	12,275	9,911
Sunnyside	0	0	0	0	0	2,070
Total	103,544	101,430	100,878	118,533	117,435	133,024
All-Day						
Penn Station	106,270	107,570	109,212	130,162	126,328	75,987
Grand Central	0	0	0	0	0	76,194
Hunterspoint Ave	3,457	2,890	3,279	3,260	4,682	514
Long Island City	195	240	136	43	130	40
Flatbush Ave	13,466	14,650	12,721	13,394	14,400	11,744
Sunnyside	0	0	0	0	0	2,568
Total	123,388	125,350	125,349	146,859	145,539	167,047

Table 4-4 Year 1995 and 2010 AM Peak and All-Day LIRR Departures by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
AM Peak (6-10 AM)						
Penn Station	2,930	3,000	4,082	4,522	4,837	5,115
Grand Central	0	0	0	0	0	1,108
Hunterspoint Ave	0	0	0	0	0	0
Long Island City	0	0	0	0	0	0
Flatbush Ave	475	1,290	648	480	469	483
Sunnyside	0	0	0	0	0	68
Total	4,290	4,290	4,731	5,001	5,306	6,774
All-Day						
Penn Station	107,410	106,680	108,120	128,860	125,064	75,227
Grand Central	0	0	0	0	0	75,432
Hunterspoint Ave	2,440	2,230	2,525	2,510	3,605	396
Long Island City	98	110	63	20	60	18
Flatbush Ave	9,959	11,300	9,795	10,313	11,088	9,043
Sunnyside	0	0	0	0	0	2,542
Total	119,907	120,320	120,503	141,703	139,817	162,659

Table 4-5 Year 1995 and 2010 AM Peak and All-Day LIRR Arrivals+Departures by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
AM Peak (6-10 AM)						
Penn Station	89,880	89,630	90,934	108,378	105,185	63,269
Grand Central	0	0	0	0	0	63,442
Hunterspoint Ave	3,457	2,890	3,279	3,260	4,682	514
Long Island City	195	240	137	44	131	40
Flatbush Ave	13,417	12,960	11,258	11,853	12,744	10,394
Sunnyside	0	0	0	0	0	2,138
Total	106,949	105,720	105,609	123,534	122,741	139,798
All-Day						
Penn Station	213,680	214,250	217,332	259,023	251,392	151,214
Grand Central	0	0	0	0	0	151,626
Hunterspoint Ave	5,897	5,120	5,805	5,769	8,287	911
Long Island City	293	350	199	63	189	58
Flatbush Ave	23,425	25,950	22,517	23,707	25,488	20,788
Sunnyside	0	0	0	0	0	5,110
Total	243,295	245,670	245,852	288,562	285,356	329,706

4.3 Year 2010 Travel Time Savings

Travel time savings is one of the measures used in the Federal Transit Administration's (FTA) Section 5309 Annual Report on New Starts. This computation is performed on each zone-to-zone interchange using matrix computation procedures developed by KPMG for the FTA. The results of the travel time savings computation is presented in Table 4-6. In 2010, the build alternative will save 6.8 million hours annually as compared to the No-Build Alternative

Table 4-6 Year 2010 Weekday and Annual Travel Time Savings

		2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
WEEKDAY PERSON-HOURS				
TT Savings for Existing Riders				
	Out-of-Vehicle Time	0	3,270	25,997
	In-Vehicle Time	0	2,984	(3,812)
	Total	0	6,254	22,185
TT Savings for New Riders				
	Out-of-Vehicle Time	0	205	2,369
	In-Vehicle Time	0	(39)	(249)
	Total	0	166	2,120
TT Savings for ALL				
	Out-of-Vehicle Time	0	3,475	28,366
	In-Vehicle Time	0	2,945	(4,061)
	Total	0	6,420	24,305
ANNUAL PERSON-HOURS				
Days/Year		282	282	282
TT Savings for Existing Riders				
	Out-of-Vehicle Time	0	922,140	7,331,154
	In-Vehicle Time	0	841,488	(1,074,984)
	Total	0	1,763,628	6,256,170
TT Savings for New Riders				
	Out-of-Vehicle Time	0	57,810	668,058
	In-Vehicle Time	0	(10,998)	(70,218)
	Total	0	46,812	597,840
TT Savings for ALL				
	Out-of-Vehicle Time	0	979,950	7,999,212
	In-Vehicle Time	0	830,490	(1,145,202)
	Total	0	1,810,440	6,854,010

4.4 Year 2010 Distribution of Terminal Station Passengers

Table 4-7 presents the distribution of arriving passengers at Penn Station, Grand Central Terminal and Sunnyside Station. This table shows the number of arriving passengers:

- Walking to each nearby zone
- Transferring to different subway lines
- Transferring to nearby bus services
- Transferring to other rail services at the same terminal.

Table 4-7 Year 2010 AM Peak Period Distribution of Arriving LIRR Passengers by Terminal

		1995 Base Network (NB95)	2010 No-Build Network (NB13)	2010 Transportation Systems Management (T310)	2010 LIRR-to-GCT Build (G310)
PENN STATION					
	Walk	50,793	58,837	56,868	31,397
	Transfer to Subway				
	- A/C/E SB	7,791	8,487	8,149	8,015
	- A/C/E NB	11,448	17,407	16,864	3,765
	- 1/2/3/9 SB	10,077	12,354	11,838	10,713
	- 1/2/3/9 NB	1,834	2,140	2,129	1,944
	- B/D/F/Q SB	1,681	1,586	1,536	1,313
	- B/D/F/Q NB	1,568	1,069	932	-
	- N/R SB	-	763	748	273
	- N/R NB	-	-	-	-
	Total Transfer to Subway	34,399	43,806	42,196	26,023
	Transfer to Bus	223	265	263	8
	Transfer to Other Rail	1,436	948	1,021	726
	Total	86,851	103,856	100,348	58,154
GRAND CENTRAL					
	Walk				51,813
	Transfer to Subway				
	- 4/5 SB				4,223
	- 6 SB				810
	- 4/5 NB				683
	- 6 NB				1,634
	- 7 EB				4
	- 7 WB				21
	- S				-
	Total Transfer to Subway	-	-	-	7,375
	Transfer to Bus				2,556
	Transfer to Other Rail				589
	Total	-	-	-	62,333
SUNNYSIDE					
	Walk				1,115
	Transfer to Subway				
	- 7				169
	- F/R				540
	- E				5
	- N				29
	Total Transfer to Subway	-	-	-	743
	Transfer to Bus				212
	Transfer to Other Rail				-
	Total	-	-	-	2,070

4.5 Year 2010 Impacts on Vehicle Trips and Vehicle Miles of Travel

Table 4-8 presents the estimated incremental automobile trips (both auto mode and drive-to-commuter rail) and the estimated incremental Vehicle Miles of Travel.

Table 4-8 Year 2010 Incremental Daily Vehicles and Daily Vehicle Miles of Travel

	(NB13)	(T310)	(G310)
Incremental Vehicle Trips (vs. NB13)			
Incremental Auto Mode Trips	-	(2,819)	(11,165)
Incremental Drive-to-Transit Trips	-	5,232	21,180
Total	-	2,413	10,015
Incremental Vehicle Miles of Travel (vs. NB13)			
Incremental Auto Mode Trips	-	(119,378)	(374,313)
Incremental Drive-to-Transit Trips	-	9,665	32,527
Total	-	(109,713)	(341,786)

5. YEAR 2020 FORECASTING RESULTS

This chapter presents the results of the ridership forecasting models for the 2020 forecast year. Similar results for the 2010 forecast year are presented in Chapter 4. The results presented in this chapter include the impacts of the build and TSM projects on total transit and LIRR ridership (linked trip impacts) and on ridership to each LIRR Manhattan terminal. The difference between total LIRR ridership to GCT and the number of new LIRR linked trips is the number of existing riders diverted from Penn Station or some other terminal to the new service to GCT.

This chapter also presents ridership forecasting results that are used in the development of the draft environmental impact statement. This information includes the distribution of LIRR-to-GCT passengers to different Manhattan Zones for purposes of evaluating pedestrian congestion; vehicle-miles of travel impact, and estimates of parking demand for each station.

5.1 Year 2020 Linked Trip Impacts

One of the best indicators of the ability of a transit project to attract new customers and increase market share is the number of linked trips by mode. Linked trips by mode represent the region-wide total travel from each origin to each destination traveling on each mode. The linked trip tables are a direct outcome of the mode choice model and therefore the modes that can be reported are identical to the modes defined in the mode choice model. These modes are:

- Automobile
- Commuter Rail (including commuter rail/subway trips and commuter rail/bus trips)
- Subway (including subway/bus trips)
- Bus

In the case of the transit mode, each trip is counted once, no matter how many transfers are made or how many transit vehicles are boarded. Accordingly, this measure is directly related to the total travel by transit and provides a realistic basis for comparing alternatives the force many transfers to alternatives that force few transfers.

Table 5-1 presents a comparison of the Year 2020 Weekday (All-Day) Linked Trips by Mode for each of the 2020 scenarios discussed in Chapter 3. This table is stratified by trip purpose as follows:

- HBW – Home-Based Work
- HBO – Home-Based Other
- NHB – Non-Home-Based

Table 5-1 also presents the total (all purposes) incremental linked trips as compared to the No-Build Alternative (NB23). As this table shows, the total number of incremental linked trips for all modes of travel is very nearly equal to zero. This is a result of the fact that a fixed person trip table is used in this travel demand forecasting model and that total travel is constrained to the same number of person trips in any given year.

The number of incremental Year 2020 Weekday Automobile Trips shows that the TSM Alternative is able to reduce automobile travel by 4,100 trips per weekday and the LIRR-to-GCT Alternative is able to reduce Automobile Travel by 15,400 trips per weekday. Conversely, the model results also show that the TSM and LIRR-to-GCT Alternatives add 4,100 and 15,400 new weekday transit riders. This is the "New

Riders-as compared to No-Build" statistic included in the FTA Section 5309 *Annual Report on New Starts*. The number of New Riders as Compared to TSM is the difference between these two figures or 11,300 Daily New Riders.

Table 5-1 also presents an estimate of the number of commuter rail linked trips predicted by the mode choice model. This statistic is similar, but not identical, to the total number of LIRR and MNR trips in the region. It is not identical to the assigned commuter rail volumes since commuter rail trips may be assigned to non-commuter rail services and vice-versa in the capacity-constrained assignment. Nevertheless, the number new commuter rail trips (build versus no-build) predicted by the mode choice model provides an indication of the expected increases in daily LIRR daily trips. In 2020, the mode choice model predicts 32,000 additional daily LIRR linked trips in the LIRR-to-GCT build condition than in the No-Build. In addition, the assignment procedures assign an additional 3,600 non-commuter rail trips in the Build alternative due to the increased availability of LIRR capacity. The number of additional daily LIRR trips is presented in Table 5-2 and is equal to 35,600 additional daily LIRR trips in the Build Alternative as compared to the No-Build.

Table 5-1 Year 1995 and 2020 Weekday (All-Day) Linked Person Trips by Mode and Purpose

		1995 Base Network (NB95)	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
HBW					
	Auto	4,455,549	5,374,457	5,371,487	5,365,829
	Commuter Rail	285,682	392,124	394,942	412,021
	Subway	1,794,233	2,294,061	2,290,079	2,284,697
	Bus	455,831	469,441	473,575	467,535
	Total	6,991,295	8,530,082	8,530,083	8,530,083
HBO					
	Auto	6,450,701	7,187,266	7,186,329	7,181,572
	Commuter Rail	147,258	177,755	178,819	185,967
	Subway	1,065,638	1,239,252	1,238,245	1,237,988
	Bus	758,066	761,046	761,926	759,792
	Total	8,421,663	9,365,319	9,365,319	9,365,318
NHB					
	Auto	1,641,898	1,801,842	1,801,667	1,800,794
	Commuter Rail	57,712	63,142	63,439	66,995
	Subway	489,708	562,863	562,558	560,536
	Bus	128,210	123,100	123,282	122,621
	Total	2,317,528	2,550,947	2,550,946	2,550,946
TOTAL					
	Auto	12,548,148	14,363,565	14,359,483	14,348,195
	Commuter Rail	490,653	633,021	637,199	664,983
	Subway	3,349,579	4,096,176	4,090,882	4,083,221
	Bus	1,342,107	1,353,586	1,358,784	1,349,948
	Total	17,730,486	20,446,347	20,446,348	20,446,347
INCREMENTAL (versus NB23) TOTAL					
	Auto		-	(4,082)	(15,370)
	Commuter Rail		-	4,179	31,963
	Subway		-	(5,294)	(12,955)
	Bus		-	5,198	(3,638)
	Total		-	1	(0)

Note: Totals may not add due to rounding.

Table 5-2 2020 Incremental (versus No-Build) Daily LIRR Trips

	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
Commuter Rail Mode	-	4,179	31,963
Other Modes Assigned to Rail	-	(700)	3,630
Total	-	3,479	35,593

5.2 Year 2020 Station Utilization

Another important result of the ridership forecasting process is the number of trips utilizing key facilities that will be affected by the project. This statistic is equivalent to a number of riders that could be counted boarding or alighting at each station or the number of persons on-board trains as they travel to or from each terminal station.

Table 5-3 presents AM Peak 4-Hour (6-10 AM) and estimated daily LIRR riders arriving at each terminal. Table 5-4 and Table 5-5 present similar information for LIRR riders departing each terminal and the sum of arrivals plus departures, respectively.

The first two columns of each table represent passenger counts taken by the LIRR in 1990 and 1995 and are used to confirm the accuracy of the model results. The counts can be compared to the column labeled "NB95" which presents the modeled estimates of Year 1995 LIRR activity at each terminal. As this table shows, the model does an excellent job of representing total (all terminals) daily 1995 LIRR arrivals and departures. The model also does reasonably well in replicating the distribution of activity among individual terminals and travel occurring in the AM Peak 4-Hour Period as a fraction of daily activity.

The next three columns represent forecasted model activity at each terminal for the 2020 No-Build (NB23), the 2020 Transportation Systems Management (TSM3), and 2020 LIRR-to-GCT Build (GCT3) Alternatives. As shown in these tables, total daily passenger activity (arrivals plus departures) for all LIRR terminals is forecasted to increase from 245,900 daily arriving and departing passengers in 1995 to 307,800 in the 2020 No-Build, an increase of 25 percent. The TSM alternative reduces this to 303,700 daily arriving and departing passengers. This decline is largely due to substantial improvements to bus operations on the Long Island Expressway that attracts riders away from the LIRR and to express bus services.

The 2020 LIRR-to-GCT alternative (GCT3) increases total (all terminals) daily LIRR arrivals and departures to 351,000, an increase of 43,200 trips (14.0 percent) over the 2020 No-Build. Daily arrivals and departures at Grand Central Terminal will be 161,500 and the new Sunnyside Station will attract 5,500 daily riders. Activity at Penn Station will drop from 276,100 to 160,700, a drop of 115,300 (-42 percent).

The fact that LIRR terminal volumes increase by 43,200 while total LIRR volumes increases by only 35,600 is caused by a greater percentage of passengers utilizing Terminal Stations in the LIRR-to-GCT Build than in the No-Build. Key examples of this phenomenon are as follows:

- The addition of Sunnyside Station results in a drop of 2,700 daily passengers at Woodside. In effect demand is shifted from LIRR line stations to one of the terminal stations
- About 1,600 daily reverse peak trips are made between Penn Station and Sunnyside. Each such trip results in *two* arrivals or departures at the terminal stations.
- About 1,000 more trips make a rail-to-rail transfer at a terminal station in the Build Case than in the No-Build. Each such trip results in *two* arrivals or departures at the terminal stations.
- The service plan used to simulate the impact of LIRR service to GCT results in a modest drop in LIRR volumes to other non-terminal stations of approximately 1,200 intra-Long Island trips
- Approximately 1,800 trips are lost due to different peak period-to-daily factors being used at Hunterspoint and Flatbush Avenue represent the low (or non-existent) peak period utilization at these stations.

Table 5-3 Year 1995 and 2020 AM Peak and All-Day LIRR Arrivals by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
AM Peak (6-10 AM)						
Penn Station	86,950	86,630	86,851	110,522	106,849	62,249
Grand Central	0	0	0	0	0	65,676
Hunterspoint Ave	3,457	2,890	3,279	3,598	5,098	603
Long Island City	195	240	137	46	138	43
Flatbush Ave	12,942	11,670	10,610	12,144	13,049	10,519
Sunnyside	0	0	0	0	0	2,255
Total	103,544	101,430	100,878	126,310	125,135	141,345
All-Day						
Penn Station	106,270	107,570	109,212	138,727	134,341	80,777
Grand Central	0	0	0	0	0	81,140
Hunterspoint Ave	3,457	2,890	3,279	3,598	5,098	603
Long Island City	195	240	136	46	137	42
Flatbush Ave	13,466	14,650	12,721	14,285	15,313	12,493
Sunnyside	0	0	0	0	0	2,765
Total	123,388	125,350	125,349	156,656	154,889	177,819

Table 5-4 Year 1995 and 2020 AM Peak and All-Day LIRR Departures by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
AM Peak (6-10 AM)						
Penn Station	2,930	3,000	4,082	4,987	5,008	5,008
Grand Central	0	0	0	0	0	1,884
Hunterspoint Ave	0	0	0	0	0	0
Long Island City	0	0	0	0	0	0
Flatbush Ave	475	1,290	648	499	502	537
Sunnyside	0	0	0	0	0	47
Total	3,405	4,290	4,731	5,486	5,510	7,476
All-Day						
Penn Station	107,410	106,680	108,120	137,340	132,997	79,969
Grand Central	0	0	0	0	0	80,329
Hunterspoint Ave	2,440	2,230	2,525	2,770	3,926	464
Long Island City	98	110	63	21	63	19
Flatbush Ave	9,959	11,300	9,795	10,999	11,791	9,619
Sunnyside	0	0	0	0	0	2,737
Total	119,907	120,320	120,503	151,131	148,777	173,138

Table 5-5 Year 1995 and 2020 AM Peak and All-Day LIRR Arrivals+Departures by Terminal

	1990 Counts	1995 Counts	1995 Base Network (NB95)	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
AM Peak (6-10 AM)						
Penn Station	89,880	89,630	90,934	115,509	111,857	67,258
Grand Central	0	0	0	0	0	67,560
Hunterspoint Ave	3,457	2,890	3,279	3,598	5,098	603
Long Island City	195	240	137	46	138	43
Flatbush Ave	13,417	12,960	11,258	12,642	13,552	11,056
Sunnyside	0	0	0	0	0	2,302
Total	106,949	105,720	105,609	131,795	130,645	148,821
All-Day						
Penn Station	213,680	214,250	217,332	276,067	267,338	160,746
Grand Central	0	0	0	0	0	161,469
Hunterspoint Ave	5,897	5,120	5,805	6,368	9,024	1,066
Long Island City	293	350	199	67	200	62
Flatbush Ave	23,425	25,950	22,517	25,285	27,104	22,112
Sunnyside	0	0	0	0	0	5,503
Total	243,295	245,670	245,852	307,786	303,666	350,957

5.3 Year 2020 Travel Time Savings

Travel time savings is one of the measures used in the Federal Transit Administration's (FTA) Section 5309 Annual Report on New Starts. This computation is performed on each zone-to-zone interchange using matrix computation procedures developed by KPMG for the FTA. The results of the travel time savings computation is presented in Table 5-6. In 2020, the build alternative will save 7.4 million hours annually as compared to the No-Build Alternative.

Table 5-6 Year 2020 Weekday and Annual Travel Time Savings

		2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
WEEKDAY PERSON-HOURS				
TT Savings for Existing Riders				
	Out-of-Vehicle Time	0	3,499	27,653
	In-Vehicle Time	0	2,283	(3,642)
	Total	0	5,782	24,011
TT Savings for New Riders				
	Out-of-Vehicle Time	0	213	2,594
	In-Vehicle Time	0	91	(334)
	Total	0	304	2,260
TT Savings for ALL				
	Out-of-Vehicle Time	0	3,712	30,247
	In-Vehicle Time	0	2,374	(3,976)
	Total	0	6,086	26,271
ANNUAL PERSON-HOURS				
Days/Year		282	282	282
TT Savings for Existing Riders				
	Out-of-Vehicle Time	0	986,718	7,798,146
	In-Vehicle Time	0	643,806	(1,027,044)
	Total	0	1,630,524	6,771,102
TT Savings for New Riders				
	Out-of-Vehicle Time	0	60,066	731,508
	In-Vehicle Time	0	25,662	(94,188)
	Total	0	85,728	637,320
TT Savings for ALL				
	Out-of-Vehicle Time	0	1,046,784	8,529,654
	In-Vehicle Time	0	669,468	(1,121,232)
	Total	0	1,716,252	7,408,422

5.4 Year 2020 Distribution of Terminal Station Passengers

Table 5-7 presents the distribution of arriving passengers at Penn Station, Grand Central Terminal and Sunnyside Station. This table shows the number of arriving passengers:

- Walking to each nearby zone
- Transferring to different subway lines
- Transferring to nearby bus services
- Transferring to other rail services at the same terminal.

Table 5-7 Year 2020 AM Peak Period Distribution of Arriving LIRR Passengers by Terminal

		1995 Base Network (NB95)	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
PENN STATION					
	Walk	50,793	63,021	60,784	33,856
	Transfer to Subway				
	- A/C/E SB	7,791	8,870	8,575	8,369
	- A/C/E NB	11,448	18,432	17,909	4,128
	- 1/2/3/9 SB	10,077	13,027	12,581	11,383
	- 1/2/3/9 NB	1,834	2,262	2,257	2,076
	- B/D/F/Q SB	1,681	1,684	1,645	1,399
	- B/D/F/Q NB	1,568	1,107	941	-
	- N/R SB	-	797	782	285
	- N/R NB	-	-	-	-
	Total Transfer to Subway	34,399	46,179	44,690	27,640
	Transfer to Bus	223	281	277	8
	Transfer to Other Rail	1,436	1,071	1,098	745
	Total	86,851	110,552	106,849	62,249
GRAND CENTRAL					
	Walk				54,433
	Transfer to Subway				
	- 4/5 SB				4,485
	- 6 SB				842
	- 4/5 NB				583
	- 6 NB				1,646
	- 7 EB				4
	- 7 WB				23
	- S				-
	Total Transfer to Subway	-	-	-	7,583
	Transfer to Bus				3,027
	Transfer to Other Rail				633
	Total	-	-	-	65,676
SUNNYSIDE					
	Walk				1,254
	Transfer to Subway				
	- 7				169
	- F/R				572
	- E				5
	- N				32
	Total Transfer to Subway	-	-	-	778
	Transfer to Bus				223
	Transfer to Other Rail				-
	Total	-	-	-	2,255

5.5 Year 2020 Impacts on Vehicle Trips and Vehicle Miles of Travel

Table 5-8 presents the estimated incremental automobile trips (both auto mode and drive-to-commuter rail) and the estimated incremental Vehicle Miles of Travel.

Table 5-8 Year 2020 Incremental Daily Vehicle Trips and Daily Vehicle Miles of Travel

	2020 No-Build Network (NB23)	2020 Transportation Systems Management (TSM3)	2020 LIRR-to-GCT Build (GCT3)
Incremental Vehicle Trips (vs. NB23)			
Incremental Auto Mode Trips	-	(3,401)	(12,087)
Incremental Drive-to-Transit Trips	-	4,039	23,413
Total	-	638	11,325
Incremental Vehicle Miles of Travel (vs. NB23)			
Incremental Auto Mode Trips	-	(128,772)	(410,583)
Incremental Drive-to-Transit Trips	-	9,182	35,921
Total	-	(119,590)	(374,662)

6. ASSESSMENT OF FORECAST RISKS

The ridership forecasts presented in this report are based on travel demand forecasting models that represent existing travel patterns and behavior and attempt to predict behavior in a future year based on assumptions regarding population and employment, the transportation system, fare policy, and other transportation-related policies. Like any forecast of the future, the reliability of these forecasts is related to the accuracy and appropriateness of the analytical techniques and the underlying assumptions.

The forecasting techniques and assumptions used in these forecasts are the result of a collaborative effort of the Long Island Rail Road, the Metropolitan Transportation Authority and its operating agencies, and KPMG LLP. This effort has stressed the need to maintain a consistent set of methodologies and assumptions among all of the on-going transit planning projects in the region. The forecasts of population, employment, and total travel which serve as input assumptions for the LIRR ESA DEIS forecasts may or may not be realized and consequently, the forecasts of ridership for the new service may or may not occur. The consistency of the assumptions between different alternatives and between different projects means that the resulting forecasts should be useful in the process of ranking each alternative and each project.

Some of the most important assumptions and their impact on forecasted ridership are described below. Additionally, independent observations used to confirm the reasonableness of the various forecast results are also presented.

1. **Sensitivity to Socioeconomic Factors.** The county-level population and employment forecasts are based on the adopted NYMTC forecasts for 2010 and 2020. NYMTC used these forecasts to develop projections of county-to-county journey-to-work travel for 1990, 1995, 2010, and 2020. The resulting journey-to-work forecasts were used as the basis for the projected growth in commuter travel in this report. The NYMTC journey-to-work forecasts show the following percentage increases in travel to Manhattan:

Table 6-1 Summary of Forecasted Journey-to-Work Growth by County

Origin	1995	2010		2020	
County	JTW	JTW	%Change	JTW	%Change
Queens	318,051	366,818	15.3%	380,610	19.7%
Nassau	96,676	112,706	16.6%	117,188	21.2%
Suffolk	35,112	46,625	32.8%	51,011	45.3%

The forecasted rate of growth has a direct impact on future year LIRR ridership. For example, if the actual growth in Suffolk-to-Manhattan journey-to-work is only 23 percent between 1995 and 2020, then LIRR ridership from Suffolk to Manhattan will only grow by half of the forecasted amount during that same time period.

2. **Sensitivity to Fare Policy.** The fares assumed for 2010 and 2020 are based on current MTA policies that indicate that commuter rail fares will remain unchanged between November 1995 and the Year 2000. No adopted MTA fare policy exists beyond the Year 2000. All MTA Long Range Planning Framework projects have assumed that after the Year 2000, fares will rise in proportion to the Consumer Price Index. This assumption results in a drop in real fares (as measured in constant year dollars) between Spring-Early Fall 1995 and the Year 2020 (or 2010) of between 3 and 4 percent (depending on location).

The sensitivity to fare that is built into the model is based on stated preference survey research conducted by MVA Consultancy for the Lower Manhattan Project and indicates that every 10 cents of fare is worth 0.75 minutes of travel time. Another way of expressing this relationship is that each hour of time is worth $8.00. These results are consistent with those used in similar models used elsewhere in the United States. The effect of the assumed drop in fare between 1995 and the forecast years is approximately the same as assuming that each travel is able to save one minute over the equivalent trip in 1995. If the fare policy in 2010 or 2020 changes then the forecasted ridership would be expected to change as well.

3. **Sensitivity to Service Plan.** Forecasts of ridership to Grand Central Terminal included in this report are based on preliminary service plans developed by Systra Consulting, Inc. in April 1999. These service plans are continuing to evolve and will be updated shortly. The distribution of travelers to Penn Station and to Grand Central is highly sensitive to the relative level-of-service offered from each origin station to each Manhattan terminal. Preliminary runs of the current demand forecasting model that differed only in the mix of express and local trains on each branch to Penn Station and Grand Central Terminal indicated a substantial range in the forecasted ridership to Grand Central Terminal. In particular, forecasted AM Peak 4-Hour LIRR arrivals at Grand Central Terminal varied from 60,000 to 68,000 based solely on the assumed stopping patterns for each train serving Grand Central Terminal. At present, a final schedule showing stopping patterns for each train has not been developed and therefore, the forecasts of LIRR ridership to Grand Central Terminal may change over time.

4. **Sensitivity of Model to Work Locations Within Manhattan.** The methodology used to prepare forecasts of customer choice between Penn Station and Grand Central Terminal is based on a network model calibrated to replicate the choices made between Hunterspoint Avenue, Long Island City, Flatbush Avenue, and Penn Station. The ability of the model to properly predict the ridership impacts to Grand Central Terminal is dependent on:

   - Consistency between traveler response in 1995 to the LIRR terminal choices then available and the future year choice between Penn Station and Grand Central Terminal.
   - The distribution of existing and future travel destinations within Manhattan (e.g., East Midtown versus West Midtown versus Lower Manhattan)

   The model forecasts that in 2020, LIRR travel to Manhattan will be divided as follows:

   - Penn Station: 44 percent
   - Grand Central Terminal: 46 percent
   - Other terminals: 10 percent

   By contrast, in 1990, Penn Station attracted 86.5 percent of the LIRR trips to Manhattan and in 2020 with dual mode trains (but without Grand Central Terminal), Penn Station is expected to attract 87.5 percent of LIRR travel to Manhattan.

   As shown in Table 6-2, below, the model has assigned travel to Grand Central Terminal in rough proportion to the distribution of travel in 1990 to the East Midtown and Upper East Side areas of Manhattan—the principal markets for this service. The model is assumes relatively little travel to Lower Manhattan will travel through Grand Central Terminal. This suggests that the modeled distribution of travelers between Penn Station and GCT is consistent with the underlying Census distribution of travel.

Table 6-2 Distribution of 1990 LIRR Attractions by Location Within Manhattan

Location	Attractions	Percent
East Midtown/Upper East Side	88,913	44%
West Midtown/Upper West Side	58,585	29%
Lower Manhattan	54,777	27%
	202,275	100%

Source: 1990 Person Trip Tables Derived from 1990 Census Transportation Planning Package

5. **Reasonableness of the Modeling Approach.** The forecasted ridership is a direct outcome of the analytical techniques that comprise the model. Like any analytical technique, the model is a simplification of very complex behavior and consequently, the results should be (and have been) checked for reasonableness. Perhaps the best independent check of the model reasonableness is to check the results of the LIRR to GCT forecasts against stated preference survey research conducted in earlier studies. In a 1986 survey conducted for the LIRR, the Caliper Corporation[1] estimated that approximately 42 percent of the then current riders would prefer to travel to GCT over Penn Station and that another 15 percent indicated that they might shift from Penn Station to Grand Central. About 37 percent of all existing non-LIRR riders to Manhattan would consider switching to the LIRR if an East Side Terminal were available.

   The model forecasts are reasonably consistent with this survey finding. The model shows a Grand Central-Penn Station split of 51-49. If all of the surveyed travelers who prefer Grand Central and half of those who said they might shift to Grand Central were to actually shift, then according to the survey, this split should be 50-50.

   The model shows that the introduction of LIRR service to Grand Central will increase LIRR ridership to Manhattan terminal by 11 percent. By comparison, given the LIRR share of travel from Nassau and Suffolk Counties (67 percent in 1990) and the assumption that half of the survey non-riders who would consider shifting would actually shift to the LIRR, the survey implies that LIRR ridership should grow by approximately 9 percent.

   These results suggest that the model approximately replicates an independent survey of LIRR customer stated preference.

[1] Caliper Corporation, *East Side Access Study Final Report,* June 10, 1986.

APPENDIX

DETAILED TABLES OF RESULTS

Table A-1
AM PEAK WEEKDAY 4-HOUR ARRIVALS AND DEPARTURES BY STATION

STATION LOCATION		1990 Counts NYMTC Hub-Bound	1995 Counts NYMTC Hub-Bound	BASE 1995 BASE NETWORK (NB95)	YEAR 2010 ALTERNATIVES 2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	YEAR 2020 ALTERNATIVES 2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
COMMUTER RAIL										
LIRR										
Arrivals	Penn Station	86,950	86,630	86,851	103,856	100,348	58,154	110,522	106,849	62,249
	Grand Central			0	0	0	62,334	0	0	65,676
	Hunterspoint	3,457	2,890	3,279	3,260	4,682	514	3,598	5,098	603
	Long Island City	195	240	137	44	131	40	46	138	43
	Flatbush (adj for 2-way)	12,942	10,336	10,610	11,374	12,275	9,911	12,144	13,049	10,519
	Sunnyside			0	0	0	2,070	0	0	2,255
	Total	103,544	100,096	100,878	118,533	117,435	133,024	126,310	125,135	141,345
Departure:	Penn Station	2,930	3,000	4,082	4,522	4,837	5,115	4,987	5,008	5,008
	Grand Central			0	0	0	1,108	0	0	1,884
	Hunterspoint			0	0	0	0	0	0	0
	Long Island City			0	0	0	0	0	0	0
	Flatbush Avenue	475	1,290	648	480	469	483	499	502	537
	Sunnyside			0	0	0	68	0	0	47
	Total	3,405	4,290	4,731	5,001	5,306	6,774	5,486	5,510	7,476
MNR										
Arrivals	Grand Central	66,763	70,169	70,346	84,164	84,150	84,153	88,738	88,737	88,811
	125th Street			2,703	2,924	2,926	2,924	3,171	3,052	3,167
	Total			73,049	87,088	87,075	87,078	91,909	91,789	91,978
Departure:	Grand Central	2,675	4,064	2,461	3,024	3,026	3,111	3,099	3,105	3,198
	125th Street			926	969	970	973	1,050	980	1,043
	Total			3,387	3,993	3,996	4,084	4,149	4,085	4,241
STATEN ISLAND FERRY										
Arrivals	Whitehall Terminal		18,993	18,617	35,162	35,308	35,253	35,142	35,227	35,158
Departure:	Whitehall Terminal		1,389	1,926	2,826	2,830	2,830	3,076	3,079	3,077

Table A-2
AM PEAK WEEKDAY 4-HOUR 60TH STREET SUBWAY SCREENLINE CROSSINGS

STATION LOCATION		1990 Counts NYMTC Hub-Bound	1995 Counts NYMTC Hub-Bound	BASE 1995 BASE NETWORK (NB95)	YEAR 2010 ALTERNATIVES 2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	YEAR 2020 ALTERNATIVES 2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
SUBWAY										
60TH STREET										
In	IRT Lexington Express	77,312	79,819	83,873	90,704	90,992	90,712	95,114	95,360	94,836
	IRT Lexington Local	48,830	45,819	50,108	50,425	50,569	50,617	52,293	52,425	52,746
	IND 8th Ave Express	52,068	62,315	45,494	49,828	49,839	49,923	52,535	52,565	52,502
	IND 8th Ave Local	15,591	18,683	26,290	29,513	29,495	29,336	30,628	30,446	30,344
	IRT Broadway Express	61,171	54,762	49,273	58,823	58,449	59,019	61,431	61,053	61,300
	IRT Broadway Local	38,248	42,015	53,490	61,518	61,591	61,282	63,059	63,207	63,409
	Total	293,220	303,413	308,528	340,811	340,935	340,889	355,060	355,056	355,136
Out	IRT Lexington Express	17,698	26,000	26,210	31,826	31,850	32,279	32,923	33,116	33,811
	IRT Lexington Local	30,685	29,834	36,961	37,143	37,396	37,622	38,496	38,560	38,610
	IND 8th Ave Express	13,436	10,549	27,209	35,500	35,472	34,917	36,963	36,982	36,340
	IND 8th Ave Local	3,737	5,457	8,372	10,469	10,417	10,140	10,720	10,633	10,365
	IRT Broadway Express	17,201	16,803	19,846	12,404	12,409	12,267	12,815	12,800	12,672
	IRT Broadway Local	16,378	15,770	7,753	20,159	20,163	20,147	20,843	20,906	20,862
	Total	99,135	104,413	126,350	147,501	147,708	147,373	152,759	152,996	152,660

Table A-3
AM PEAK WEEKDAY 4-HOUR BROOKLYN SUBWAY SCREENLINE CROSSINGS

STATION LOCATION		1990 Counts NYMTC Hub-Bound	1995 Counts NYMTC Hub-Bound	BASE 1995 BASE NETWORK (NB95)	YEAR 2010 ALTERNATIVES 2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	YEAR 2020 ALTERNATIVES 2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
SUBWAY										
BROOKLYN										
In	BMT 14th St Tunnel	26,999	28,516	28,266	35,048	35,049	35,030	36,543	36,643	36,677
	BMT Williamsburg Br	28,584	26,832	34,085	41,645	41,289	41,728	43,637	43,324	43,583
	IND Rutgers Tunnel	23,085	29,536	27,371	36,860	36,624	36,767	38,288	38,146	38,303
	BMT Manhattan Br	76,882	64,339	62,672	81,553	83,010	82,635	86,710	86,892	87,518
	IND Cranberry Tun	58,681	69,096	63,825	62,716	62,843	62,530	65,761	65,791	65,548
	IND Clark Tunnel	43,354	31,950	28,496	32,004	32,052	31,791	33,715	33,526	33,274
	BMT Montague Tunnel	27,629	35,217	21,015	37,718	36,379	36,495	37,472	37,601	36,915
	IRT Joralemon Tunnel	69,030	56,496	54,090	56,587	57,249	55,606	58,588	59,237	57,272
	Total	354,244	341,982	319,819	384,131	384,495	382,583	400,714	401,161	399,091
Out	BMT 14th St Tunnel	6,923	5,979	8,619	10,283	10,122	10,264	10,722	10,556	10,708
	BMT Williamsburg Br	3,379	3,097	6,387	6,376	6,368	6,378	6,627	6,641	6,644
	IND Rutgers Tunnel	6,931	7,900	10,970	8,758	8,814	8,855	9,777	9,726	9,623
	BMT Manhattan Br	9,510	8,297	6,906	9,704	9,692	9,728	10,220	10,212	10,239
	IND Cranberry Tun	9,538	10,297	8,915	8,082	8,102	8,088	8,637	8,630	8,596
	IND Clark Tunnel	6,709	6,692	4,790	4,938	4,908	4,900	5,166	5,144	5,165
	BMT Montague Tunnel	4,092	5,959	3,930	8,462	8,409	8,445	8,881	8,869	8,895
	IRT Joralemon Tunnel	8,678	11,155	8,725	8,943	8,865	8,840	9,214	9,260	9,419
	Total	55,760	59,376	59,242	65,546	65,280	65,498	69,243	69,038	69,289

Table A-4
AM PEAK WEEKDAY 4-HOUR QUEENS SUBWAY & BUS SCREENLINE CROSSINGS

STATION LOCATION		1990 Counts NYMTC Hub-Bound	1995 Counts NYMTC Hub-Bound	BASE 1995 BASE NETWORK (NB95)	YEAR 2010 ALTERNATIVES 2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	YEAR 2020 ALTERNATIVES 2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
SUBWAY										
QUEENS										
In	BMT 60th St	61,905	63,035	66,317	67,260	67,204	67,273	70,652	70,848	70,368
	IND 53rd St	113,246	116,516	116,575	98,071	97,688	96,243	102,343	102,222	100,750
	IRT Steinway	63,217	54,171	56,804	96,944	99,902	91,886	100,861	103,736	95,753
	63rd St Tunnel	3,143	3,560	3,277	37,503	37,570	36,445	39,661	39,422	38,354
	Total	241,511	237,282	242,973	299,778	302,364	291,847	313,517	316,228	305,226
Out	BMT 60th St	10,369	9,227	10,122	6,851	6,907	6,947	7,429	7,511	7,503
	IND 53rd St	18,950	16,284	16,727	23,519	23,362	23,123	25,047	25,015	24,782
	IRT Steinway	13,270	12,858	13,626	15,728	15,726	15,599	16,919	16,901	16,658
	63rd St Tunnel	1,994	2,457	9,553	14,805	14,578	13,722	15,465	15,182	14,361
	Total	44,583	40,826	50,028	60,904	60,573	59,391	64,859	64,609	63,304
BUS										
In	Brooklyn Battery Tun.	17,069	14,025	17,009	13,983	13,883	13,902	13,905	13,823	13,855
	Manhattan Bridge	463	325	14	6	6	6	5	5	5
	Queensboro Bridge	2,300	2,232	658	579	580	679	607	625	707
	Queens Midtown Tun.	12,094	9,364	5,243	1,400	2,261	1,140	1,466	2,344	1,176
	Williamsburg Bridge	180	293	6	0	0	0	0	0	0
	60th Street	30,726	24,280	27,630	18,804	18,745	18,856	19,227	19,137	19,289
	Total	62,832	50,519	50,560	34,772	35,475	34,583	35,210	35,934	35,032
Out	Brooklyn Battery Tun.	72		0	0	0	0	0	0	0
	Manhattan Bridge	128		1	0	0	0	0	0	0
	Queensboro Bridge	690		468	263	248	281	272	271	275
	Queens Midtown Tun.	349		0	0	0	0	0	0	0
	Williamsburg Bridge	247		0	1	1	1	1	1	1
	60th Street	8,597		7,298	7,701	7,704	8,213	7,871	7,902	8,423
	Total	10,083		7,767	7,965	7,953	8,495	8,144	8,174	8,699

Table A-5
WEEKDAY (ALL-DAY) LINKED PERSON TRIPS BY MODE

	BASE	YEAR 2010 ALTERNATIVES			YEAR 2020 ALTERNATIVES		
	1995 BASE NETWORK (NB95)	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
PERSON TRIPS BY MODE (INTRAZONAL TRIPS EXCLUDED)							
HBW							
Auto	4,455,549	4,898,639	4,896,172	4,890,530	5,374,457	5,371,487	5,365,829
Commuter Rail	285,682	368,126	371,172	386,916	392,124	394,942	412,021
Subway	1,794,233	2,185,990	2,181,888	2,176,926	2,294,061	2,290,079	2,284,697
Bus	455,831	443,267	446,791	441,652	469,441	473,575	467,535
Total	6,991,295	7,896,022	7,896,023	7,896,024	8,530,082	8,530,083	8,530,083
HBO							
Auto	6,450,701	6,763,135	6,762,488	6,757,846	7,187,266	7,186,329	7,181,572
Commuter Rail	147,258	167,406	169,184	174,621	177,755	178,819	185,967
Subway	1,065,638	1,198,240	1,197,107	1,197,121	1,239,252	1,238,245	1,237,988
Bus	758,066	734,394	734,396	733,587	761,046	761,926	759,792
Total	8,421,663	8,863,175	8,863,176	8,863,175	9,365,319	9,365,319	9,365,318
NHB							
Auto	1,641,898	1,704,763	1,704,469	1,703,962	1,801,842	1,801,667	1,800,794
Commuter Rail	57,712	59,383	60,296	62,547	63,142	63,439	66,995
Subway	489,708	546,901	546,344	544,837	562,863	562,558	560,536
Bus	128,210	118,854	118,791	118,555	123,100	123,282	122,621
Total	2,317,528	2,429,901	2,429,901	2,429,901	2,550,947	2,550,946	2,550,946
TOTAL							
Auto	12,548,148	13,366,537	13,363,129	13,352,338	14,363,565	14,359,483	14,348,195
Commuter Rail	490,653	594,915	600,652	624,084	633,021	637,199	664,983
Subway	3,349,579	3,931,131	3,925,339	3,918,884	4,096,176	4,090,882	4,083,221
Bus	1,342,107	1,296,515	1,299,979	1,293,794	1,353,586	1,358,784	1,349,948
Total	17,730,486	19,189,098	19,189,099	19,189,100	20,446,347	20,446,348	20,446,347
INCREMENTAL (INTRAZONAL TRIPS EXCLUDED) TOTAL							
Auto	0	0	(3,408)	(14,199)	0	(4,082)	(15,370)
Commuter Rail	0	0	5,738	29,169	0	4,179	31,963
Subway	0	0	(5,793)	(12,247)	0	(5,294)	(12,955)
Bus	0	0	3,464	(2,722)	0	5,198	(3,638)
Total	0	0	1	1	0	1	(0)

Table A-6
AM PEAK PERIOD (6-10AM) DISTRIBUTION OF LIRR ARRIVING PASSENGERS AT PENN STATION

	1995 BASE NETWORK (NB95)	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
WALK TO FINAL DESTINATION							
85	74.78	71.57	68.85	71.35	73.47	70.53	72.84
92	0.14	0.13	0.13	135.48	0.14	0.14	143.10
93	171.18	174.88	167.96	175.65	187.97	180.17	187.79
94	1,216.41	1,230.10	1,182.06	1,235.71	1,319.95	1,265.84	1,318.84
97	2,411.80	2,399.18	2,305.87	2,431.82	2,520.20	2,417.28	2,540.72
98	413.70	679.41	654.24	704.70	717.54	689.57	739.91
111	191.14	198.80	199.30	0.00	208.47	208.60	0.00
114	0.04	41.97	40.33	0.00	44.76	42.91	0.00
115	234.98	238.57	231.53	0.00	251.63	243.69	0.00
116	587.74	586.63	579.90	0.00	616.79	608.69	0.00
117	1,740.67	1,760.84	1,748.56	0.00	1,851.03	1,834.90	0.00
118	1,060.27	1,027.36	986.61	439.80	1,078.98	1,034.12	458.92
119	1,763.46	1,787.27	1,722.80	0.00	1,872.29	1,801.09	0.00
120	3,023.73	3,008.99	2,895.67	0.00	3,142.89	3,018.38	0.00
121	2,414.67	2,315.42	2,224.94	2,344.37	2,420.20	2,320.95	2,437.07
122	0.48	1,301.92	1,250.89	1,315.67	1,371.51	1,315.10	1,378.35
123	1,689.91	1,646.22	1,588.56	1,762.76	1,715.85	1,652.32	1,825.80
124	3,112.09	3,582.91	3,448.26	3,636.98	3,996.91	3,838.75	4,034.47
125	887.37	996.37	964.09	998.28	1,110.06	1,071.92	1,106.11
126	1,904.33	1,841.57	1,768.56	1,856.24	1,905.26	1,826.02	1,909.95
127	1,625.11	1,564.63	1,504.44	1,562.13	1,616.44	1,551.09	1,605.30
128	504.49	539.68	518.86	545.12	575.80	552.48	578.55
129	2,344.84	2,499.58	2,404.03	2,528.86	2,659.21	2,552.29	2,675.88
130	259.71	265.08	254.55	265.41	279.88	268.20	278.74
131	176.62	198.06	190.29	199.85	210.36	201.70	211.14
132	67.50	103.81	99.95	100.89	139.56	134.07	134.76
133	459.65	703.92	676.64	707.79	947.70	909.07	947.30
134	0.74	830.66	799.17	837.43	945.45	907.73	947.88
135	650.35	626.09	602.43	626.23	708.40	680.24	704.66
136	349.47	527.92	507.37	539.71	715.29	686.02	727.12
137	1.50	52.25	50.53	53.25	59.61	57.54	60.42
138	0.07	529.76	511.49	536.04	556.36	536.07	559.88
139	496.28	475.07	457.82	495.07	546.27	525.38	566.19
140	234.67	211.00	202.97	223.75	241.88	232.17	254.96
141	0.00	264.37	254.94	273.72	304.18	292.71	313.19
142	0.39	337.86	325.11	343.31	352.79	338.80	356.51
143	454.52	446.38	429.91	452.61	469.32	451.08	473.34
144	1,060.55	1,195.09	1,151.47	1,245.85	1,305.21	1,254.94	1,352.60
145	1,117.34	1,230.06	1,185.71	1,261.29	1,330.04	1,279.41	1,356.00
146	1,678.74	1,858.55	1,791.22	252.54	2,017.43	1,940.35	272.35
147	307.87	340.63	327.70	55.29	369.10	354.37	59.55
148	1,320.52	1,334.46	1,286.04	0.00	1,435.21	1,380.27	0.00
149	1,122.11	1,101.89	1,060.98	551.09	1,184.14	1,137.86	588.68
150	603.84	614.16	591.97	118.68	664.20	638.90	126.75

(CONTINUED)

Table A-6
AM PEAK PERIOD (6-10AM) DISTRIBUTION OF LIRR ARRIVING PASSENGERS AT PENN STATION (CONTINUED)

	1995 BASE NETWORK (NB95)	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
WALK TO FINAL DESTINATION							
151	0.00	950.98	916.74	512.28	1,021.64	982.84	550.36
152	725.91	710.54	682.88	0.00	757.24	726.26	0.00
153	0.52	0.00	0.00	0.00	0.00	0.00	0.00
154	3,733.60	4,019.08	3,889.25	0.00	4,347.92	4,198.51	0.00
155	3,562.18	3,464.24	3,354.75	0.00	3,608.98	3,487.65	0.00
156	2,224.37	2,232.98	2,208.07	0.00	2,335.28	2,305.17	0.00
157	0.00	1,121.23	1,098.94	0.00	1,164.56	1,139.36	0.00
158	0.00	0.00	0.00	0.00	0.00	0.00	0.00
159	0.00	0.00	0.00	0.00	0.00	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00	0.00
161	1,160.16	1,151.68	1,108.86	0.00	1,201.73	1,154.74	0.00
162	224.80	220.89	214.81	0.00	230.89	224.04	0.00
163	0.00	197.69	192.15	0.00	205.04	198.88	0.00
164	0.00	559.50	537.63	0.00	581.82	558.00	0.00
165	144.47	147.74	144.28	0.00	155.98	152.02	0.00
166	0.00	0.00	0.00	0.00	0.00	0.00	0.00
167	0.00	52.84	50.80	0.00	54.74	52.51	0.00
168	686.47	641.96	640.67	0.00	664.79	662.41	0.00
169	553.91	537.06	529.54	0.00	557.80	549.03	0.00
170	40.86	87.52	83.93	0.00	92.88	88.90	0.00
TOTAL	50,793.00	58,837.00	56,868.00	31,397.00	63,021.00	60,784.00	33,856.00
TRANSFERS TO SUBWAY							
Subway Routes A/C/E SB	7,791	8,487	8,149	8,015	8,870	8,575	8,369
Subway Routes A/C/E NB	11,448	17,407	16,864	3,765	18,432	17,909	4,128
Subway Routes 1/2/3/9 SB	10,077	12,354	11,838	10,713	13,027	12,581	11,383
Subway Routes 1/2/3/9 NB	1,834	2,140	2,129	1,944	2,262	2,257	2,076
Subway Routes B/D/F/Q SB	1,681	1,586	1,536	1,313	1,684	1,645	1,399
Subway Routes B/D/F/Q NB	1,568	1,069	932	-	1,107	941	-
Subway Routes N/R SB	-	763	748	273	797	782	285
Subway Routes N/R NB	-	-	-	-	-	-	-
TOTAL TO SUBWAY	34,399	43,806	42,196	26,023	46,179	44,690	27,640
TOTAL BUS TRANSFERS	223	265	263	8	281	277	8
TOTAL LIRR@NYPS	85,415	102,908	99,327	57,428	109,481	105,751	61,504

Table A-7
AM PEAK PERIOD (6-10AM) DISTRIBUTION OF LIRR ARRIVING PASSENGERS AT GRAND CENTRAL TERMINAL

	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
WALK TO FINAL DESTINATION						
111	0	0	308.77	0	0	321.52
114	0	0	54.42	0	0	57.62
115	0	0	288.12	0	0	302.72
116	0	0	885.31	0	0	924.72
117	0	0	2,593.77	0	0	2,711.88
118	0	0	674.69	0	0	706.82
119	0	0	2,407.41	0	0	2,509.53
120	0	0	3,506.74	0	0	3,651.21
123	0	0	1,802.83	0	0	1,874.74
146	0	0	2,152.37	0	0	2,330.46
147	0	0	320.46	0	0	346.48
148	0	0	1,610.34	0	0	1,727.02
149	0	0	788.94	0	0	845.99
150	0	0	717.71	0	0	774.12
151	0	0	484.58	0	0	519.79
152	0	0	898.87	0	0	956.00
153	0	0	3,337.54	0	0	3,592.10
154	0	0	5,480.30	0	0	5,905.50
155	0	0	4,971.62	0	0	5,150.13
156	0	0	3,561.01	0	0	3,693.86
157	0	0	1,805.31	0	0	1,865.02
158	0	0	3,715.59	0	0	3,867.53
159	0	0	1,623.85	0	0	1,689.91
160	0	0	1,644.42	0	0	1,711.51
161	0	0	1,550.82	0	0	1,611.45
162	0	0	321.07	0	0	333.84
163	0	0	256.22	0	0	265.00
164	0	0	725.36	0	0	751.23
165	0	0	184.45	0	0	193.83
166	0	0	854.91	0	0	884.40
167	0	0	74.06	0	0	76.34
168	0	0	1,179.24	0	0	1,213.07
169	0	0	919.35	0	0	948.73
170	0	0	112.55	0	0	118.92
TOTAL PEDESTRIANS			51,813.00			54,433.00
TRANSFERS TO SUBWAY						
Subway Route 4/5 SB	0	0	4,223	0	0	4,485
Subway Route 6 SB	0	0	810	0	0	842
Subway Route 4/5 NB	0	0	683	0	0	583
Subway Route 6 NB	0	0	1,634	0	0	1,646
Subway Route 7 EB	0	0	4	0	0	4
Subway Route 7 WB	0	0	21	0	0	23
Subway Route S	0	0	-	0	0	-
TOTAL TO SUBWAY	0	0	7,375	0	0	7,583
TRANSFERS TO BUS	0	0	2,556	0	0	3,027
TOTAL LIRR@GCT	0	0	61,745	0	0	65,043

Table A-8
AM PEAK PERIOD (6-10AM) DISTRIBUTION OF LIRR ARRIVING PASSENGERS AT SUNNYSIDE YARD STATION

STATION LOCATION	BASE	YEAR 2010 ALTERNATIVES			YEAR 2020 ALTERNATIVES		
	1995 BASE NETWORK (NB95)	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
LONG ISLAND RAILROAD							
TO SUBWAY							
Subway Route 7	0	0	0	169	0	0	169
Subway Routes F/R	0	0	0	540	0	0	572
Subway Route E	0	0	0	5	0	0	5
Subway Route N	0	0	0	29	0	0	32
Subtotal	0	0	0	743	0	0	779
WALK TO FINAL DESTINATION ZONE							
Zone 687	0	0	0	212	0	0	234
Zone 692	0	0	0	171	0	0	180
Zone 695	0	0	0	0	0	0	0
Zone 696	0	0	0	293	0	0	380
Zone 697	0	0	0	440	0	0	459
Subtotal	0	0	0	1,115	0	0	1,254
TO BUS							
Total Bus Transfers	0	0	0	212	0	0	223
Total LIRR @ Sunnyside Yard	0	0	0	2,070	0	0	2,255

Table A-9
INCREMENTAL TRAVEL TIMES SAVINGS VERSUS NO-BUILD

STATION LOCATION	BASE	YEAR 2010 ALTERNATIVES			YEAR 2020 ALTERNATIVES		
	1995 BASE NETWORK (NB95)	2010 NO-BUILD (NB13)	2010 TSM (T310)	2010 LIRR-GCT BUILD (G310)	2020 NO-BUILD (NB23)	2020 TSM (TSM3)	2020 LIRR-GCT BUILD (GCT3)
DAILY PERSON HOURS							
TT Savings for Existing Riders							
Out-of-Vehicle Time	0	0	3,270	25,997	0	3,499	27,653
In-Vehicle Time	0	0	2,984	(3,812)	0	2,283	(3,642)
Total	0	0	6,254	22,185	0	5,782	24,011
TT Savings for New Riders							
Out-of-Vehicle Time	0	0	205	2,369	0	213	2,594
In-Vehicle Time	0	0	(39)	(249)	0	91	(334)
Total							
TT Savings for ALL							
Out-of-Vehicle Time	0	0	3,475	28,366	0	3,712	30,247
In-Vehicle Time	0	0	2,945	(4,061)	0	2,374	(3,976)
Total	0	0	6,420	24,305	0	6,086	26,271
ANNUAL PERSON HOURS							
Days/Year	282	282	282	282	282	282	282
TT Savings for Existing Riders							
Out-of-Vehicle Time	0	0	922,140	7,331,154	0	986,718	7,798,146
In-Vehicle Time	0	0	841,488	(1,074,984)	0	643,806	(1,027,044)
Total	0	0	1,763,628	6,256,170	0	1,630,524	6,771,102
TT Savings for New Riders							
Out-of-Vehicle Time	0	0	57,810	668,058	0	60,066	731,508
In-Vehicle Time	0	0	(10,998)	(70,218)	0	25,662	(94,188)
Total	0	0	46,812	597,840	0	85,728	637,320
TT Savings for ALL							
Out-of-Vehicle Time	0	0	979,950	7,999,212	0	1,046,784	8,529,654
In-Vehicle Time	0	0	830,490	(1,145,202)	0	669,468	(1,121,232)
Total	0	0	1,810,440	6,854,010	0	1,716,252	7,408,422

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
CITY TERMINAL ZONE																			
3000	New York-Penn Station	84,811	3,269	88,080	86,630	3,269	89,899	85,415	3,772	89,187	102,908	4,109	107,017	99,327	4,385	103,712	57,428	4,693	62,121
3807	New York-GCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61,744	1,096	62,840
3002	Hunterspoint Ave	3,457	0	3,457	2,890	0	2,890	3,263	0	3,263	3,287	31	3,318	6,989	28	7,017	541	28	570
3001	Long Island City	195	0	195	240	0	240	140	3	143	44	0	44	131	0	131	40	0	40
3091	Flatbush Ave	11,935	475	12,410	10,291	475	10,766	10,499	598	11,097	11,292	463	11,755	12,194	455	12,650	9,833	468	10,301
	Subtotal	100,398	3,744	104,142	100,051	3,744	103,795	99,318	4,373	103,691	117,530	4,604	122,134	118,642	4,868	123,509	129,587	6,285	135,872
3806	Jamaica Penn Station	3,582	2,308	5,890	3,538	2,292	5,830	3,131	964	4,095	3,909	1,078	4,987	3,888	1,082	4,970	4,203	1,448	5,652
3003	Woodside	659	495	1,154	802	521	1,323	1,077	250	1,327	1,913	210	2,124	1,646	202	1,848	859	190	1,049
3808	Sunnyside	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,010	67	2,077
3004	Forest Hills	62	352	414	58	433	491	272	41	313	382	48	429	414	54	468	357	65	421
3005	Kew Gardens	30	447	477	39	467	506	206	89	295	320	32	353	323	38	360	338	38	376
3092	Nostrand Ave	156	14	170	105	14	119	175	49	224	193	34	228	195	35	231	188	34	221
3093	East New York			0	117	1	118	274	64	337	304	68	372	311	70	381	300	97	397
	Subtotal	4,489	3,616	8,105	4,659	3,728	8,387	5,134	1,457	6,591	7,022	1,471	8,492	6,777	1,480	8,257	8,254	1,938	10,192
	Total	104,887	7,360	112,247	104,710	7,472	112,182	104,452	5,830	110,282	124,552	6,074	130,626	125,419	6,348	131,767	137,841	8,223	146,064
BABYLON BRANCH																			
3049	Babylon	230	3,325	3,555	195	3,265	3,460	101	2,800	2,901	137	3,603	3,740	146	3,965	4,111	128	3,031	3,159
3048	Lindenhurst	97	1,526	1,623	91	1,278	1,369	56	1,230	1,286	64	1,940	2,004	66	1,721	1,787	67	2,823	2,890
3047	Copiague	150	1,015	1,165	145	1,001	1,146	48	1,186	1,235	62	1,681	1,742	64	1,684	1,748	66	1,820	1,887
3046	Amityville	162	831	993	210	727	937	180	1,005	1,185	211	1,418	1,629	214	1,422	1,636	216	1,547	1,763
3045	Massapequa Park	52	1,666	1,718	50	1,481	1,531	32	1,817	1,849	40	2,162	2,202	41	2,167	2,207	41	2,461	2,502
3044	Massapequa	91	2,708	2,799	90	2,522	2,612	60	2,181	2,240	73	2,594	2,667	75	2,602	2,677	84	2,519	2,603
3043	Seaford	63	1,566	1,629	58	1,435	1,493	53	1,773	1,825	63	2,048	2,111	64	2,053	2,116	65	1,996	2,060
3042	Wantagh	64	2,788	2,852	53	2,739	2,792	49	2,233	2,282	58	2,583	2,641	59	2,571	2,630	58	2,472	2,530
3041	Bellmore	75	2,800	2,875	92	2,698	2,790	65	2,295	2,360	76	2,744	2,820	73	2,749	2,821	79	2,887	2,965
3040	Merrick	55	2,827	2,882	70	2,812	2,882	126	2,535	2,661	141	2,998	3,139	143	3,000	3,143	143	3,233	3,376
3039	Freeport	195	1,642	1,837	200	1,672	1,872	121	2,087	2,208	137	2,447	2,583	134	2,454	2,587	146	2,573	2,719
3038	Baldwin	97	3,014	3,111	114	2,914	3,028	73	3,125	3,198	86	3,653	3,739	86	3,660	3,747	93	4,293	4,386
3037	Rockville Centre	207	2,414	2,621	215	2,191	2,406	275	1,895	2,170	298	1,984	2,282	303	1,984	2,287	307	2,089	2,397
	Total	1,538	28,122	29,660	1,583	26,735	28,318	1,238	26,162	27,400	1,445	31,854	33,299	1,466	32,030	33,496	1,492	33,745	35,237

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
FAR ROCKAWAY BRANCH																			
3127	Far Rockaway	16	113	129	22	58	80	5	70	75	16	418	434	16	420	436	16	423	439
3126	Inwood	9	225	234	9	232	241	30	466	496	56	444	501	56	445	501	56	465	522
3125	Lawrence	17	253	270	17	263	280	4	519	524	9	540	548	9	541	550	9	577	586
3124	Cedarhurst	80	556	636	78	519	597	45	335	380	59	353	412	58	353	411	58	363	421
3123	Woodmere	48	597	645	56	630	686	30	617	647	41	686	727	41	685	726	40	692	732
3122	Hewlett	85	704	789	78	642	720	6	885	891	8	988	996	8	990	998	8	997	1,005
3121	Gibson	40	637	677	33	501	534	37	49	86	47	50	97	47	50	97	47	50	97
3097	Valley Stream	151	2,156	2,307	137	2,254	2,391	211	2,241	2,452	196	2,505	2,701	200	2,511	2,711	209	2,639	2,848
3096	Rosedale	21	1,276	1,297	21	1,058	1,079	155	741	896	211	946	1,157	217	949	1,166	222	1,091	1,313
3095	Laurelton	19	489	508	24	471	495	15	700	715	27	710	737	28	710	738	28	805	833
3094	Locust Manor	28	492	520	24	452	476	41	427	469	36	275	311	36	275	312	36	266	303
	Total	514	7,498	8,012	499	7,080	7,579	578	7,052	7,630	705	7,915	8,620	716	7,929	8,645	730	8,367	9,097
HEMPSTEAD BRANCH																			
3120	Hempstead	235	1,029	1,264	264	800	1,064	62	973	1,034	53	1,041	1,094	84	1,042	1,125	78	1,170	1,248
3119	Country Life Press	11	347	358	11	298	309	4	335	340	2	360	363	3	361	364	3	403	405
3118	Garden City	118	577	695	115	581	696	65	242	307	66	294	360	91	294	385	73	312	386
3117	Nassau Blvd	76	655	731	73	677	750	68	394	462	77	438	514	85	438	523	82	750	831
3116	Stewart Manor	15	834	849	18	771	789	44	1,031	1,076	36	1,089	1,125	68	1,090	1,158	69	1,640	1,708
3115	Floral Park	60	1,270	1,330	63	1,231	1,294	71	1,262	1,333	63	1,204	1,267	88	1,203	1,291	59	647	706
3114	Bellerose	10	444	454	8	516	524	92	726	818	96	532	628	116	599	716	106	693	799
3008	Queens Village	32	579	611	33	474	507	24	640	664	25	688	713	38	696	735	34	1,068	1,102
3007	Hollis	6	56	62	7	53	60	17	78	95	21	69	90	39	69	108	27	156	184
	Total	563	5,791	6,354	592	5,401	5,993	448	5,682	6,129	439	5,714	6,154	612	5,792	6,405	531	6,838	7,369

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
LONG BEACH BRANCH																			
3113	Long Beach	116	1,763	1,879	116	1,631	1,747	24	1,860	1,884	26	2,321	2,347	26	2,101	2,128	26	2,181	2,207
3112	Island Park	30	1,175	1,205	30	1,146	1,176	27	1,550	1,576	33	1,592	1,625	33	1,814	1,847	33	1,865	1,899
3111	Oceanside	47	1,361	1,408	70	1,264	1,334	38	793	832	47	671	718	48	1,255	1,303	49	1,155	1,204
3110	East Rockaway	37	431	468	62	474	536	7	926	933	8	1,397	1,404	8	816	823	8	962	970
3109	Centre Ave	23	518	541	13	489	502	20	250	269	24	299	324	25	299	324	25	310	335
3036	Lynbrook	202	1,568	1,770	198	1,473	1,671	116	1,445	1,562	120	1,460	1,580	122	1,462	1,585	123	1,562	1,685
	Total	455	6,816	7,271	489	6,477	6,966	233	6,823	7,056	259	7,740	7,999	263	7,747	8,010	264	8,035	8,299
MONTAUK BRANCH																			
3068	Montauk	11	4	15	11	5	16	1	0	1	3	0	3	3	0	3	3	0	3
3067	Amagansett	3	6	9	4	3	7	0	94	94	0	130	131	0	131	131	0	131	131
3066	East Hampton	25	2	27	25	16	41	7	35	42	15	46	61	15	47	62	14	47	61
3065	Bridgehampton	8	3	11	9	10	19	8	6	14	11	9	20	11	9	20	12	9	21
3064	Southampton	14	8	22	14	7	21	11	25	37	14	34	48	14	34	49	14	35	48
3063	Southampton Campus-L	3	0	3	3	0	3	11	0	12	14	0	15	14	0	15	14	0	14
3062	Hampton Bays	10	7	17	10	15	25	6	12	17	7	17	24	7	17	24	7	17	24
3061	Quogue	3	0	3	3	0	3	0	3	3	0	3	3	0	3	3	0	3	3
3060	Westhampton	10	1	11	11	8	19	9	16	26	13	22	35	13	22	35	13	22	35
3059	Speonk	7	41	48	8	66	74	2	35	37	2	78	79	2	75	76	2	79	81
3058	Center Moriches	0	19	19	1	11	12	2	21	22	3	10	13	3	14	17	3	9	12
3057	Mastic-Shirley	12	313	325	14	244	258	8	250	258	11	434	445	11	441	453	11	447	458
3056	Bellport	4	9	13	1	10	11	2	18	20	5	16	20	5	9	14	4	9	14
3055	Patchogue	66	657	723	72	469	541	40	416	456	54	660	714	54	677	731	54	674	728
3054	Sayville	62	425	487	90	559	649	20	548	568	27	976	1,004	28	927	955	27	1,025	1,052
3053	Oakdale	11	186	197	13	158	171	12	220	232	18	319	336	18	235	253	18	228	246
3052	Great River	1	71	72	0	79	79	18	79	96	21	88	109	26	288	314	20	150	170
3051	Islip	23	416	439	18	353	371	30	352	382	48	557	605	57	608	665	47	560	608
3050	Bay Shore	60	491	551	65	450	515	27	601	628	33	947	980	38	1,039	1,077	33	965	998
	Total	333	2,659	2,992	372	2,463	2,835	214	2,730	2,944	298	4,347	4,645	320	4,575	4,895	295	4,411	4,706

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
OYSTER BAY																			
3108	Oyster Bay	22	51	73	22	57	79	20	8	29	20	9	30	21	12	33	21	9	30
3107	Mill Neck	1	2	3	1	2	3	2	139	141	2	196	198	3	214	217	3	202	204
3106	Locust Valley	30	186	216	28	180	208	21	202	223	22	272	294	25	296	320	23	281	304
3105	Glen Cove	7	146	153	11	147	158	27	74	101	27	102	129	30	109	139	28	104	132
3104	Glen St	10	153	163	18	149	167	1	244	245	1	332	333	1	369	371	1	340	342
3103	Sea Cliff	13	199	212	11	188	199	52	182	234	47	245	292	65	277	341	51	251	302
3102	Glen Head	9	196	205	13	264	277	5	252	257	6	350	356	6	418	424	6	356	362
3101	Greenvale	14	93	107	12	82	94	9	165	173	7	238	245	10	258	268	7	242	249
3100	Roslyn	51	205	256	52	234	286	36	244	279	27	313	340	30	364	394	29	334	362
3099	Albertson	29	167	196	32	170	202	45	191	236	30	246	276	33	307	340	30	261	291
3098	East Williston	21	492	513	16	459	475	11	489	500	5	676	681	7	768	775	5	585	590
	Total	207	1,890	2,097	216	1,932	2,148	230	2,189	2,419	195	2,979	3,175	231	3,391	3,622	204	2,964	3,168
PORT JEFFERSON																			
3078	Port Jefferson	62	434	496	62	358	420	11	454	465	15	847	862	15	916	931	15	875	890
3077	Stony Brook	110	336	446	110	332	442	63	583	646	73	523	596	73	565	639	74	497	570
3076	St James	18	201	219	20	214	234	22	209	231	25	242	267	25	267	292	25	244	269
3075	Smithtown	39	485	524	42	490	532	53	575	628	61	783	844	62	831	892	61	786	848
3074	Kings Park	26	893	919	19	861	880	31	875	906	38	1,196	1,234	39	1,284	1,323	38	1,199	1,238
3073	Northport	65	1,133	1,198	75	1,041	1,116	50	1,125	1,175	62	1,222	1,284	63	1,316	1,379	62	1,214	1,276
3072	Greenlawn	13	388	401	10	424	434	39	590	630	48	29	77	49	80	130	51	22	73
3071	Huntington	394	4,485	4,879	273	4,664	4,937	109	3,910	4,019	122	7,177	7,299	127	7,738	7,865	122	6,789	6,911
3070	Cold Spring Harbor	36	1,010	1,046	37	1,036	1,073	20	780	800	24	885	908	24	695	720	24	1,178	1,202
3069	Syosset	217	2,009	2,226	206	2,352	2,558	173	2,533	2,707	203	3,093	3,297	210	3,080	3,290	205	3,452	3,657
3014	Hicksville	665	6,285	6,950	604	6,336	6,940	462	6,220	6,682	609	8,038	8,647	633	8,065	8,697	641	7,544	8,185
3013	Westbury	227	1,359	1,586	244	1,510	1,754	179	1,559	1,738	202	1,412	1,614	217	1,405	1,622	225	2,182	2,407
3012	Carle Place	29	297	326	33	296	329	477	211	688	504	248	752	541	248	789	476	20	496
3011	Mineola	810	2,509	3,319	641	2,287	2,928	376	1,852	2,227	399	2,354	2,753	410	2,387	2,797	463	2,197	2,660
3010	Merillon Ave	14	547	561	20	593	613	184	1,486	1,670	223	1,737	1,961	234	1,726	1,960	232	2,118	2,350
3009	New Hyde Park	65	1,152	1,217	81	1,187	1,268	193	1,770	1,963	187	2,287	2,474	190	2,289	2,479	198	3,019	3,217
	Total	2,790	23,523	26,313	2,477	23,981	26,458	2,443	24,732	27,176	2,794	32,073	34,868	2,911	32,893	35,804	2,914	33,334	36,248

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		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
PORT WASHINGTON																			
3090	Port Washington	206	2,467	2,673	206	2,429	2,635	152	2,332	2,483	145	2,769	2,914	182	2,771	2,953	146	2,831	2,977
3089	Plandome	31	478	509	28	468	496	23	227	250	27	263	290	33	266	299	27	269	296
3088	Manhasset	183	2,159	2,342	172	2,197	2,369	293	2,410	2,702	305	3,335	3,640	389	2,816	3,205	311	2,643	2,954
3087	Great Neck	455	2,694	3,149	419	3,015	3,434	484	3,031	3,515	404	3,195	3,599	582	3,720	4,302	417	4,510	4,928
3086	Little Neck	17	1,464	1,481	19	1,446	1,465	166	1,269	1,435	144	849	992	178	919	1,097	146	1,011	1,156
3085	Douglaston	30	1,014	1,044	30	1,140	1,170	24	1,479	1,502	27	1,767	1,794	40	1,768	1,808	28	1,943	1,972
3084	Bayside	84	3,073	3,157	87	3,263	3,350	119	3,695	3,814	123	2,080	2,204	136	2,135	2,271	136	2,439	2,576
3083	Auburndale	16	1,094	1,110	12	1,132	1,144	17	1,472	1,489	14	1,327	1,341	16	1,361	1,376	17	2,662	2,679
3082	Broadway	17	927	944	15	1,019	1,034	71	1,078	1,149	69	718	787	83	737	820	75	1,275	1,350
3081	Murray Hill	12	370	382	14	447	461	80	150	229	97	62	159	103	67	171	101	122	223
3080	Flushing	89	427	516	106	482	588	515	710	1,224	700	763	1,463	727	798	1,525	726	1,577	2,303
	Total	1,140	16,167	17,307	1,108	17,038	18,146	1,944	17,849	19,794	2,054	17,128	19,182	2,469	17,358	19,827	2,131	21,283	23,414
RONKONKOMA																			
3029	Greenport	8	7	15	8	3	11	15	19	34	18	22	40	18	22	41	18	22	41
3028	Southold	0	8	8	0	9	9	16	96	112	20	128	148	20	128	148	20	130	150
3027	Mattituck	2	6	8	2	8	10	19	27	46	23	16	39	24	16	40	23	16	39
3026	Riverhead	16	16	32	16	7	23	2	50	51	2	98	100	2	98	100	2	98	100
3025	Yaphank	0	14	14	0	5	5	14	6	20	18	10	28	18	10	28	18	10	28
3024	Medford	0	27	27	0	15	15	15	3	18	22	3	25	22	3	25	22	3	25
3023	Holtsville	1	11	12	1	4	5	46	152	198	58	242	300	59	254	313	58	252	310
3022	Ronkonkoma	251	5,003	5,254	251	5,430	5,681	59	5,029	5,088	73	6,881	6,953	74	6,915	6,989	73	6,791	6,864
3021	Central Islip	52	1,187	1,239	56	1,514	1,570	119	1,081	1,200	147	1,259	1,407	148	1,266	1,414	153	1,827	1,980
3020	Brentwood	95	1,152	1,247	83	1,155	1,238	98	1,546	1,644	102	3,042	3,143	104	3,007	3,111	123	1,938	2,061
3019	Deer Park	87	1,502	1,589	101	1,815	1,916	131	1,590	1,720	160	1,310	1,471	162	1,259	1,421	172	3,661	3,833
3018	Wyandanch	87	1,323	1,410	101	1,375	1,476	63	1,339	1,402	75	1,898	1,972	77	1,880	1,956	97	1,585	1,681
3017	Pine Lawn	0	0	0	0	0	0	31	0	31	17	0	17	17	0	17	28	0	28
3016	Farmingdale	114	881	995	111	987	1,098	277	1,157	1,435	300	1,415	1,715	307	1,417	1,723	315	1,502	1,817
3015	Bethpage	62	1,171	1,233	41	1,093	1,134	208	864	1,071	264	1,067	1,330	267	1,120	1,387	295	1,582	1,877
	Total	775	12,308	13,083	771	13,420	14,191	1,112	12,957	14,069	1,299	17,389	18,688	1,318	17,395	18,713	1,417	19,416	20,834

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
WEST HEMPSTEAD																			
3132	West Hempstead	6	189	195	6	226	232	13	209	223	18	198	216	13	198	211	18	224	242
3131	Hempstead Gardens	5	204	209	4	139	143	81	193	274	72	201	274	73	201	275	67	239	306
3130	Lakeview	4	297	301	4	302	306	5	267	273	6	288	294	6	289	296	6	316	322
3129	Malverne	11	565	576	10	524	534	8	523	531	8	581	589	9	582	590	9	658	667
3128	Westwood	3	347	350	2	345	347	21	438	459	22	450	472	22	452	474	22	507	529
3035	St Albans	0	40	40	0	39	39	20	79	99	27	46	73	28	46	73	33	218	251
	Total	29	1,642	1,671	26	1,575	1,601	150	1,709	1,859	154	1,765	1,919	151	1,768	1,919	156	2,162	2,318
LIRR TOTALS																			
LIRR Total W/O Terminal Zone		8,344	106,416	114,760	8,133	106,102	114,235	8,591	107,886	116,476	9,643	128,905	138,549	10,456	130,880	141,336	10,134	140,556	150,690
LIRR Total With Terminal Zone		113,231	113,776	227,007	112,843	113,574	226,417	113,043	113,715	226,758	134,195	134,979	269,175	135,875	137,228	273,103	147,975	148,780	296,754

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
METRO NORTH																			
HUDSON LINE																			
3227	Poughkeepsie	0	661	661	0	661	661	127	784	911	216	890	1,106	216	890	1,106	217	890	1,107
3226	New Hamburg	0	619	619	0	619	619	12	787	799	23	878	901	23	878	901	23	880	902
3225	Beacon	5	921	926	5	921	926	44	872	916	89	1,143	1,232	89	1,143	1,232	89	1,141	1,230
3224	Cold Spring	2	307	309	2	307	309	7	374	381	8	434	442	8	434	442	8	434	442
3223	Garrison	0	203	203	0	203	203	2	251	253	2	299	301	2	299	301	2	299	301
3222	Peekskill	35	888	923	35	888	923	81	926	1,007	113	1,521	1,634	113	1,521	1,634	113	1,519	1,632
3221	Montrose	1	223	224	1	223	224	40	140	179	0	0	0	0	0	0	0	0	0
3220	Crugers	23	118	141	23	118	141	36	139	175	0	0	0	0	0	0	0	0	0
3219	Croton-Harmon	368	2,935	3,303	368	2,935	3,303	90	3,003	3,093	92	2,789	2,881	92	2,789	2,881	92	2,787	2,879
3218	Ossining	15	816	831	15	816	831	231	794	1,024	257	885	1,142	257	885	1,143	257	885	1,143
3217	Scarborough	1	716	717	1	716	717	43	912	955	46	1,087	1,132	46	1,087	1,132	46	1,087	1,133
3216	Philipse Manor	1	311	312	1	311	312	72	153	225	82	178	260	82	178	259	83	178	261
3215	Tarrytown	65	1,652	1,717	65	1,652	1,717	127	1,801	1,928	101	1,099	1,201	102	1,101	1,203	102	1,100	1,202
3214	Irvington	32	602	634	32	602	634	23	729	751	23	855	878	23	855	878	23	855	878
3213	Ardsley	13	142	155	13	142	155	0	436	436	0	31	31	0	31	31	0	31	31
3212	Dobbs Ferry	20	870	890	20	870	890	132	711	842	130	842	972	130	841	972	131	842	972
3211	Hastings	15	869	884	15	869	884	171	819	990	173	950	1,123	173	949	1,122	174	950	1,123
3210	Greystone	0	518	518	0	518	518	66	622	687	63	169	232	63	169	232	63	169	232
3209	Glenwood	1	249	250	1	249	250	40	291	330	37	682	720	37	682	720	38	682	720
3208	Yonkers	68	440	508	68	440	508	218	805	1,023	202	531	734	202	531	734	203	531	734
3207	Ludlow	3	190	193	3	190	193	75	533	608	74	431	505	74	431	505	74	431	506
3206	Riverdale	5	480	485	5	480	485	51	776	827	45	563	608	46	563	609	48	563	611
3205	Spuyten Duyvil	6	628	634	6	628	634	37	397	433	38	415	452	38	414	452	40	415	455
3204	Marble Hill	134	56	190	134	56	190	1,343	698	2,041	984	704	1,688	984	704	1,688	1,000	706	1,706
3203	University Heights	15	10	25	15	10	25	91	65	155	75	110	184	75	110	184	80	110	190
3202	Morris Heights	14	66	80	14	66	80	28	44	72	15	97	112	15	97	112	16	97	114
	Total	842	15,490	16,332	842	15,490	16,332	3,184	17,859	21,043	2,888	17,583	20,470	2,888	17,583	20,471	2,920	17,581	20,501

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
HARLEM LINE																			
3259	Dover Plains	0	50	50	0	50	50	1	115	116	1	198	199	1	198	199	1	198	199
3258	Harlem Valley-Wingda	1	18	19	1	18	19	1	74	75	2	173	175	2	173	175	2	173	175
3257	Pawling	0	78	78	0	78	78	10	175	185	48	349	396	48	348	396	48	348	396
3256	Patterson	1	45	46	1	45	46	8	10	18	11	23	33	11	23	33	10	23	33
3255	Brewster North	27	568	595	27	568	595	2	598	600	3	835	838	3	835	838	3	835	838
3254	Brewster	1	774	775	1	774	775	69	354	423	94	493	587	94	493	587	94	493	587
3253	Croton Falls	9	322	331	9	322	331	3	715	718	9	943	952	9	943	952	9	943	952
3252	Purdy's	1	280	281	1	280	281	47	295	342	62	404	466	62	404	465	62	404	466
3251	Golden's Bridge	4	754	758	4	754	758	1	984	985	1	1,214	1,215	1	1,214	1,215	1	1,214	1,215
3250	Katonah	11	791	802	11	791	802	8	457	465	9	509	518	9	509	518	9	509	518
3249	Bedford Hills	10	496	506	10	496	506	112	528	640	139	589	729	140	589	729	140	589	730
3248	Mount Kisco	33	900	933	33	900	933	183	833	1,016	210	932	1,142	210	931	1,142	211	931	1,142
3247	Chappaqua	13	1,645	1,658	13	1,645	1,658	9	1,334	1,344	11	2,125	2,136	11	2,125	2,136	11	2,125	2,136
3246	Pleasantville	18	522	540	18	522	540	88	680	767	90	854	944	90	854	944	90	854	944
3245	Hawthorne	11	404	415	11	404	415	116	257	372	116	319	435	116	319	435	116	319	435
3244	Valhalla	5	185	190	5	185	190	63	208	271	70	254	324	70	254	324	70	254	324
3243	North White Plains	15	1,429	1,444	15	1,429	1,444	51	1,215	1,267	47	1,497	1,544	47	1,496	1,544	48	1,497	1,545
3242	White Plains	162	2,552	2,714	162	2,552	2,714	1,080	2,842	3,923	1,305	3,660	4,965	1,305	3,660	4,965	1,314	3,660	4,974
3241	Hartsdale	9	2,246	2,255	9	2,246	2,255	31	2,684	2,715	53	1,985	2,038	53	1,985	2,038	53	1,985	2,038
3240	Scarsdale	22	3,019	3,041	22	3,019	3,041	144	2,537	2,681	173	5,170	5,343	173	5,170	5,343	174	5,170	5,344
3239	Crestwood	3	1,363	1,366	3	1,363	1,366	85	2,059	2,145	111	2,678	2,788	111	2,678	2,788	109	2,676	2,785
3238	Tuckahoe	7	1,007	1,014	7	1,007	1,014	15	1,473	1,488	26	2,094	2,120	26	2,094	2,120	29	2,094	2,123
3237	Bronxville	17	2,011	2,028	17	2,011	2,028	97	1,883	1,980	121	2,574	2,696	122	2,574	2,696	122	2,573	2,695
3236	Fleetwood	5	1,880	1,885	5	1,880	1,885	45	1,587	1,631	58	2,375	2,433	58	2,375	2,433	58	2,374	2,432
3235	Mount Vernon West	115	833	948	115	833	948	167	1,006	1,173	184	390	574	184	390	574	185	390	574
3234	Wakefield	1	218	219	1	218	219	42	395	437	67	531	598	67	531	598	67	531	599
3233	Woodlawn	15	633	648	15	633	648	57	1,342	1,399	89	1,447	1,536	89	1,447	1,536	91	1,446	1,537
3232	Williams Bridge	26	92	118	26	92	118	147	593	740	253	907	1,161	253	907	1,160	262	907	1,168
3231	Botanical Garden	118	241	359	118	241	359	73	184	257	105	464	570	105	465	570	108	465	573
3230	Fordham	147	122	269	147	122	269	512	310	822	663	653	1,316	663	652	1,315	672	653	1,325
3229	Tremont	5	1	6	5	1	6	41	139	181	240	257	497	240	257	497	250	259	509
3228	Melrose	5	4	9	5	4	9	317	206	524	743	407	1,150	743	407	1,150	753	410	1,163
	Total	817	25,483	26,300	817	25,483	26,300	3,629	28,071	31,700	5,114	37,303	42,417	5,115	37,300	42,415	5,172	37,300	42,472

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
NEW HAVEN LINE																			
3297	Danbury	0	95	95	0	95	95	184	53	237	209	47	256	209	47	256	209	47	256
3296	Bethel	0	112	112	0	112	112	61	415	477	58	454	511	58	454	511	58	454	511
3295	Redding	1	60	61	1	60	61	2	238	240	2	286	289	2	286	288	2	287	289
3294	Branchville	5	175	180	5	175	180	11	99	110	10	112	122	10	112	122	10	112	122
3293	Cannondale	0	105	105	0	105	105	21	433	454	25	504	528	25	504	528	25	504	528
3291	Wilton (Kent Rd)	23	220	243	23	220	243	17	6	23	0	0	0	0	0	0	0	0	0
3290	Merritt 7	12	108	120	12	108	120	125	134	259	145	158	303	145	158	303	145	158	303
3289	New Canaan	0	984	984	0	984	984	44	944	988	71	839	910	71	839	910	71	839	910
3288	Talmadge Hill	1	334	335	1	334	335	7	782	789	12	1,394	1,406	12	1,394	1,406	12	1,394	1,406
3287	Springdale	0	318	318	0	318	318	59	194	253	94	264	358	94	264	358	94	264	358
3286	Glenbrook	1	348	349	1	348	349	114	543	657	179	762	941	179	762	941	179	762	942
3285	NewHaven	0	990	990	0	990	990	31	1,439	1,470	44	1,974	2,018	44	1,974	2,018	44	1,974	2,018
3284	Milford	17	618	635	17	618	635	5	17	23	6	19	24	6	19	24	6	19	24
3283	Stratford	11	546	557	11	546	557	232	522	755	256	697	953	256	697	953	256	697	953
3282	Bridgeport	121	388	509	121	388	509	530	607	1,137	585	1,145	1,730	585	1,145	1,730	585	1,145	1,730
3281	Fairfield	87	1,989	2,076	87	1,989	2,076	68	1,776	1,844	84	2,819	2,903	84	2,818	2,903	84	2,818	2,903
3280	Southport	9	151	160	9	151	160	88	310	398	103	3	106	103	3	106	103	3	106
3279	Green's Farms	13	551	564	13	551	564	10	602	612	12	742	754	12	742	754	12	742	754
3278	Westport	90	1,822	1,912	90	1,822	1,912	141	1,771	1,912	195	2,269	2,465	195	2,269	2,465	195	2,269	2,465
3277	East Norwalk	47	486	533	47	486	533	135	598	733	211	798	1,009	211	798	1,009	211	798	1,009
3276	South Norwalk	182	763	945	182	763	945	184	742	925	261	1,018	1,279	261	1,018	1,279	261	1,018	1,279
3275	Rowayton	5	525	530	5	525	530	29	65	94	32	89	121	32	89	121	32	89	121
3274	Darien	27	1,169	1,196	27	1,169	1,196	35	1,643	1,677	46	2,274	2,320	46	2,274	2,320	46	2,274	2,320
3273	Noroton Heights	2	965	967	2	965	967	148	940	1,088	175	1,315	1,491	175	1,315	1,491	175	1,315	1,491
3272	Stamford	976	2,572	3,548	976	2,572	3,548	2,212	2,658	4,869	3,661	3,347	7,007	3,661	3,347	7,007	3,662	3,347	7,008
3271	Old Greenwich	12	830	842	12	830	842	219	629	848	300	848	1,148	300	848	1,148	300	848	1,148
3270	Riverside	5	528	533	5	528	533	38	492	530	52	637	689	52	637	689	52	637	689
3269	Cos Cob	29	707	736	29	707	736	18	1,257	1,275	23	1,558	1,581	23	1,558	1,581	23	1,557	1,581
3268	Greenwich	214	1,838	2,052	214	1,838	2,052	403	896	1,299	662	1,096	1,758	662	1,096	1,758	662	1,096	1,758
3267	Port Chester	54	1,065	1,119	54	1,065	1,119	129	1,908	2,037	243	2,346	2,589	243	2,346	2,589	247	2,346	2,592
3266	Rye	26	1,643	1,669	26	1,643	1,669	132	1,713	1,845	162	2,048	2,211	162	2,048	2,211	163	2,048	2,211
3265	Harrison	30	1,409	1,439	30	1,409	1,439	55	1,587	1,642	78	1,853	1,931	78	1,853	1,931	78	1,853	1,932
3264	Mamaroneck	36	1,329	1,365	36	1,329	1,365	86	969	1,055	118	1,051	1,169	118	1,051	1,169	119	1,051	1,170
3263	Larchmont	28	2,641	2,669	28	2,641	2,669	81	2,291	2,372	102	2,567	2,669	102	2,567	2,669	102	2,567	2,669
3262	New Rochelle	86	1,653	1,739	86	1,653	1,739	171	1,968	2,139	214	2,052	2,266	214	2,052	2,266	215	2,052	2,266
3261	Pelham	14	1,769	1,783	14	1,769	1,783	65	1,761	1,826	75	1,929	2,004	75	1,929	2,004	76	1,929	2,004
3260	Mount Vernon	80	901	981	80	901	981	101	1,418	1,519	112	1,459	1,571	112	1,459	1,571	113	1,459	1,571
3505	Fordham	232	2	234	232	2	234	209	249	458	410	296	706	410	296	707	416	297	713
	Total	2,476	32,709	35,185	2,476	32,709	35,185	6,199	34,668	40,867	9,028	43,068	52,097	9,028	43,068	52,096	9,043	43,067	52,110

TABLE A-10 YEAR 2010 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2010 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
MANHATTAN																			
3500	125th St	864	0	864	864	0	864	2,454	774	3,228	2,724	883	3,606	2,725	815	3,540	2,724	779	3,503
3201	125th St			0			0	250	151	401	200	86	287	200	155	356	200	193	394
3200	NYC-Grand Central	66,455	0	66,455	66,455	0	66,455	68,014	2,340	70,354	82,423	3,083	85,506	82,419	3,084	85,503	82,239	3,007	85,245
	Total	67,319	0	67,319	67,319	0	67,319	70,717	3,266	73,983	85,347	4,052	89,399	85,345	4,054	89,399	85,163	3,979	89,142
Total MNCRR W/O Manhattan		4,135	73,682	77,817	4,135	73,682	77,817	13,012	80,598	93,610	17,030	97,954	114,983	17,031	97,951	114,982	17,134	97,948	115,083
Total MNCRR With Manhattan		71,454	73,682	145,136	71,454	73,682	145,136	83,729	83,864	167,592	102,376	102,006	204,382	102,376	102,005	204,380	102,297	101,927	204,225

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
CITY TERMINAL ZONE																			
3000	New York-Penn Station	84,811	3,269	88,080	86,630	3,269	89,899	85,415	3,772	89,187	109,481	4,479	113,959	105,751	4,502	110,253	61,504	4,555	66,059
3807	New York-GCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65,043	1,828	66,872
3002	Hunterspoint Ave	3,457	0	3,457	2,890	0	2,890	3,263	0	3,263	3,621	28	3,649	7,625	28	7,653	630	29	659
3001	Long Island City	195	0	195	240	0	240	140	3	143	46	0	46	138	0	138	43	0	43
3091	Flatbush Ave	11,935	475	12,410	10,291	475	10,766	10,499	598	11,097	12,060	484	12,544	12,966	487	13,453	10,438	523	10,960
	Subtotal	100,398	3,744	104,142	100,051	3,744	103,795	99,318	4,373	103,691	125,208	4,990	130,198	126,480	5,018	131,498	137,658	6,935	144,593
3806	Jamaica Penn Station	3,582	2,308	5,890	3,538	2,292	5,830	3,131	964	4,095	4,298	1,166	5,465	4,286	1,164	5,450	4,634	1,581	6,215
3003	Woodside	659	495	1,154	802	521	1,323	1,077	250	1,327	2,084	215	2,299	1,760	219	1,979	943	213	1,156
3808	Sunnyside	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,193	43	2,236
3004	Forest Hills	62	352	414	58	433	491	272	41	313	436	59	495	448	57	505	446	77	523
3005	Kew Gardens	30	447	477	39	467	506	206	89	295	346	39	385	347	40	386	381	45	425
3092	Nostrand Ave	156	14	170	105	14	119	175	49	224	213	38	251	215	38	253	212	41	252
3093	East New York			0	117	1	118	274	64	337	324	74	399	331	75	405	326	107	432
	Subtotal	4,489	3,616	8,105	4,659	3,728	8,387	5,134	1,457	6,591	7,701	1,592	9,293	7,386	1,592	8,977	9,134	2,105	11,239
	Total	104,887	7,360	112,247	104,710	7,472	112,182	104,452	5,830	110,282	132,909	6,582	139,491	133,866	6,609	140,475	146,792	9,040	155,832
BABYLON BRANCH																			
3049	Babylon	230	3,325	3,555	195	3,265	3,460	101	2,800	2,901	148	3,933	4,081	164	4,390	4,554	145	3,335	3,480
3048	Lindenhurst	97	1,526	1,623	91	1,278	1,369	56	1,230	1,286	71	2,208	2,279	73	1,909	1,982	88	3,146	3,234
3047	Copiague	150	1,015	1,165	145	1,001	1,146	48	1,186	1,235	69	1,862	1,931	72	1,866	1,937	82	2,022	2,104
3046	Amityville	162	831	993	210	727	937	180	1,005	1,185	234	1,559	1,793	237	1,563	1,800	240	1,701	1,941
3045	Massapequa Park	52	1,666	1,718	50	1,481	1,531	32	1,817	1,849	43	2,271	2,314	43	2,276	2,319	48	2,583	2,631
3044	Massapequa	91	2,708	2,799	90	2,522	2,612	60	2,181	2,240	78	2,718	2,796	80	2,725	2,805	106	2,646	2,752
3043	Seaford	63	1,566	1,629	58	1,435	1,493	53	1,773	1,825	67	2,133	2,200	67	2,138	2,206	60	2,079	2,139
3042	Wantagh	64	2,788	2,852	53	2,739	2,792	49	2,233	2,282	61	2,708	2,769	63	2,695	2,758	66	2,591	2,658
3041	Bellmore	75	2,800	2,875	92	2,698	2,790	65	2,295	2,360	79	2,875	2,954	77	2,880	2,957	87	3,028	3,116
3040	Merrick	55	2,827	2,882	70	2,812	2,882	126	2,535	2,661	149	3,133	3,282	150	3,138	3,288	161	3,398	3,559
3039	Freeport	195	1,642	1,837	200	1,672	1,872	121	2,087	2,208	140	2,565	2,705	141	2,568	2,709	155	2,693	2,849
3038	Baldwin	97	3,014	3,111	114	2,914	3,028	73	3,125	3,198	90	3,834	3,924	91	3,841	3,932	105	4,489	4,594
3037	Rockville Centre	207	2,414	2,621	215	2,191	2,406	275	1,895	2,170	314	2,072	2,386	316	2,072	2,388	339	2,189	2,528
	Total	1,538	28,122	29,660	1,583	26,735	28,318	1,238	26,162	27,400	1,541	33,872	35,413	1,574	34,061	35,635	1,683	35,900	37,583

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
FAR ROCKAWAY BRANCH																			
3127	Far Rockaway	16	113	129	22	58	80	5	70	75	17	442	459	17	444	461	18	442	460
3126	Inwood	9	225	234	9	232	241	30	466	496	59	467	526	59	468	527	59	488	547
3125	Lawrence	17	253	270	17	263	280	4	519	524	9	560	569	9	562	571	9	599	607
3124	Cedarhurst	80	556	636	78	519	597	45	335	380	61	370	431	61	370	431	62	379	442
3123	Woodmere	48	597	645	56	630	686	30	617	647	43	714	757	43	713	756	42	719	761
3122	Hewlett	85	704	789	78	642	720	6	885	891	8	1,030	1,038	8	1,031	1,039	8	1,038	1,046
3121	Gibson	40	637	677	33	501	534	37	49	86	50	52	101	50	52	101	50	52	101
3097	Valley Stream	151	2,156	2,307	137	2,254	2,391	211	2,241	2,452	206	2,622	2,827	208	2,627	2,835	230	2,761	2,991
3096	Rosedale	21	1,276	1,297	21	1,058	1,079	155	741	896	228	998	1,226	235	1,000	1,235	242	1,150	1,392
3095	Laurelton	19	489	508	24	471	495	15	700	715	29	756	785	30	755	785	31	855	886
3094	Locust Manor	28	492	520	24	452	476	41	427	469	38	287	325	39	287	326	39	276	315
	Total	514	7,498	8,012	499	7,080	7,579	578	7,052	7,630	748	8,298	9,045	759	8,308	9,067	790	8,758	9,549
HEMPSTEAD BRANCH																			
3120	Hempstead	235	1,029	1,264	264	800	1,064	62	973	1,034	88	1,098	1,186	88	1,099	1,187	97	1,233	1,330
3119	Country Life Press	11	347	358	11	298	309	4	335	340	3	381	384	3	382	385	3	425	429
3118	Garden City	118	577	695	115	581	696	65	242	307	96	314	410	96	314	410	101	333	434
3117	Nassau Blvd	76	655	731	73	677	750	68	394	462	90	469	559	90	469	559	91	800	891
3116	Stewart Manor	15	834	849	18	771	789	44	1,031	1,076	73	1,161	1,234	73	1,162	1,235	99	1,702	1,802
3115	Floral Park	60	1,270	1,330	63	1,231	1,294	71	1,262	1,333	94	1,274	1,368	94	1,275	1,370	82	743	824
3114	Bellerose	10	444	454	8	516	524	92	726	818	121	637	758	121	637	758	119	775	893
3008	Queens Village	32	579	611	33	474	507	24	640	664	39	730	769	41	740	781	49	1,132	1,181
3007	Hollis	6	56	62	7	53	60	17	78	95	40	74	114	41	74	115	45	165	210
	Total	563	5,791	6,354	592	5,401	5,993	448	5,682	6,129	644	6,138	6,782	647	6,154	6,800	686	7,307	7,993

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
LONG BEACH BRANCH																			
3113	Long Beach	116	1,763	1,879	116	1,631	1,747	24	1,860	1,884	27	2,521	2,548	28	2,198	2,226	27	2,282	2,309
3112	Island Park	30	1,175	1,205	30	1,146	1,176	27	1,550	1,576	35	1,585	1,620	35	1,910	1,945	36	1,964	2,000
3111	Oceanside	47	1,361	1,408	70	1,264	1,334	38	793	832	51	669	720	51	1,342	1,393	53	1,251	1,304
3110	East Rockaway	37	431	468	62	474	536	7	926	933	8	1,507	1,515	8	837	846	9	977	985
3109	Centre Ave	23	518	541	13	489	502	20	250	269	26	316	342	27	316	343	27	328	355
3036	Lynbrook	202	1,568	1,770	198	1,473	1,671	116	1,445	1,562	127	1,524	1,651	128	1,526	1,654	141	1,633	1,775
	Total	455	6,816	7,271	489	6,477	6,966	233	6,823	7,056	274	8,123	8,397	277	8,129	8,407	293	8,435	8,728
MONTAUK BRANCH																			
3068	Montauk	11	4	15	11	5	16	1	0	1	3	0	3	3	0	3	3	0	3
3067	Amagansett	3	6	9	4	3	7	0	94	94	0	153	153	0	154	154	0	153	153
3066	East Hampton	25	2	27	25	16	41	7	35	42	17	52	69	17	53	70	15	53	68
3065	Bridgehampton	8	3	11	9	10	19	8	6	14	13	10	23	13	10	23	13	10	23
3064	Southampton	14	8	22	14	7	21	11	25	37	17	37	54	17	37	54	17	38	54
3063	Southampton Campus-L	3	0	3	3	0	3	11	0	12	17	0	17	17	0	17	17	0	17
3062	Hampton Bays	10	7	17	10	15	25	6	12	17	8	19	28	8	19	28	8	19	28
3061	Quogue	3	0	3	3	0	3	0	3	3	0	3	3	0	3	3	0	3	3
3060	Westhampton	10	1	11	11	8	19	9	16	26	15	24	39	15	24	39	14	24	39
3059	Speonk	7	41	48	8	66	74	2	35	37	2	86	88	2	83	85	2	88	90
3058	Center Moriches	0	19	19	1	11	12	2	21	22	3	12	15	3	15	19	3	10	14
3057	Mastic-Shirley	12	313	325	14	244	258	8	250	258	13	497	510	13	504	518	13	511	524
3056	Bellport	4	9	13	1	10	11	2	18	20	5	18	24	5	10	16	5	10	16
3055	Patchogue	66	657	723	72	469	541	40	416	456	63	731	794	63	750	813	63	747	810
3054	Sayville	62	425	487	90	559	649	20	548	568	31	1,080	1,111	32	1,029	1,061	31	1,137	1,168
3053	Oakdale	11	186	197	13	158	171	12	220	232	20	334	355	21	264	285	20	255	275
3052	Great River	1	71	72	0	79	79	18	79	96	24	119	143	30	316	346	23	164	187
3051	Islip	23	416	439	18	353	371	30	352	382	55	617	673	67	674	740	55	620	676
3050	Bay Shore	60	491	551	65	450	515	27	601	628	38	1,049	1,088	44	1,152	1,196	37	1,070	1,108
	Total	333	2,659	2,992	372	2,463	2,835	214	2,730	2,944	346	4,845	5,190	370	5,100	5,470	342	4,915	5,258

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

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Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
OYSTER BAY																			
3108	Oyster Bay	22	51	73	22	57	79	20	8	29	21	10	31	22	14	36	22	9	31
3107	Mill Neck	1	2	3	1	2	3	2	139	141	3	207	210	3	226	229	3	213	216
3106	Locust Valley	30	186	216	28	180	208	21	202	223	24	284	308	26	310	336	24	294	318
3105	Glen Cove	7	146	153	11	147	158	27	74	101	29	108	137	32	115	147	30	110	140
3104	Glen St	10	153	163	18	149	167	1	244	245	1	349	350	2	388	390	1	358	359
3103	Sea Cliff	13	199	212	11	188	199	52	182	234	50	256	306	69	289	357	54	262	316
3102	Glen Head	9	196	205	13	264	277	5	252	257	6	380	386	7	453	460	7	387	393
3101	Greenvale	14	93	107	12	82	94	9	165	173	7	260	267	11	282	293	7	265	272
3100	Roslyn	51	205	256	52	234	286	36	244	279	28	327	355	32	379	411	31	347	378
3099	Albertson	29	167	196	32	170	202	45	191	236	32	257	289	34	321	355	32	272	304
3098	East Williston	21	492	513	16	459	475	11	489	500	5	707	713	8	802	810	6	612	618
	Total	207	1,890	2,097	216	1,932	2,148	230	2,189	2,419	207	3,145	3,352	244	3,579	3,823	217	3,130	3,347
PORT JEFFERSON																			
3078	Port Jefferson	62	434	496	62	358	420	11	454	465	17	965	982	17	1,023	1,040	17	960	977
3077	Stony Brook	110	336	446	110	332	442	63	583	646	85	566	650	85	633	718	86	572	658
3076	St James	18	201	219	20	214	234	22	209	231	28	270	298	28	298	327	29	272	301
3075	Smithtown	39	485	524	42	490	532	53	575	628	70	867	937	70	920	990	70	870	940
3074	Kings Park	26	893	919	19	861	880	31	875	906	43	1,326	1,370	44	1,427	1,471	44	1,330	1,374
3073	Northport	65	1,133	1,198	75	1,041	1,116	50	1,125	1,175	70	1,347	1,417	71	1,468	1,539	71	1,334	1,405
3072	Greenlawn	13	388	401	10	424	434	39	590	630	56	33	89	56	89	146	57	24	81
3071	Huntington	394	4,485	4,879	273	4,664	4,937	109	3,910	4,019	141	7,929	8,070	143	8,532	8,675	149	7,501	7,650
3070	Cold Spring Harbor	36	1,010	1,046	37	1,036	1,073	20	780	800	27	968	995	27	764	791	29	1,292	1,321
3069	Syosset	217	2,009	2,226	206	2,352	2,558	173	2,533	2,707	223	3,252	3,475	226	3,237	3,463	242	3,629	3,871
3014	Hicksville	665	6,285	6,950	604	6,336	6,940	462	6,220	6,682	662	8,413	9,075	687	8,443	9,130	721	7,862	8,582
3013	Westbury	227	1,359	1,586	244	1,510	1,754	179	1,559	1,738	225	1,476	1,701	230	1,468	1,698	254	2,330	2,585
3012	Carle Place	29	297	326	33	296	329	477	211	688	559	261	820	567	261	828	537	23	559
3011	Mineola	810	2,509	3,319	641	2,287	2,928	376	1,852	2,227	423	2,464	2,887	437	2,497	2,935	515	2,298	2,812
3010	Merillon Ave	14	547	561	20	593	613	184	1,486	1,670	247	1,846	2,093	252	1,835	2,086	273	2,253	2,525
3009	New Hyde Park	65	1,152	1,217	81	1,187	1,268	193	1,770	1,963	201	2,443	2,644	205	2,446	2,651	251	3,269	3,520
	Total	2,790	23,523	26,313	2,477	23,981	26,458	2,443	24,732	27,176	3,077	34,425	37,502	3,146	35,342	38,488	3,344	35,818	39,163

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		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
PORT WASHINGTON																			
3090	Port Washington	206	2,467	2,673	206	2,429	2,635	152	2,332	2,483	187	2,903	3,091	187	2,904	3,091	201	2,967	3,167
3089	Plandome	31	478	509	28	468	496	23	227	250	34	279	313	34	279	313	37	287	324
3088	Manhasset	183	2,159	2,342	172	2,197	2,369	293	2,410	2,702	408	3,489	3,897	408	2,939	3,347	446	2,847	3,292
3087	Great Neck	455	2,694	3,149	419	3,015	3,434	484	3,031	3,515	602	3,370	3,971	602	3,913	4,515	675	4,656	5,331
3086	Little Neck	17	1,464	1,481	19	1,446	1,465	166	1,269	1,435	183	984	1,166	183	963	1,146	200	1,165	1,366
3085	Douglaston	30	1,014	1,044	30	1,140	1,170	24	1,479	1,502	42	1,857	1,899	42	1,839	1,881	50	2,037	2,087
3084	Bayside	84	3,073	3,157	87	3,263	3,350	119	3,695	3,814	146	2,246	2,392	147	2,228	2,374	181	2,617	2,798
3083	Auburndale	16	1,094	1,110	12	1,132	1,144	17	1,472	1,489	17	1,460	1,477	17	1,442	1,458	22	2,850	2,872
3082	Broadway	17	927	944	15	1,019	1,034	71	1,078	1,149	89	785	874	89	760	849	99	1,366	1,465
3081	Murray Hill	12	370	382	14	447	461	80	150	229	109	74	183	110	72	182	120	143	263
3080	Flushing	89	427	516	106	482	588	515	710	1,224	771	844	1,614	767	850	1,617	814	1,704	2,519
	Total	1,140	16,167	17,307	1,108	17,038	18,146	1,944	17,849	19,794	2,588	18,289	20,877	2,585	18,189	20,774	2,845	22,639	25,484
RONKONKOMA																			
3029	Greenport	8	7	15	8	3	11	15	19	34	21	26	47	21	26	47	22	26	47
3028	Southold	0	8	8	0	9	9	16	96	112	24	143	166	24	143	166	24	146	169
3027	Mattituck	2	6	8	2	8	10	19	27	46	28	18	46	28	18	46	28	18	46
3026	Riverhead	16	16	32	16	7	23	2	50	51	3	111	113	3	111	114	3	111	113
3025	Yaphank	0	14	14	0	5	5	14	6	20	21	11	32	21	11	32	21	11	32
3024	Medford	0	27	27	0	15	15	15	3	18	25	4	29	25	4	29	25	4	29
3023	Holtsville	1	11	12	1	4	5	46	152	198	68	267	335	68	282	350	67	279	347
3022	Ronkonkoma	251	5,003	5,254	251	5,430	5,681	59	5,029	5,088	82	7,679	7,761	83	7,714	7,797	81	7,583	7,664
3021	Central Islip	52	1,187	1,239	56	1,514	1,570	119	1,081	1,200	169	1,453	1,623	169	1,461	1,631	184	2,045	2,229
3020	Brentwood	95	1,152	1,247	83	1,155	1,238	98	1,546	1,644	119	3,322	3,441	119	3,271	3,390	150	2,133	2,283
3019	Deer Park	87	1,502	1,589	101	1,815	1,916	131	1,590	1,720	183	1,472	1,655	184	1,429	1,613	197	4,073	4,270
3018	Wyandanch	87	1,323	1,410	101	1,375	1,476	63	1,339	1,402	87	2,115	2,202	87	2,097	2,184	116	1,777	1,893
3017	Pine Lawn	0	0	0	0	0	0	31	0	31	19	0	19	19	0	19	42	0	42
3016	Farmingdale	114	881	995	111	987	1,098	277	1,157	1,435	342	1,508	1,851	343	1,511	1,855	362	1,601	1,963
3015	Bethpage	62	1,171	1,233	41	1,093	1,134	208	864	1,071	295	1,120	1,415	298	1,175	1,474	343	1,663	2,006
	Total	775	12,308	13,083	771	13,420	14,191	1,112	12,957	14,069	1,486	19,249	20,735	1,493	19,254	20,746	1,664	21,470	23,134

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
WEST HEMPSTEAD																			
3132	West Hempstead	6	189	195	6	226	232	13	209	223	13	206	219	13	207	220	13	233	246
3131	Hempstead Gardens	5	204	209	4	139	143	81	193	274	78	211	288	78	211	288	72	249	322
3130	Lakeview	4	297	301	4	302	306	5	267	273	7	303	309	7	304	310	7	332	338
3129	Malverne	11	565	576	10	524	534	8	523	531	9	612	621	9	613	622	10	692	701
3128	Westwood	3	347	350	2	345	347	21	438	459	23	469	492	24	470	493	24	526	550
3035	St Albans	0	40	40	0	39	39	20	79	99	29	49	78	29	48	77	35	224	260
	Total	29	1,642	1,671	26	1,575	1,601	150	1,709	1,859	158	1,849	2,007	160	1,852	2,012	161	2,257	2,418
LIRR TOTALS																			
LIRR Total W/O Terminal Zone		8,344	106,416	114,760	8,133	106,102	114,235	8,591	107,886	116,476	11,069	138,232	149,301	11,254	139,967	151,221	12,026	150,630	162,656
LIRR Total With Terminal Zone		113,231	113,776	227,007	112,843	113,574	226,417	113,043	113,715	226,758	143,978	144,814	288,792	145,120	146,576	291,696	158,817	159,670	318,488

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
METRO NORTH																			
HUDSON LINE																			
3227	Poughkeepsie	0	661	661	0	661	661	127	784	911	194	1,100	1,294	193	1,100	1,293	195	1,101	1,295
3226	New Hamburg	0	619	619	0	619	619	12	787	799	22	1,080	1,102	22	1,080	1,102	22	1,084	1,106
3225	Beacon	5	921	926	5	921	926	44	872	916	94	1,305	1,399	94	1,305	1,399	94	1,305	1,399
3224	Cold Spring	2	307	309	2	307	309	7	374	381	10	455	464	10	455	464	10	455	465
3223	Garrison	0	203	203	0	203	203	2	251	253	2	315	317	2	315	317	2	315	317
3222	Peekskill	35	888	923	35	888	923	81	926	1,007	127	1,583	1,710	127	1,581	1,708	127	1,581	1,708
3221	Montrose	1	223	224	1	223	224	40	140	179	0	0	0	0	0	0	0	0	0
3220	Crugers	23	118	141	23	118	141	36	139	175	0	0	0	0	0	0	0	0	0
3219	Croton-Harmon	368	2,935	3,303	368	2,935	3,303	90	3,003	3,093	93	2,921	3,014	93	2,921	3,014	93	2,920	3,013
3218	Ossining	15	816	831	15	816	831	231	794	1,024	268	925	1,193	268	925	1,194	269	926	1,194
3217	Scarborough	1	716	717	1	716	717	43	912	955	47	1,138	1,185	47	1,138	1,185	47	1,139	1,186
3216	Philipse Manor	1	311	312	1	311	312	72	153	225	88	188	275	87	188	275	88	189	277
3215	Tarrytown	65	1,652	1,717	65	1,652	1,717	127	1,801	1,928	108	1,137	1,245	108	1,137	1,245	109	1,135	1,244
3214	Irvington	32	602	634	32	602	634	23	729	751	24	890	914	24	890	914	24	890	914
3213	Ardsley	13	142	155	13	142	155	0	436	436	0	32	32	0	32	32	0	32	32
3212	Dobbs Ferry	20	870	890	20	870	890	132	711	842	133	873	1,006	133	873	1,006	133	874	1,007
3211	Hastings	15	869	884	15	869	884	171	819	990	176	981	1,157	176	981	1,157	176	982	1,159
3210	Greystone	0	518	518	0	518	518	66	622	687	65	175	241	65	175	241	66	175	241
3209	Glenwood	1	249	250	1	249	250	40	291	330	39	707	747	39	707	747	40	708	748
3208	Yonkers	68	440	508	68	440	508	218	805	1,023	207	546	753	207	546	753	207	546	753
3207	Ludlow	3	190	193	3	190	193	75	533	608	80	446	526	80	446	526	80	446	527
3206	Riverdale	5	480	485	5	480	485	51	776	827	48	602	650	48	602	650	51	603	654
3205	Spuyten Duyvil	6	628	634	6	628	634	37	397	433	40	442	482	40	442	482	43	444	486
3204	Marble Hill	134	56	190	134	56	190	1,343	698	2,041	1,014	683	1,698	1,014	683	1,697	1,029	686	1,715
3203	University Heights	15	10	25	15	10	25	91	65	155	80	118	199	80	118	199	86	119	205
3202	Morris Heights	14	66	80	14	66	80	28	44	72	16	105	121	16	104	121	17	106	123
	Total	842	15,490	16,332	842	15,490	16,332	3,184	17,859	21,043	2,975	18,747	21,723	2,975	18,744	21,720	3,008	18,760	21,768

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only. Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
HARLEM LINE																			
3259	Dover Plains	0	50	50	0	50	50	1	115	116	2	251	253	2	251	253	2	251	253
3258	Harlem Valley-Wingda	1	18	19	1	18	19	1	74	75	3	209	212	3	209	212	3	209	212
3257	Pawling	0	78	78	0	78	78	10	175	185	53	425	479	53	425	479	54	428	482
3256	Patterson	1	45	46	1	45	46	8	10	18	12	25	37	12	25	37	12	25	36
3255	Brewster North	27	568	595	27	568	595	2	598	600	4	913	916	4	913	916	4	914	918
3254	Brewster	1	774	775	1	774	775	69	354	423	105	538	643	105	538	643	105	538	643
3253	Croton Falls	9	322	331	9	322	331	3	715	718	10	1,027	1,037	10	1,027	1,037	10	1,028	1,038
3252	Purdy's	1	280	281	1	280	281	47	295	342	66	428	494	66	428	494	66	429	495
3251	Golden's Bridge	4	754	758	4	754	758	1	984	985	1	1,282	1,283	1	1,282	1,283	1	1,283	1,284
3250	Katonah	11	791	802	11	791	802	8	457	465	10	540	549	10	540	549	10	540	550
3249	Bedford Hills	10	496	506	10	496	506	112	528	640	147	625	771	147	625	771	148	625	772
3248	Mount Kisco	33	900	933	33	900	933	183	833	1,016	225	987	1,211	225	987	1,211	225	987	1,212
3247	Chappaqua	13	1,645	1,658	13	1,645	1,658	9	1,334	1,344	11	2,196	2,208	11	2,196	2,208	11	2,197	2,208
3246	Pleasantville	18	522	540	18	522	540	88	680	767	94	879	973	94	879	973	94	879	974
3245	Hawthorne	11	404	415	11	404	415	116	257	372	120	327	447	120	327	447	120	326	447
3244	Valhalla	5	185	190	5	185	190	63	208	271	73	262	335	73	262	335	73	262	335
3243	North White Plains	15	1,429	1,444	15	1,429	1,444	51	1,215	1,267	50	1,563	1,613	50	1,563	1,613	50	1,564	1,615
3242	White Plains	162	2,552	2,714	162	2,552	2,714	1,080	2,842	3,923	1,383	3,835	5,218	1,383	3,835	5,218	1,393	3,836	5,229
3241	Hartsdale	9	2,246	2,255	9	2,246	2,255	31	2,684	2,715	55	2,046	2,101	55	2,045	2,101	55	2,047	2,102
3240	Scarsdale	22	3,019	3,041	22	3,019	3,041	144	2,537	2,681	181	5,292	5,473	181	5,292	5,473	182	5,293	5,475
3239	Crestwood	3	1,363	1,366	3	1,363	1,366	85	2,059	2,145	116	2,744	2,859	118	2,744	2,862	119	2,744	2,862
3238	Tuckahoe	7	1,007	1,014	7	1,007	1,014	15	1,473	1,488	30	2,147	2,177	28	2,147	2,175	28	2,148	2,176
3237	Bronxville	17	2,011	2,028	17	2,011	2,028	97	1,883	1,980	129	2,655	2,783	129	2,655	2,783	129	2,655	2,784
3236	Fleetwood	5	1,880	1,885	5	1,880	1,885	45	1,587	1,631	62	2,433	2,494	62	2,433	2,494	62	2,433	2,495
3235	Mount Vernon West	115	833	948	115	833	948	167	1,006	1,173	194	401	596	194	401	596	195	401	596
3234	Wakefield	1	218	219	1	218	219	42	395	437	71	570	641	71	570	641	71	572	643
3233	Woodlawn	15	633	648	15	633	648	57	1,342	1,399	96	1,534	1,630	96	1,534	1,630	98	1,535	1,633
3232	Williams Bridge	26	92	118	26	92	118	147	593	740	270	978	1,248	270	978	1,248	280	983	1,263
3231	Botanical Garden	118	241	359	118	241	359	73	184	257	112	499	612	112	500	612	117	502	619
3230	Fordham	147	122	269	147	122	269	512	310	822	703	699	1,402	704	699	1,403	713	703	1,416
3229	Tremont	5	1	6	5	1	6	41	139	181	254	275	530	254	274	529	266	281	547
3228	Melrose	5	4	9	5	4	9	317	206	524	779	437	1,216	779	437	1,217	790	446	1,236
	Total	817	25,483	26,300	817	25,483	26,300	3,629	28,071	31,700	5,419	39,023	44,442	5,421	39,022	44,443	5,484	39,063	44,547

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
NEW HAVEN LINE																			
3297	Danbury	0	95	95	0	95	95	184	53	237	224	51	275	224	51	275	224	51	275
3296	Bethel	0	112	112	0	112	112	61	415	477	62	491	552	62	491	552	62	491	553
3295	Redding	1	60	61	1	60	61	2	238	240	2	310	312	2	310	312	2	311	313
3294	Branchville	5	175	180	5	175	180	11	99	110	11	121	133	11	121	133	11	121	132
3293	Cannondale	0	105	105	0	105	105	21	433	454	26	540	566	26	540	566	26	540	566
3291	Wilton (Kent Rd)	23	220	243	23	220	243	17	6	23	0	0	0	0	0	0	0	0	0
3290	Merritt 7	12	108	120	12	108	120	125	134	259	155	170	325	155	170	325	155	170	325
3289	New Canaan	0	984	984	0	984	984	44	944	988	75	899	975	75	894	969	75	900	975
3288	Talmadge Hill	1	334	335	1	334	335	7	782	789	13	1,492	1,505	13	1,497	1,510	13	1,492	1,505
3287	Springdale	0	318	318	0	318	318	59	194	253	99	295	393	99	287	385	99	295	393
3286	Glenbrook	1	348	349	1	348	349	114	543	657	189	816	1,005	189	825	1,013	189	817	1,005
3285	NewHaven	0	990	990	0	990	990	31	1,439	1,470	50	2,021	2,072	50	2,021	2,072	50	2,024	2,074
3284	Milford	17	618	635	17	618	635	5	17	23	6	20	26	6	20	26	6	20	26
3283	Stratford	11	546	557	11	546	557	232	522	755	263	748	1,011	263	748	1,011	263	748	1,012
3282	Bridgeport	121	388	509	121	388	509	530	607	1,137	614	1,235	1,848	614	1,235	1,848	614	1,236	1,850
3281	Fairfield	87	1,989	2,076	87	1,989	2,076	68	1,776	1,844	89	3,044	3,133	89	3,044	3,133	89	3,045	3,134
3280	Southport	9	151	160	9	151	160	88	310	398	107	3	110	107	3	110	107	3	110
3279	Green's Farms	13	551	564	13	551	564	10	602	612	13	799	812	13	799	812	13	799	812
3278	Westport	90	1,822	1,912	90	1,822	1,912	141	1,771	1,912	206	2,440	2,647	206	2,440	2,647	206	2,441	2,647
3277	East Norwalk	47	486	533	47	486	533	135	598	733	223	856	1,080	223	856	1,080	223	857	1,080
3276	South Norwalk	182	763	945	182	763	945	184	742	925	277	1,095	1,372	277	1,095	1,372	277	1,095	1,372
3275	Rowayton	5	525	530	5	525	530	29	65	94	34	96	129	34	96	129	34	96	129
3274	Darien	27	1,169	1,196	27	1,169	1,196	35	1,643	1,677	49	2,464	2,512	49	2,464	2,512	49	2,464	2,513
3273	Noroton Heights	2	965	967	2	965	967	148	940	1,088	180	1,428	1,608	180	1,428	1,608	180	1,428	1,608
3272	Stamford	976	2,572	3,548	976	2,572	3,548	2,212	2,658	4,869	3,880	3,621	7,502	3,881	3,621	7,502	3,881	3,622	7,503
3271	Old Greenwich	12	830	842	12	830	842	219	629	848	314	915	1,228	314	915	1,228	314	915	1,228
3270	Riverside	5	528	533	5	528	533	38	492	530	54	682	736	54	682	736	54	682	736
3269	Cos Cob	29	707	736	29	707	736	18	1,257	1,275	25	1,664	1,689	25	1,664	1,689	25	1,664	1,689
3268	Greenwich	214	1,838	2,052	214	1,838	2,052	403	896	1,299	697	1,169	1,865	697	1,169	1,865	697	1,169	1,866
3267	Port Chester	54	1,065	1,119	54	1,065	1,119	129	1,908	2,037	260	2,435	2,696	260	2,435	2,696	265	2,435	2,700
3266	Rye	26	1,643	1,669	26	1,643	1,669	132	1,713	1,845	167	2,121	2,288	167	2,121	2,288	167	2,121	2,288
3265	Harrison	30	1,409	1,439	30	1,409	1,439	55	1,587	1,642	81	1,918	1,999	81	1,918	1,999	82	1,918	1,999
3264	Mamaroneck	36	1,329	1,365	36	1,329	1,365	86	969	1,055	123	1,085	1,208	123	1,085	1,208	124	1,085	1,208
3263	Larchmont	28	2,641	2,669	28	2,641	2,669	81	2,291	2,372	105	2,661	2,766	105	2,661	2,766	105	2,661	2,766
3262	New Rochelle	86	1,653	1,739	86	1,653	1,739	171	1,968	2,139	226	2,129	2,355	226	2,129	2,355	226	2,129	2,355
3261	Pelham	14	1,769	1,783	14	1,769	1,783	65	1,761	1,826	77	1,994	2,070	77	1,994	2,070	77	1,994	2,071
3260	Mount Vernon	80	901	981	80	901	981	101	1,418	1,519	117	1,501	1,618	117	1,501	1,618	117	1,502	1,619
3505	Fordham	232	2	234	232	2	234	209	249	458	421	313	734	421	312	733	429	313	742
	Total	2,476	32,709	35,185	2,476	32,709	35,185	6,199	34,668	40,867	9,512	45,641	55,153	9,512	45,640	55,152	9,528	45,651	55,179

TABLE A-11 YEAR 2020 WEEKDAY AM PEAK 4 HOUR COMMUTER RAIL RIDERSHIP BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

Node	Station	AM Peak 4 Hours Counts						1995 BASE			YEAR 2020 ALTERNATIVES								
		1990 Counts			1995 Counts			1995 BASE NETWORK(NB95)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total	Offs	Ons	Total
MANHATTAN																			
3500	125th St	864	0	864	864	0	864	2,454	774	3,228	2,850	824	3,674	2,846	822	3,669	2,846	822	3,667
3201	125th St			0			0	250	151	401	205	158	364	205	158	363	205	158	363
3200	NYC-Grand Central	66,455	0	66,455	66,455	0	66,455	68,014	2,340	70,354	86,989	3,145	90,134	86,989	3,151	90,140	86,879	3,083	89,962
	Total	67,319	0	67,319	67,319	0	67,319	70,717	3,266	73,983	90,045	4,127	94,172	90,041	4,131	94,172	89,930	4,062	93,993
Total MNCRR W/O Manhattan		4,135	73,682	77,817	4,135	73,682	77,817	13,012	80,598	93,610	17,906	103,411	121,318	17,908	103,406	121,314	18,020	103,474	121,494
Total MNCRR With Manhattan		71,454	73,682	145,136	71,454	73,682	145,136	83,729	83,864	167,592	107,951	107,538	215,489	107,950	107,537	215,486	107,950	107,537	215,487

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

		1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
Node	Station	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
CITY TERMINAL ZONE																						
3000	New York-Penn Station	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3807	New York-GCT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3002	Hunterspoint Ave	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3001	Long Island City	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3091	Flatbush Ave	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3806	Jamaica Penn Station	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3003	Woodside	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3808	Sunnyside	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3004	Forest Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3005	Kew Gardens	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3092	Nostrand Ave	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3093	East New York	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BABYLON BRANCH																						
3049	Babylon	2,167	3,234	1,517	2,788	4,021	1,951	3,070	4,566	2,149	2,354	3,569	1,647	3,045	4,404	2,131	3,400	5,067	2,380	2,592	3,956	1,814
3048	Lindenhurst	1,037	1,298	726	1,615	1,950	1,130	1,440	1,775	1,008	2,329	3,407	1,630	1,837	2,235	1,286	1,597	1,963	1,118	2,606	3,814	1,824
3047	Copiague	1,065	1,393	745	1,503	1,965	1,052	1,508	1,969	1,055	1,627	2,120	1,139	1,666	2,179	1,166	1,671	2,184	1,170	1,815	2,359	1,271
3046	Amityville	1,001	1,059	701	1,380	1,470	966	1,385	1,475	969	1,497	1,593	1,048	1,518	1,616	1,063	1,524	1,621	1,067	1,649	1,750	1,154
3045	Massapequa Park	1,477	2,013	1,034	1,757	2,391	1,230	1,761	2,397	1,233	1,998	2,601	1,398	1,846	2,510	1,292	1,850	2,516	1,295	2,100	2,731	1,470
3044	Massapequa	1,986	2,868	1,390	2,365	3,401	1,656	2,374	3,410	1,662	2,308	3,366	1,616	2,479	3,562	1,735	2,487	3,570	1,741	2,441	3,539	1,708
3043	Seaford	1,726	2,334	1,208	1,995	2,674	1,396	2,000	2,679	1,400	1,949	2,468	1,364	2,079	2,787	1,455	2,085	2,793	1,460	2,023	2,562	1,416
3042	Wantagh	2,023	3,328	1,416	2,342	3,782	1,639	2,332	3,742	1,632	2,244	3,288	1,570	2,455	3,963	1,719	2,445	3,923	1,712	2,356	3,452	1,650
3041	Bellmore	2,121	3,106	1,484	2,534	3,695	1,773	2,538	3,701	1,777	2,666	3,903	1,866	2,656	3,863	1,859	2,660	3,868	1,862	2,801	4,087	1,961
3040	Merrick	2,329	3,361	1,631	2,748	3,962	1,924	2,751	3,966	1,926	2,956	4,910	2,069	2,873	4,139	2,011	2,878	4,144	2,015	3,116	5,153	2,181
3039	Freeport	1,827	3,236	1,279	2,140	3,757	1,498	2,147	3,767	1,503	2,253	3,627	1,577	2,244	3,929	1,571	2,248	3,936	1,574	2,363	3,791	1,654
3038	Baldwin	2,561	3,351	1,793	2,994	3,867	2,096	3,000	3,875	2,100	3,511	4,544	2,458	3,142	4,069	2,200	3,149	4,078	2,204	3,678	4,766	2,574
3037	Rockville Centre	1,688	1,671	1,181	1,770	1,755	1,239	1,774	1,757	1,242	1,862	1,782	1,303	1,850	1,835	1,295	1,851	1,836	1,296	1,963	1,873	1,374
	Total	23,009	32,252	16,106	27,929	38,691	19,550	28,080	39,079	19,656	29,553	41,176	20,687	29,691	41,093	20,784	29,847	41,499	20,893	31,502	43,832	22,051

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

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Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
FAR ROCKAWAY BRANCH																						
3127	Far Rockaway	32	2	17	200	138	106	201	138	107	202	139	107	212	146	112	213	146	113	212	146	113
3126	Inwood	332	614	176	335	595	178	336	596	178	349	622	185	352	626	187	353	627	187	366	653	194
3125	Lawrence	403	513	214	423	540	224	424	541	225	452	577	240	440	560	233	440	561	233	469	598	249
3124	Cedarhurst	302	88	160	327	95	173	326	95	173	334	97	177	342	99	181	342	99	181	351	102	186
3123	Woodmere	478	309	253	537	346	284	536	346	284	540	347	286	558	359	296	558	359	296	562	359	298
3122	Hewlett	874	690	463	977	771	518	978	772	519	986	778	522	1,018	803	539	1,019	804	540	1,026	810	544
3121	Gibson	61	35	32	68	39	36	68	39	36	68	39	36	72	41	38	72	41	38	72	41	38
3097	Valley Stream	1,988	2,088	1,054	2,191	2,266	1,161	2,198	2,274	1,165	2,309	2,402	1,224	2,293	2,385	1,215	2,299	2,392	1,218	2,425	2,534	1,285
3096	Rosedale	621	535	329	807	834	428	814	839	431	916	960	485	856	883	453	862	887	457	971	1,015	514
3095	Laurelton	506	248	268	522	299	277	523	299	277	590	339	313	556	320	295	556	320	295	628	363	333
3094	Locust Manor	386	204	205	259	133	137	259	133	138	252	115	133	270	139	143	271	139	144	262	120	139
	Total	5,983	5,325	3,171	6,646	6,056	3,522	6,664	6,073	3,532	6,999	6,415	3,709	6,969	6,362	3,693	6,985	6,376	3,702	7,344	6,740	3,892
HEMPSTEAD BRANCH																						
3120	Hempstead	791	1,508	435	842	1,618	463	854	1,627	470	952	1,812	524	901	1,709	495	901	1,710	496	1,010	1,906	555
3119	Country Life Press	289	594	159	309	655	170	310	657	171	345	718	190	327	689	180	328	690	180	365	755	201
3118	Garden City	242	51	133	284	60	156	304	64	167	304	64	167	323	69	178	323	69	178	342	72	188
3117	Nassau Blvd	283	207	156	315	230	173	320	233	176	509	370	280	342	249	188	342	249	188	545	396	300
3116	Stewart Manor	449	602	247	470	633	258	483	639	266	714	796	393	514	680	283	515	680	283	752	843	414
3115	Floral Park	1,054	1,303	580	1,000	1,243	550	1,020	1,253	561	559	832	308	1,080	1,326	594	1,082	1,327	595	652	937	359
3114	Bellerose	356	354	196	273	250	150	312	279	171	348	278	191	330	297	182	330	297	182	389	311	214
3008	Queens Village	441	445	243	474	502	261	489	517	269	735	831	404	512	542	282	520	550	286	788	889	434
3007	Hollis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	3,905	5,064	2,148	3,966	5,192	2,182	4,092	5,269	2,250	4,466	5,700	2,456	4,329	5,560	2,381	4,341	5,572	2,388	4,843	6,110	2,664

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

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		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
LONG BEACH BRANCH																						
3113	Long Beach	1,495	1,153	763	1,866	1,392	952	1,690	1,284	862	1,754	1,334	895	2,026	1,539	1,033	1,768	1,342	902	1,835	1,394	936
3112	Island Park	1,461	1,169	745	1,506	1,218	768	1,712	1,369	873	1,760	1,407	898	1,501	1,195	766	1,803	1,442	919	1,854	1,483	945
3111	Oceanside	758	804	386	655	810	334	1,187	1,098	605	1,097	1,086	559	656	843	335	1,269	1,182	647	1,188	1,171	606
3110	East Rockaway	752	780	383	1,132	1,188	577	663	692	338	781	814	398	1,221	1,274	623	681	698	347	794	825	405
3109	Centre Ave	213	65	109	256	78	131	257	78	131	265	83	135	271	82	138	272	83	139	281	88	143
3036	Lynbrook	1,264	877	645	1,280	888	653	1,285	890	655	1,366	952	697	1,339	928	683	1,341	929	684	1,438	999	733
	Total	5,943	4,848	3,031	6,694	5,574	3,414	6,794	5,410	3,465	7,024	5,676	3,582	7,014	5,861	3,577	7,134	5,676	3,638	7,390	5,959	3,769
MONTAUK BRANCH																						
3068	Montauk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3067	Amagansett	94	1,047	81	131	1,428	112	131	1,437	113	131	1,431	112	153	1,670	132	154	1,679	133	153	1,672	132
3066	East Hampton	21	65	18	28	86	24	29	87	25	28	86	24	32	98	28	32	99	28	32	98	28
3065	Bridgehampton	14	18	12	20	27	17	20	27	17	21	28	18	23	30	20	23	30	20	23	31	20
3064	Southampton	37	86	32	48	114	42	48	114	42	48	115	42	54	127	46	54	127	46	54	128	47
3063	Southampton Campus-L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3062	Hampton Bays	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3061	Quogue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3060	Westhampton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3059	Speonk	19	81	17	42	166	36	41	162	35	43	171	37	47	185	40	45	180	39	48	190	41
3058	Center Moriches	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3057	Mastic-Shirley	173	311	148	298	545	257	303	554	261	307	563	264	341	626	294	347	635	298	351	646	302
3056	Bellport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3055	Patchogue	369	663	318	579	1,036	498	593	1,061	510	591	1,052	508	644	1,151	554	660	1,179	567	657	1,168	565
3054	Sayville	484	742	416	859	1,327	738	817	1,286	703	900	1,406	774	951	1,471	818	908	1,429	781	999	1,561	860
3053	Oakdale	192	320	165	278	495	239	209	351	180	203	356	175	293	508	252	236	393	203	228	399	196
3052	Great River	81	140	70	92	167	79	264	440	227	143	238	123	121	220	104	291	486	250	158	263	136
3051	Islip	310	383	266	491	605	422	540	664	464	493	608	424	546	673	469	601	739	516	548	676	472
3050	Bay Shore	544	746	468	848	1,188	730	932	1,307	802	864	1,203	743	941	1,322	809	1,035	1,456	890	959	1,339	825
	Total	2,338	4,603	2,011	3,715	7,185	3,195	3,928	7,490	3,378	3,773	7,257	3,245	4,147	8,079	3,566	4,385	8,432	3,772	4,212	8,173	3,622

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		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
OYSTER BAY																						
3108	Oyster Bay	22	19	12	22	17	12	25	20	14	22	17	13	24	18	13	27	22	15	24	18	13
3107	Mill Neck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3106	Locust Valley	187	211	105	247	281	138	269	306	151	255	292	143	259	294	145	282	320	158	268	306	150
3105	Glen Cove	88	28	49	113	32	63	121	35	68	115	33	65	119	34	67	128	37	72	122	35	68
3104	Glen St	200	268	112	273	363	153	304	404	170	280	375	157	287	381	161	319	425	179	294	394	165
3103	Sea Cliff	192	145	107	239	186	134	279	211	156	247	192	138	250	195	140	292	221	164	259	202	145
3102	Glen Head	241	309	135	333	433	186	397	555	222	339	438	190	361	472	202	430	604	241	368	477	206
3101	Greenvale	173	229	97	245	329	137	268	359	150	249	334	140	267	362	150	293	394	164	272	368	153
3100	Roslyn	240	260	134	297	328	166	343	379	192	316	349	177	310	342	173	358	395	200	330	364	185
3099	Albertson	203	227	114	238	288	133	292	364	164	250	299	140	249	301	139	305	380	171	261	313	146
3098	East Williston	378	363	212	515	512	289	586	596	328	446	429	250	539	535	302	613	622	343	467	449	262
	Total	1,925	2,060	1,078	2,521	2,769	1,412	2,885	3,228	1,616	2,520	2,759	1,411	2,665	2,934	1,492	3,048	3,419	1,707	2,665	2,924	1,493
PORT JEFFERSON																						
3078	Port Jefferson	338	1,413	223	628	2,428	415	679	2,611	448	651	2,491	429	716	2,747	473	759	2,914	501	714	2,745	472
3077	Stony Brook	559	2,499	369	516	1,660	340	553	1,766	365	494	1,513	326	563	1,750	372	622	1,982	410	570	1,790	376
3076	St James	203	425	134	234	454	155	257	502	169	236	460	156	262	509	173	287	563	189	264	515	175
3075	Smithtown	552	1,038	364	746	1,410	492	788	1,490	520	749	1,415	494	827	1,567	546	874	1,656	577	830	1,572	548
3074	Kings Park	854	1,697	563	1,162	2,309	767	1,247	2,486	823	1,166	2,315	770	1,291	2,564	852	1,386	2,765	915	1,294	2,570	854
3073	Northport	1,090	2,977	719	1,190	3,691	786	1,278	3,871	844	1,184	3,701	782	1,314	4,060	867	1,427	4,277	942	1,304	4,067	860
3072	Greenlawn	539	983	356	66	90	44	111	153	73	62	79	41	76	104	50	125	173	82	69	88	46
3071	Huntington	3,723	12,043	2,457	6,771	23,147	4,469	7,297	24,941	4,816	6,410	21,098	4,231	7,485	25,601	4,940	8,048	27,502	5,312	7,093	23,355	4,681
3070	Cold Spring Harbor	753	1,370	497	855	1,381	564	677	1,087	447	1,132	1,956	747	936	1,512	618	744	1,195	491	1,243	2,146	820
3069	Syosset	2,518	5,147	1,662	3,066	6,346	2,024	3,060	6,301	2,020	3,401	6,982	2,245	3,232	6,702	2,133	3,221	6,652	2,126	3,601	7,386	2,376
3014	Hicksville	5,761	10,540	3,803	7,437	13,832	4,908	7,474	13,886	4,933	7,020	12,888	4,633	7,799	14,512	5,147	7,838	14,571	5,173	7,346	13,501	4,849
3013	Westbury	1,493	2,094	985	1,387	1,665	915	1,393	1,666	920	2,068	2,774	1,365	1,461	1,754	964	1,459	1,741	963	2,221	3,018	1,466
3012	Carle Place	440	435	290	481	456	318	505	484	333	317	343	210	524	500	346	529	505	349	358	387	236
3011	Mineola	1,603	1,520	1,058	1,984	1,889	1,309	2,018	1,919	1,332	1,892	1,771	1,249	2,082	1,981	1,374	2,116	2,011	1,396	1,994	1,860	1,316
3010	Merillon Ave	1,444	1,051	953	1,696	1,199	1,119	1,695	1,188	1,119	2,033	1,507	1,342	1,810	1,278	1,195	1,804	1,264	1,191	2,184	1,615	1,441
3009	New Hyde Park	1,508	1,026	995	1,902	1,253	1,255	1,907	1,254	1,258	2,478	1,889	1,636	2,035	1,340	1,343	2,038	1,341	1,345	2,713	2,043	1,790
	Total	23,378	46,258	15,430	30,122	63,211	19,880	30,940	65,605	20,420	31,293	63,181	20,653	32,413	68,482	21,392	33,278	71,112	21,964	33,797	68,658	22,306

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		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
PORT WASHINGTON																						
3090	Port Washington	1,812	1,875	380	2,127	2,209	447	2,155	2,225	452	2,173	2,252	456	2,255	2,330	474	2,256	2,330	474	2,311	2,380	485
3089	Plandome	148	244	31	172	285	36	177	289	37	176	291	37	185	302	39	185	302	39	192	310	40
3088	Manhasset	2,047	2,918	430	2,759	4,051	579	2,421	3,424	508	2,236	3,367	470	2,948	4,276	619	2,529	3,574	531	2,485	3,611	522
3087	Great Neck	2,351	2,448	494	2,417	2,185	508	2,887	2,976	606	3,314	3,577	696	2,661	2,344	559	3,030	3,127	636	3,567	3,727	749
3086	Little Neck	1,129	2,490	237	781	2,198	164	864	2,273	181	910	2,570	191	918	2,446	193	902	2,383	189	1,075	2,857	226
3085	Douglaston	1,019	830	214	1,216	969	255	1,226	975	257	1,337	1,068	281	1,288	1,030	270	1,276	1,015	268	1,415	1,135	297
3084	Bayside	2,536	2,849	533	1,464	1,293	308	1,509	1,347	317	1,711	1,676	359	1,589	1,422	334	1,577	1,408	331	1,858	1,824	390
3083	Auburndale	1,308	1,350	275	1,178	2,017	247	1,209	2,058	254	2,353	3,790	494	1,297	2,213	272	1,281	2,170	269	2,523	4,065	530
3082	Broadway	840	525	177	575	422	121	600	433	126	988	748	207	639	464	134	621	440	130	1,072	803	225
3081	Murray Hill	161	44	34	110	34	23	118	37	25	157	47	33	127	40	27	126	39	26	186	56	39
3080	Flushing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	13,351	15,575	2,804	12,798	15,662	2,688	13,165	16,036	2,765	15,354	19,386	3,224	13,908	16,867	2,921	13,782	16,789	2,894	16,683	20,769	3,504
RONKONKOMA																						
3029	Greenport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3028	Southold	40	114	35	54	149	46	54	150	46	55	151	47	60	166	52	60	167	52	61	169	53
3027	Mattituck	46	57	40	39	61	34	40	61	34	39	61	34	46	70	40	46	70	40	46	70	40
3026	Riverhead	51	181	44	100	454	86	100	458	86	100	455	86	113	518	97	114	522	98	113	519	98
3025	Yaphank	10	19	9	14	26	12	14	26	12	14	26	12	16	31	14	16	31	14	16	31	14
3024	Medford	10	12	9	14	18	12	14	18	12	14	18	12	17	20	14	17	20	14	17	21	14
3023	Holtsville	79	405	68	120	634	103	125	661	107	123	657	106	133	700	115	139	732	120	138	728	119
3022	Ronkonkoma	4,545	23,348	3,909	6,211	32,615	5,341	6,244	32,844	5,370	6,109	33,085	5,254	6,934	36,526	5,963	6,967	36,759	5,992	6,822	37,067	5,867
3021	Central Islip	991	1,694	853	1,157	2,041	995	1,163	2,055	1,001	1,654	3,254	1,422	1,335	2,343	1,148	1,342	2,359	1,154	1,855	3,649	1,595
3020	Brentwood	1,119	1,908	963	2,180	4,025	1,875	2,156	3,974	1,854	1,403	2,602	1,207	2,382	4,379	2,049	2,346	4,316	2,018	1,548	2,891	1,331
3019	Deer Park	1,533	3,030	1,318	1,310	2,264	1,127	1,266	2,134	1,089	3,414	7,411	2,936	1,474	2,555	1,268	1,437	2,438	1,236	3,804	8,247	3,272
3018	Wyandanch	1,202	1,854	1,033	1,688	2,647	1,451	1,674	2,597	1,440	1,432	2,201	1,231	1,884	2,954	1,620	1,868	2,899	1,607	1,611	2,475	1,385
3017	Pine Lawn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3016	Farmingdale	1,129	2,284	971	1,361	2,770	1,170	1,367	2,790	1,175	1,441	2,942	1,239	1,462	2,971	1,258	1,466	2,990	1,261	1,550	3,155	1,333
3015	Bethpage	948	1,365	815	1,177	1,737	1,012	1,227	1,847	1,056	1,661	2,781	1,429	1,251	1,835	1,076	1,304	1,949	1,121	1,777	2,943	1,528
	Total	11,704	36,271	10,066	15,423	49,441	13,264	15,443	49,615	13,281	17,460	55,645	15,016	17,108	55,068	14,713	17,121	55,253	14,724	19,358	61,964	16,648

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
WEST HEMPSTEAD																						
3132	West Hempstead	196	119	90	187	113	86	185	112	85	209	127	96	192	117	88	193	117	89	216	132	99
3131	Hempstead Gardens	274	67	126	274	68	126	275	68	126	306	76	141	288	71	133	288	71	133	322	80	148
3130	Lakeview	244	207	112	264	221	121	265	222	122	289	240	133	277	233	128	278	234	128	303	253	139
3129	Malverne	399	314	184	443	347	204	444	348	204	501	391	231	467	366	215	467	367	215	527	412	243
3128	Westwood	459	413	211	472	425	217	474	427	218	529	477	243	492	443	226	493	444	227	550	496	253
3035	St Albans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	1,572	1,120	723	1,639	1,174	754	1,642	1,177	755	1,835	1,312	844	1,716	1,230	790	1,720	1,233	791	1,919	1,372	883
LIRR TOTALS																						
LIRR Total W/O Terminal Zone		93,107	153,375	56,566	111,453	194,955	69,860	113,633	198,982	71,119	120,278	208,508	74,829	119,959	211,535	75,309	121,642	215,361	76,473	129,714	226,502	80,832
LIRR Total With Terminal Zone		93,107	153,375	56,566	111,453	194,955	69,860	113,633	198,982	71,119	120,278	208,508	74,829	119,959	211,535	75,309	121,642	215,361	76,473	129,714	226,502	80,832

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
METRO NORTH																						
HUDSON LINE																						
3227	Poughkeepsie	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3226	New Hamburg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3225	Beacon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3224	Cold Spring	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3223	Garrison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3222	Peekskill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3221	Montrose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3220	Crugers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3219	Croton-Harmon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3218	Ossining	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3217	Scarborough	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3216	Philipse Manor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3215	Tarrytown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3214	Irvington	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3213	Ardsley	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3212	Dobbs Ferry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3211	Hastings	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3210	Greystone	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3209	Glenwood	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3208	Yonkers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3207	Ludlow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3206	Riverdale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3205	Spuyten Duyvil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3204	Marble Hill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3203	University Heights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3202	Morris Heights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
HARLEM LINE																						
3259	Dover Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3258	Harlem Valley-Wingda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3257	Pawling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3256	Patterson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3255	Brewster North	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3254	Brewster	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3253	Croton Falls	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3252	Purdy's	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3251	Golden's Bridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3250	Katonah	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3249	Bedford Hills	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3248	Mount Kisco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3247	Chappaqua	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3246	Pleasantville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3245	Hawthorne	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3244	Valhalla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3243	North White Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3242	White Plains	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3241	Hartsdale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3240	Scarsdale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3239	Crestwood	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3238	Tuckahoe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3237	Bronxville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3236	Fleetwood	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3235	Mount Vernon West	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3234	Wakefield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3233	Woodlawn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3232	Williams Bridge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3231	Botanical Garden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3230	Fordham	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3229	Tremont	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3228	Melrose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

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Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
NEW HAVEN LINE																						
3297	Danbury	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3296	Bethel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3295	Redding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3294	Branchville	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3293	Cannondale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3291	Wilton (Kent Rd)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3290	Merritt 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3289	New Canaan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3288	Talmadge Hill	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3287	Springdale	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3286	Glenbrook	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3285	NewHaven	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3284	Milford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3283	Stratford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3282	Bridgeport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3281	Fairfield	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3280	Southport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3279	Green's Farms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3278	Westport	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3277	East Norwalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3276	South Norwalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3275	Rowayton	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3274	Darien	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3273	Noroton Heights	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3272	Stamford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3271	Old Greenwich	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3270	Riverside	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3269	Cos Cob	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3268	Greenwich	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3267	Port Chester	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3266	Rye	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3265	Harrison	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3264	Mamaroneck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3263	Larchmont	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3262	New Rochelle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3261	Pelham	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3260	Mount Vernon	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3505	Fordham	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE A-12 WEEKDAY AM PEAK 4 HOUR DRIVE-TO-COMMUTER RAIL VEHICLE TRIPS, VEHICLE MILES OF TRAVEL AND PARKED CARS BY BRANCH

Note: For determining Branch-level impacts only, Station-level data should be used with caution.

Node	Station	1995 BASE			YEAR 2010 ALTERNATIVES									YEAR 2020 ALTERNATIVES								
		1995 BASE NETWORK(NB95)			2010 NO-BUILD (NB13)			2010 TSM (T310)			2010 LIRR-GCT BUILD(G310)			2020 NO-BUILD (NB23)			2020 TSM (TSM3)			2020 LIRR-GCT BUILD(GCT3)		
		Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked	Veh Trips	VMT	Veh. Parked
MANHATTAN																						
3500	125th St	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3201	125th St	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3200	NYC-Grand Central	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total MNCRR W/O Manhattan		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total MNCRR With Manhattan		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A-13
Weekday AM Peak 1-Hour Subway Passengers On-Board East Side Subways by Location

					BASE	YEAR 2010 ALTERNATIVES			YEAR 2020 ALTERNATIVES		
MNR: 0.355 LIRR: 0.355		1995 Capacity	1995 Count 1 Hour	1995 Actual V/C	(NB95) 1995 BASE NETWORK Est. 1 Hr.	(NB13) 2010 NO-BUILD Est. 1 Hr.	(T310) 2010 TSM Est. 1 Hr.	(G310) 2010 LIRR-GCT BUILD Est. 1 Hr.	(NB23) 2020 NO-BUILD Est. 1 Hr.	(TSM3) 2020 TSM Est. 1 Hr.	(GCT3) 2020 LIRR-GCT BUILD Est. 1 Hr.
Lexington Avenue											
4/5	149th St/138th Street	31,900	18,455	0.58	22,033	22,203	22,349	22,233	23,631	23,692	23,553
	125th Street	31,900	24,270	0.76	27,453	28,914	28,968	28,928	30,705	30,775	30,748
	86th Street	29,700	32,060	1.08	29,775	32,200	32,302	32,203	33,765	33,853	33,667
	59th Street	28,600	24,980	0.87	28,592	27,783	27,937	27,898	28,950	29,054	28,973
	Grand Central	25,300	29,390	1.16	29,137	29,657	29,673	31,137	30,603	30,745	32,497
	14th Street	25,300	23,380	0.92	25,619	25,224	25,238	26,456	25,931	26,037	27,498
	Brooklyn Bridge	25,300	20,860	0.82	22,880	23,466	23,487	24,386	24,103	24,252	25,279
	Total		173,395		185,488	189,447	189,953	193,241	197,688	198,409	202,215
6	3rd Avenue	26,400	14,245	0.54	14,966	17,049	17,060	17,046	18,328	18,371	18,361
	125th Street	26,400	9,940	0.38	5,469	6,585	6,673	6,588	7,192	7,232	7,136
	86th Street	26,400	17,720	0.67	12,808	13,613	13,658	13,656	14,295	14,348	14,477
	68th Street	26,400	19,890	0.75	17,789	17,901	17,952	17,969	18,564	18,611	18,725
	59th Street	26,400	17,960	0.68	19,764	19,453	19,560	19,454	20,129	20,214	20,225
	Grand Central	26,400	15,050	0.57	15,983	16,253	16,282	16,615	16,811	16,831	17,025
	14th Street	26,400	7,550	0.29	7,023	6,513	6,581	6,804	6,786	6,851	7,031
	Total		102,355		93,802	97,367	97,766	98,131	102,105	102,457	102,980
Total			275,750		279,290	286,814	287,720	291,372	299,794	300,866	305,196
East Side Totals											
Lexington Ave											
4/5/6	125th Street		34,210		32,922	35,498	35,641	35,516	37,897	38,007	37,884
4/5/6	86th Street		49,780		42,583	45,813	45,960	45,858	48,060	48,201	48,144
4/5/6	59th Street		42,940		48,356	47,235	47,496	47,352	49,079	49,269	49,198
4/5/6	Grand Central		44,440		45,120	45,911	45,954	47,752	47,414	47,576	49,522
4/5/6	14th Street		30,930		32,641	31,736	31,820	33,259	32,717	32,887	34,529
4/5	Brooklyn Bridge		20,860		22,880	23,466	23,487	24,386	24,103	24,252	25,279
	Total		223,160		224,502	229,660	230,358	234,124	239,270	240,193	244,557

Table A-14
Weekday AM Peak 1-Hour Subway Passengers On-Board Line at Maximum Load Point

					BASE	YEAR 2010 ALTERNATIVES			YEAR 2020 ALTERNATIVES		
		1995 Capacity	1995 Count 1 Hour	1995 Actual V/C	(NB95) 1995 BASE NETWORK Est. 1 Hr.	(NB13) 2010 NO-BUILD Est. 1 Hr.	(T310) 2010 TSM Est. 1 Hr.	(G310) 2010 LIRR-GCT BUILD Est. 1 Hr.	(NB23) 2020 NO-BUILD Est. 1 Hr.	(TSM3) 2020 TSM Est. 1 Hr.	(GCT3) 2020 LIRR-GCT BUILD Est. 1 Hr.
North of 60th Street											
1/9	103rd Street	17,600	14,970	0.85	15,043	18,153	18,196	18,191	18,707	18,682	18,692
2/3	72nd Street	24,090	20,560	0.85	20,009	23,894	23,741	23,975	24,954	24,800	24,902
A/D	125th Street	28,180	16,420	0.58	16,746	18,521	18,498	18,524	19,591	19,627	19,581
B/C	72nd Street	15,660	9,620	0.61	10,605	12,112	12,111	12,047	12,586	12,519	12,476
Q	Roosevelt Island	12,600	1,441	0.11	1,095	16,495	16,515	16,048	17,419	17,319	16,888
4/5	86th Street	29,700	32,060	1.08	29,775	32,200	32,302	32,203	33,765	33,853	33,667
6	68th Street	26,400	19,890	0.75	17,789	17,901	17,952	17,969	18,564	18,611	18,725
Total			114,961		111,061	139,275	139,316	138,956	145,585	145,411	144,932
Queens											
N	Queensboro Plaza	15,587	13,620	0.87	14,472	17,865	17,880	17,823	18,714	18,816	18,521
R/T	Queens Plz	15,455	12,680	0.82	11,921	8,901	8,864	8,941	9,402	9,379	9,475
E/F	23rd Street	42,600	48,190	1.13	46,384	39,027	38,875	38,299	40,727	40,679	40,092
7	33rd Street	30,250	24,320	0.80	23,336	25,901	25,708	24,578	27,014	26,829	25,690
	Total		98,810		96,113	91,695	91,328	89,640	95,858	95,703	93,778
North Brooklyn											
L	Bedford Avenue	15,080	12,420	0.82	11,641	14,435	14,435	14,428	15,051	15,092	15,106
J/M/Z	Marcy Avenue	22,040	13,000	0.59	14,041	17,155	17,008	17,189	17,976	17,847	17,953
	Total		25,420		25,682	31,590	31,444	31,617	33,026	32,939	33,059
South Brooklyn											
F	Bergen Street	21,000	16,510	0.79	19,643	20,119	20,051	20,111	21,035	20,981	21,021
B/N	36th Street	22,936	18,890	0.82	18,648	20,251	20,255	20,184	21,037	21,067	21,240
D/Q	7th Avenue	30,800	20,320	0.66	22,681	26,660	26,677	26,653	27,919	27,954	27,926
A/C	High Street	34,804	26,640	0.77	28,442	27,945	28,001	27,862	29,302	29,316	29,208
2/3	Atlantic Avenue	20,900	15,470	0.74	14,313	15,528	15,537	15,473	16,377	16,321	16,268
M/R	DeKalb Avenue	20,520	9,010	0.44	6,665	6,009	5,969	5,982	6,297	6,322	6,308
4/5	Atlantic Avenue	29,700	26,680	0.90	26,477	29,687	29,936	29,356	31,025	31,228	30,492
G	Clinton-Washington	6,300	4,280	0.68	3,395	3,116	3,114	3,115	3,318	3,316	3,316
S	Botanic Gardens	2,450	0	0.00	1,031	960	960	960	1,022	1,022	1,022
	Total		137,800		141,295	150,275	150,501	149,696	157,333	157,527	156,802

Appendix D: Traffic and Transportation

MTA / LIRR EAST SIDE ACCESS FEIS

TECHNICAL APPENDIX:
TRAFFIC AND PEDESTRIAN LEVEL OF SERVICE ANALYSES

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December 2000

INTRODUCTION

This Technical Appendix contains the detailed traffic and pedestrian level of service analyses conducted for existing conditions and for the No Build and Build (East Side Access) Alternatives. The contents of this Technical Appendix is subdivided into the three geographical areas addressed in the FEIS: Midtown Manhattan; Sunnyside, Queens; and Eastern Queens and Long Island.

CONTENTS OF THE MIS/FEIS AND THE TECHNICAL APPENDIX

The FEIS contains a full verbal and graphic description of traffic and pedestrian conditions in the three study areas under existing conditions and the various alternatives. In terms of traffic level of service findings, the MIS/FEIS presents an overview of the impacts associated with the alternatives — where significant impacts are expected and what types of improvements would be needed to mitigate adverse impacts. This Technical Appendix provides an additional layer of analysis details. For vehicular traffic, it includes volume-to-capacity (v/c) ratios, average vehicle delays, and levels of service by approach and by lane group for each intersection analyzed for each alternative, as well as for the mitigated conditions under the alternatives. For pedestrian and passenger flow analyses, it includes v/c ratios, time-space analyses, and levels of service for conditions within Grand Central Terminal, for Lexington Avenue subway station facilities, and for on-street sidewalk and crosswalk analyses. Additional levels of detail — e.g., intersection capacity analysis worksheets themselves — are available within a series of books at the offices of Eng-Wong, Taub & Associates.

The contents of this Technical Appendix include the following Figures and Tables:

Grand Central Terminal (GCT) Area

Figure M-1 Existing Grand Central Terminal Area Traffic Volumes
Figure M-2 No Build Alternative GCT Area Traffic Volumes
Figure M-3 Build Alternative GCT Area Traffic Volumes
Figure M-4 Existing GCT External Pedestrian Volumes
Figure M-5 2010 No Build GCT External Pedestrian Volumes
Figure M-6 2010 Build GCT External Pedestrian Volumes
Figure M-7 GCT Upper Concourse Pedestrian Volumes
Figure M-8 Lexington Avenue Subway Stairwell Volumes

Table M-1 Existing Grand Central Area Traffic Levels of Service
Table M-2 No Build Alternative GCT Area Traffic Levels of Service
Table M-3 Build / Mitigated Alternative GCT Area Traffic Levels of Service
Table M-4 Existing GCT External Pedestrian Analyses
Table M-5 2010 No Build GCT External Pedestrian Analyses
Table M-6 2010 Build GCT External Pedestrian Analyses
Table M-7 2010 Mitigated Build GCT External Pedestrian Analyses
Table M-8 Existing GCT Internal Pedestrian Analyses
Table M-9 2010 No Build GCT Internal Pedestrian Analyses
Table M-10 2020 No Build GCT Internal Pedestrian Analyses
Table M-11 2010 Build GCT Internal Pedestrian Analyses
Table M-12 2020 Build GCT Internal Pedestrian Analyses
Table M-13 2010 Mitigated Build GCT Internal Pedestrian Analyses
Table M-14 2020 Mitigated Build GCT Internal Pedestrian Analyses
Table M-15 Subway Mezzanine B Pedestrian Analyses

Table M-16 Existing Subway Stairs Analyses
Table M-17 2010 No Build Subway Stairs Analyses
Table M-18 2020 No Build Subway Stairs Analyses
Table M-19 2010 Build Subway Stairs Analyses
Table M-20 2020 Build Subway Stairs Analyses
Table M-21 2010 Mitigated Build Subway Stairs Analyses
Table M-22 2020 Mitigated Build Subway Stairs Analyses
Table M-23 Existing Subway Platform Time-Space Analyses
Table M-24 2010 No Build Subway Platform Time-Space Analyses
Table M-25 2020 No Build Subway Platform Time-Space Analyses
Table M-26 2010 Build Subway Platform Time-Space Analyses
Table M-27 2020 Build Subway Platform Time-Space Analyses
Table M-28 2010 Mitigated Build Subway Platform Time-Space Analyses
Table M-29 2020 Mitigated Build Subway Platform Time-Space Analyses
Table M-30 LIRR Platform Analyses
Table M-31 GCT External / NEA Analyses
Table M-32 Subway Stairs Analyses of P16 Stairwell

Sunnyside Area

Figure S-1 Existing Sunnyside Area Traffic Volumes
Figure S-2 2010 No Build Sunnyside Area Traffic Volumes
Figure S-3 Sunnyside Pedestrian Volumes

Table S-1 Existing Sunnyside Area Traffic Levels of Service
Table S-2 2010 No Build Sunnyside Area Traffic Levels of Service
Table S-3 Sunnyside Pedestrian Analyses

Eastern Queens and Long Island

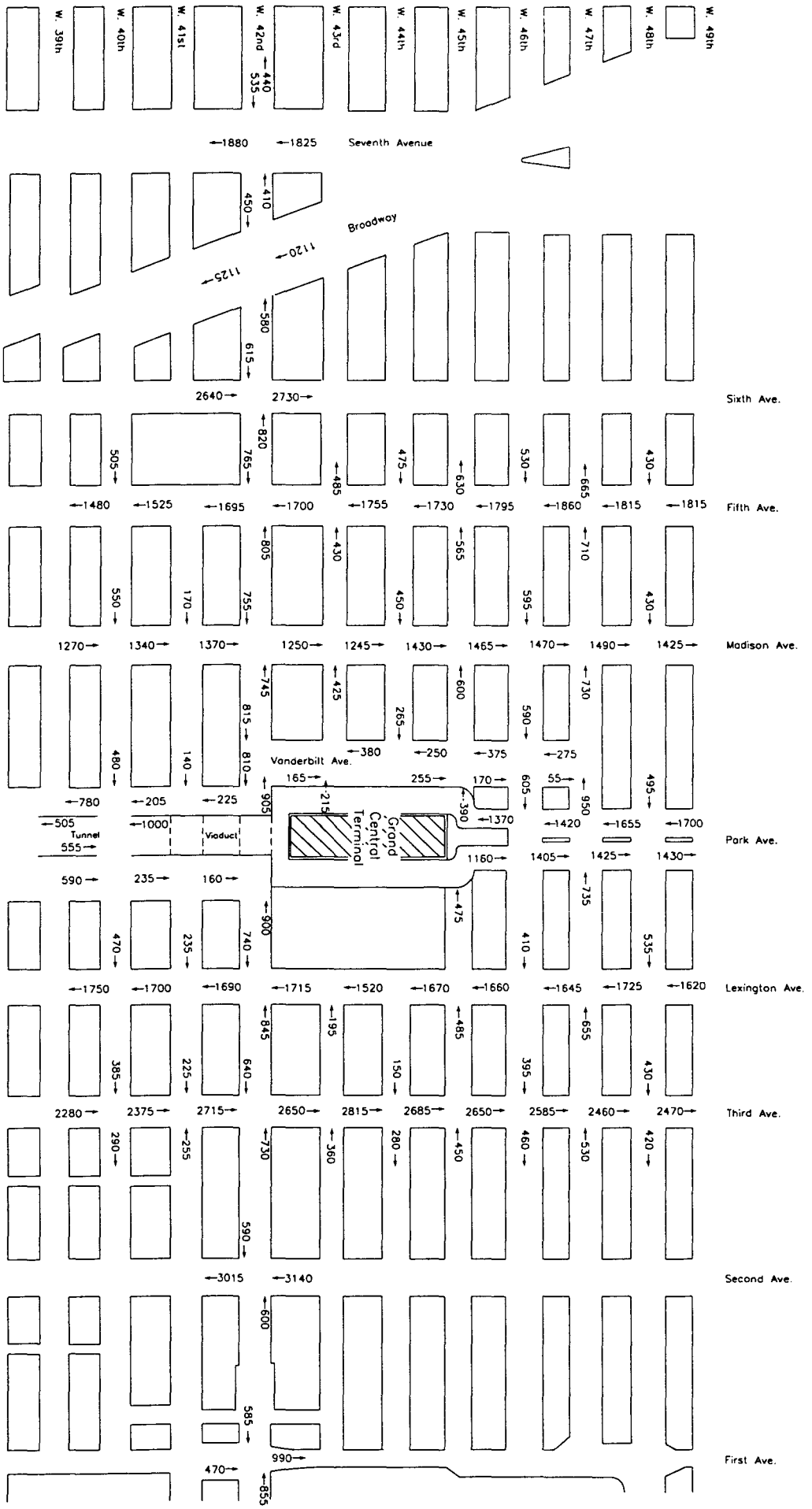
Figures L-1 to L-15 Existing Long Island Road Station Area Traffic Volumes (1 per station area)
Figures L-16 to L-30 No Build Long Island Road Station Area Traffic Volumes (1 per station area)
Figures L-31 to L-45 Build Long Island Road Station Area Traffic Volumes (1 per station area)

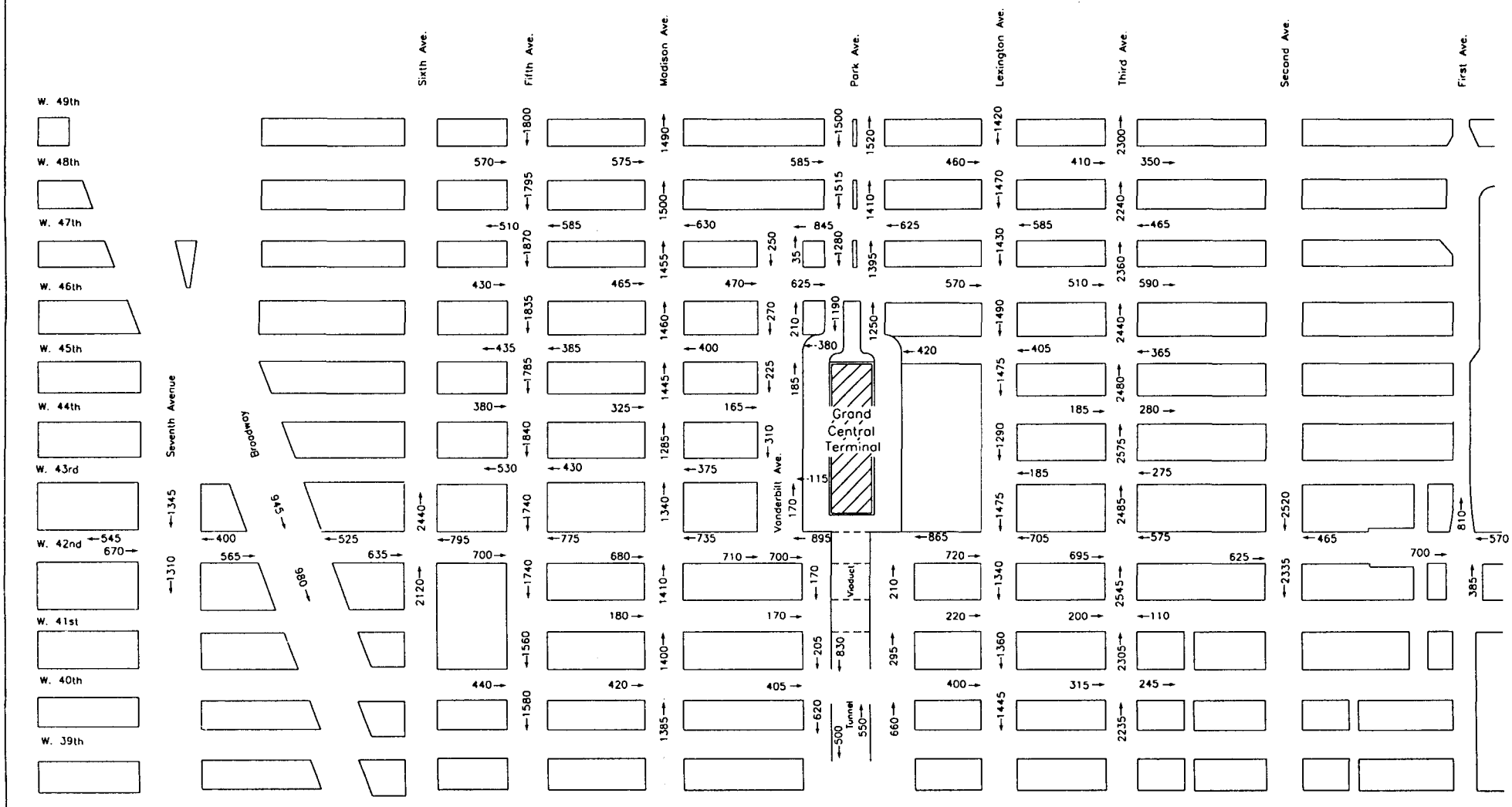
Table L-1 Existing LIRR Station Area Traffic Levels of Service
Table L-2 2010 No Build LIRR Station Area Traffic Levels of Service
Table L-3 2020 No Build LIRR Station Area Traffic Levels of Service
Table L-4 2010 Build LIRR Station Area Traffic Levels of Service
Table L-5 2020 Build LIRR Station Area Traffic Levels of Service
Table L-6 2010 Mitigated Build LIRR Station Area Traffic Levels of Service (AM Peak Hour)
Table L-7 2020 Mitigated Build LIRR Station Area Traffic Levels of Service (AM Peak Hour)
Table L-8 2010 Mitigated Build LIRR Station Area Traffic Levels of Service (PM Peak Hour)
Table L-9 2020 Mitigated Build LIRR Station Area Traffic Levels of Service (PM Peak Hour)

FIGURE M-1

EXISTING TRAFFIC VOLUMES

INTERSECTION APPROACH VOLUMES : EXISTING AM PEAK





INTERSECTION APPROACH VOLUMES : EXISTING MIDDAY PEAK

INTERSECTION APPROACH VOLUMES : EXISTING PM PEAK

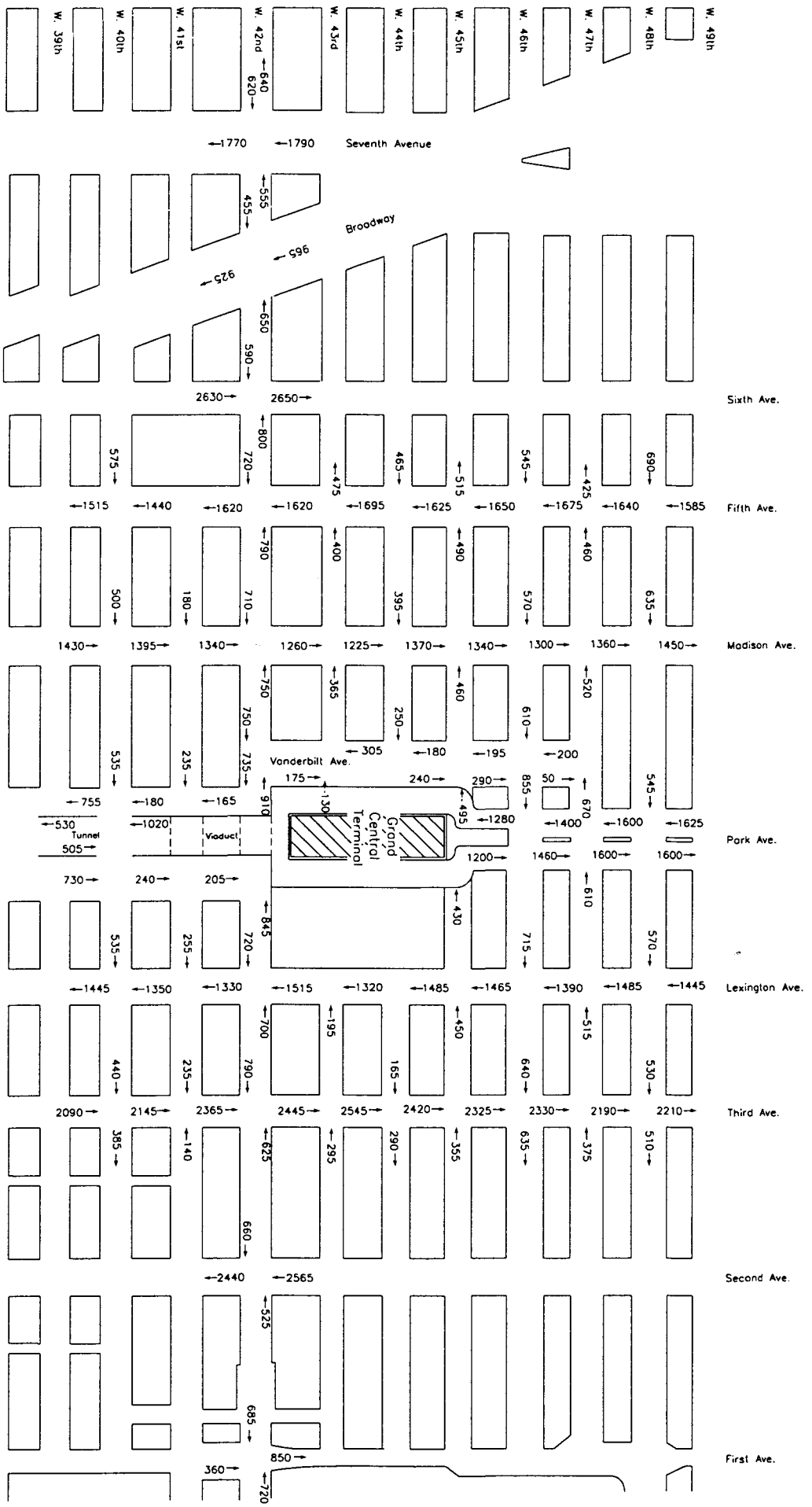
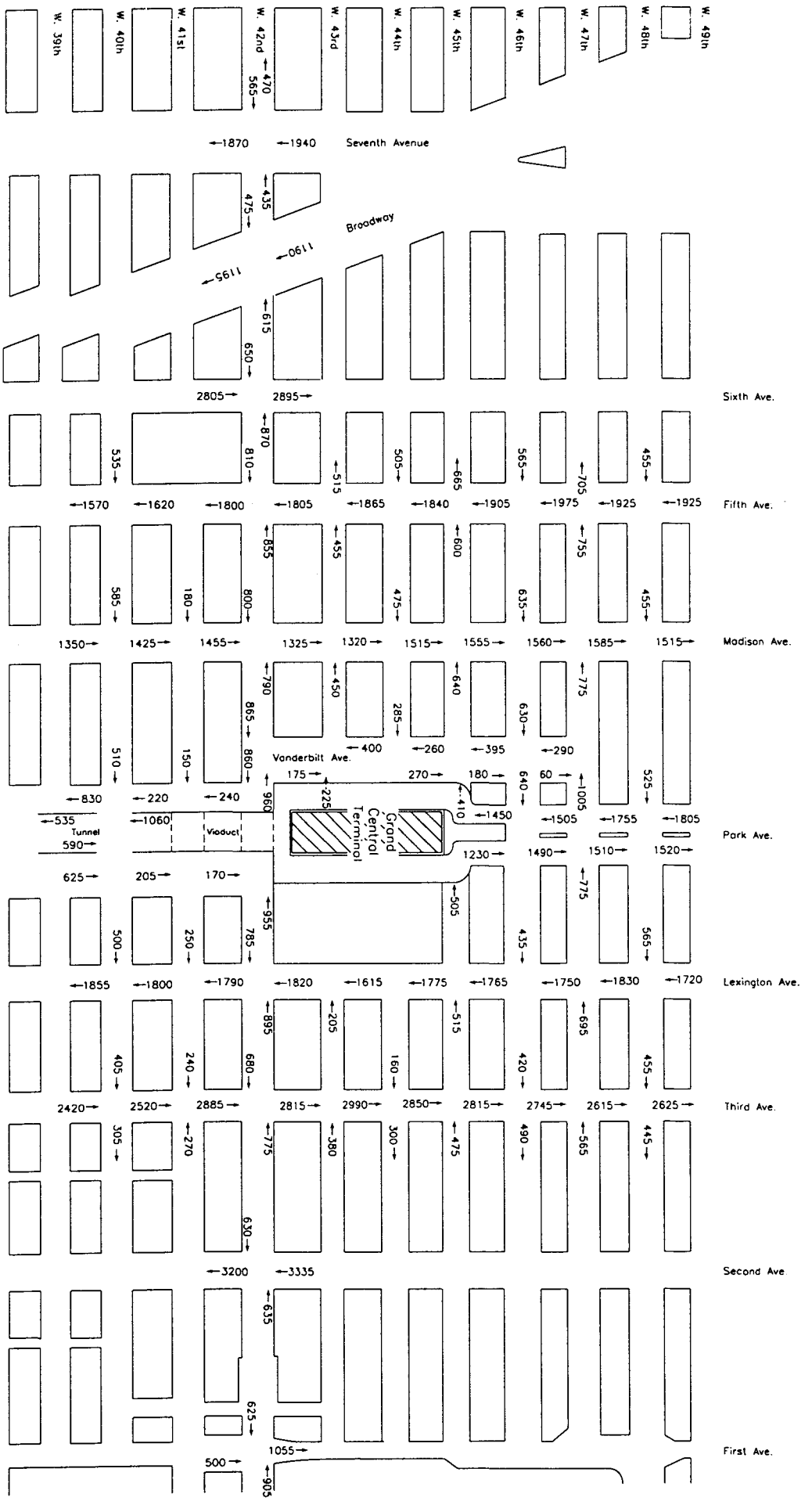


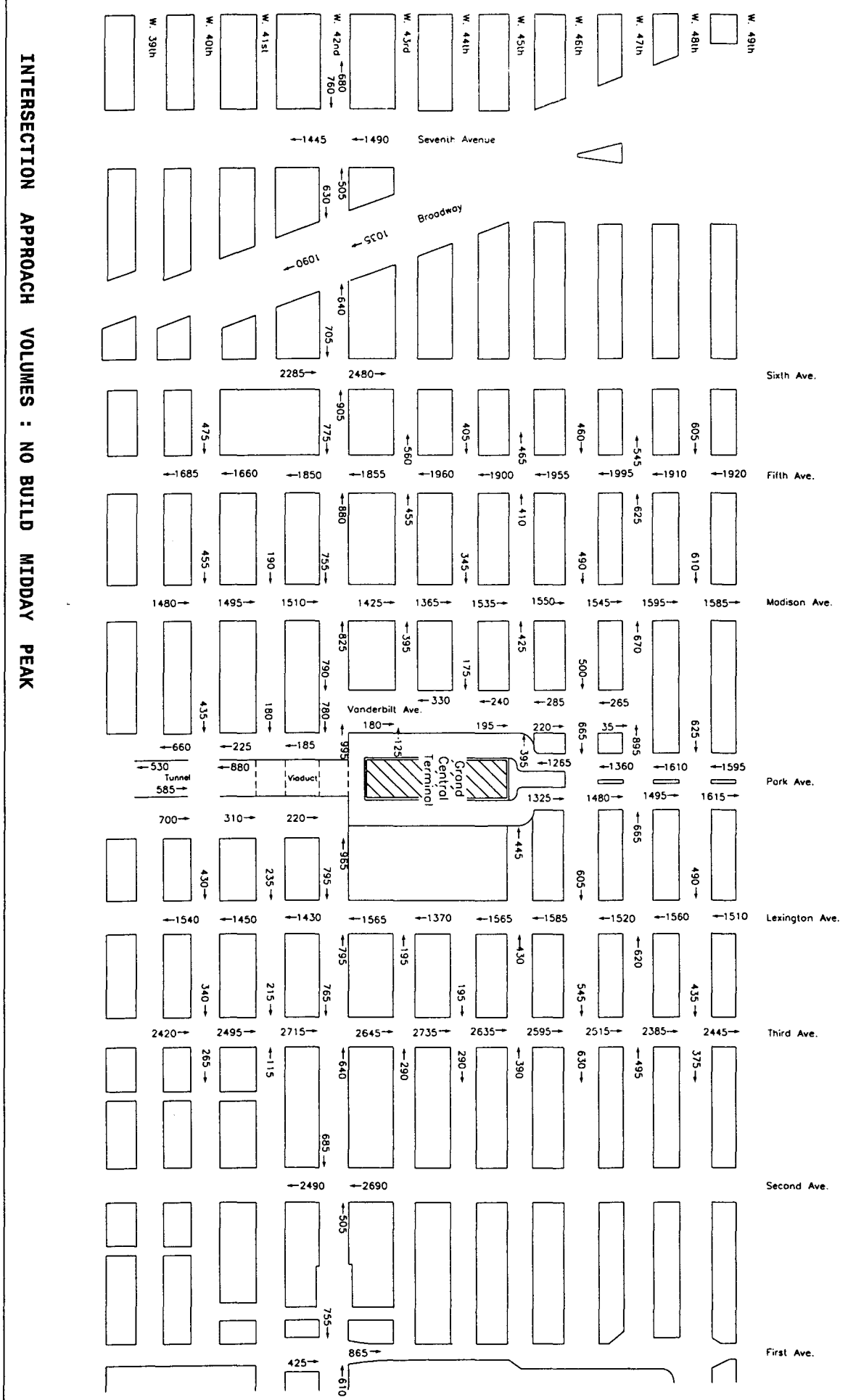
FIGURE M-2

2010 NO BUILD TRAFFIC VOLUMES

INTERSECTION APPROACH VOLUMES : NO BUILD AM PEAK



INTERSECTION APPROACH VOLUMES : NO BUILD MIDDAY PEAK



INTERSECTION APPROACH VOLUMES : NO BUILD PM PEAK

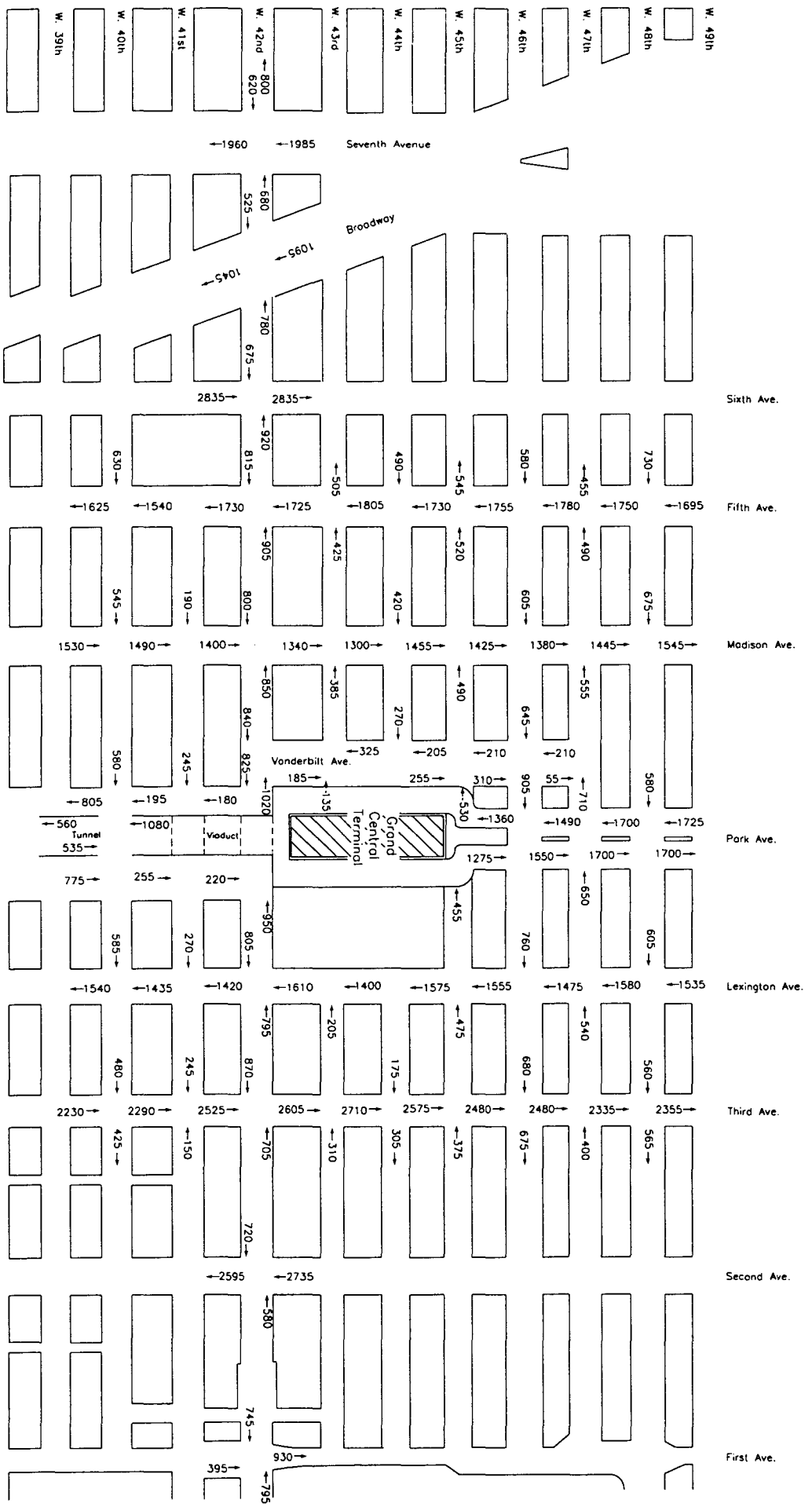
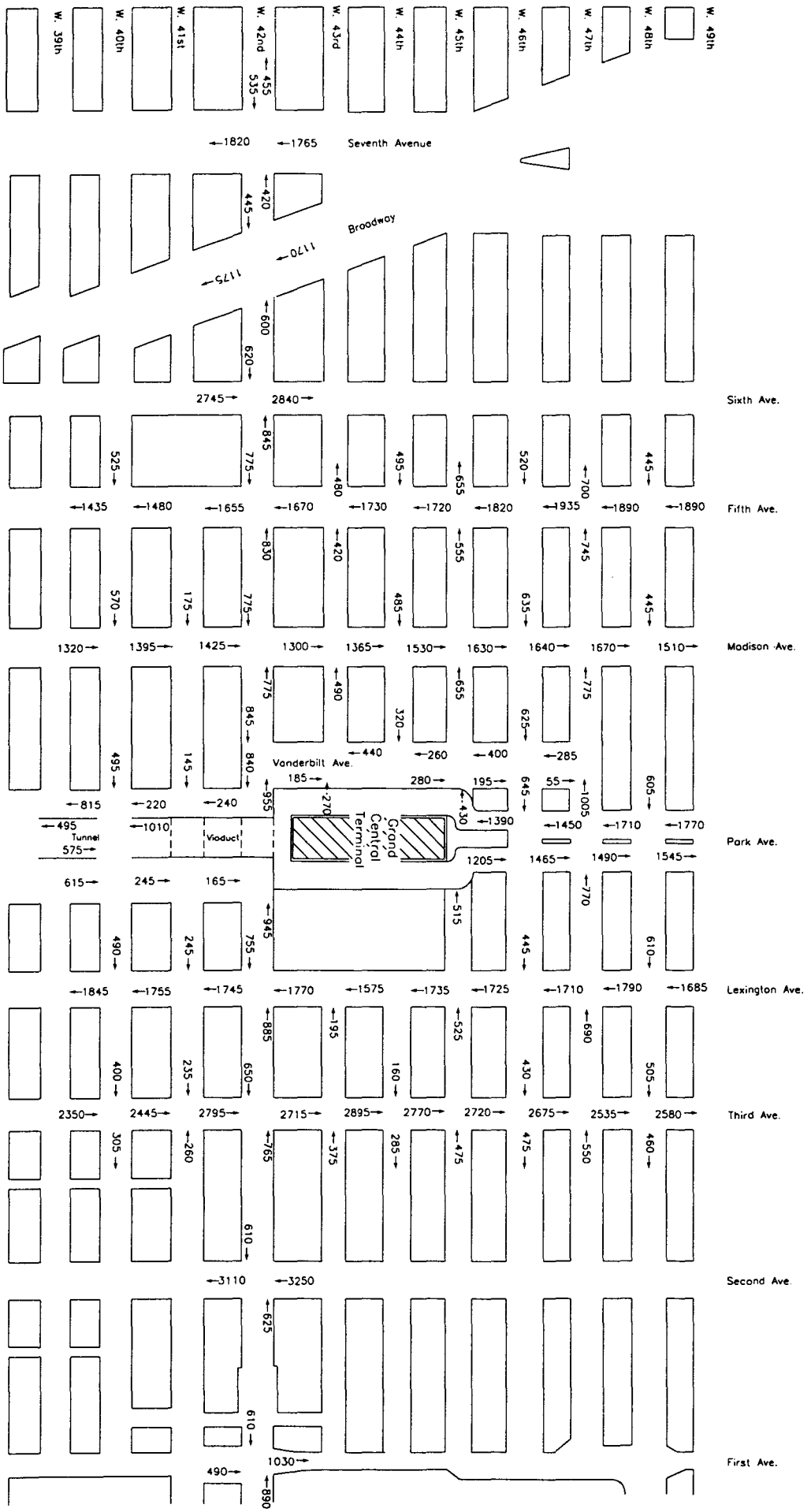
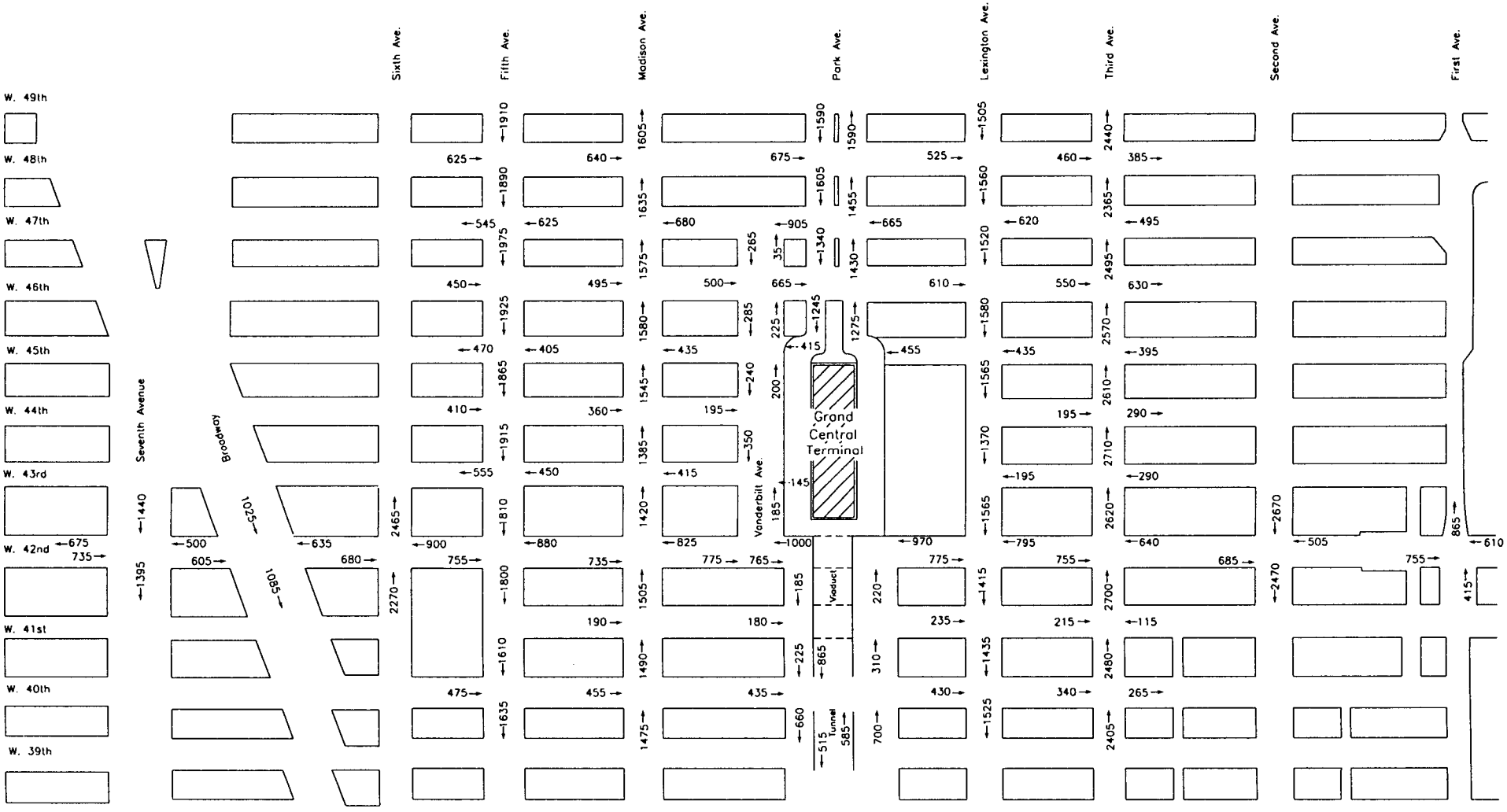


FIGURE M-3

2010 BUILD TRAFFIC VOLUMES

INTERSECTION APPROACH VOLUMES : BUILD AM PEAK





INTERSECTION APPROACH VOLUMES : BUILD MIDDAY PEAK

INTERSECTION APPROACH VOLUMES : BUILD PM PEAK

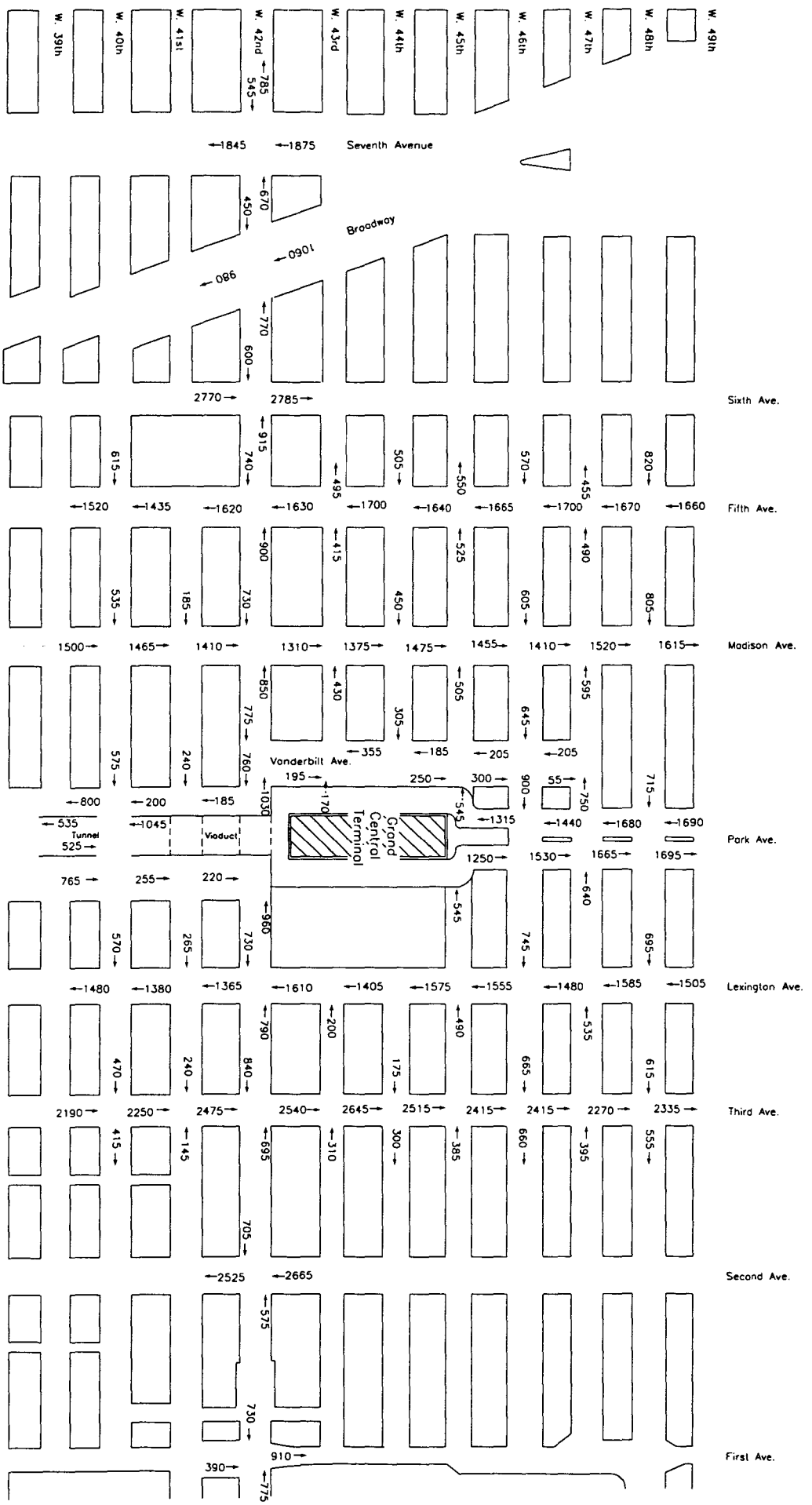
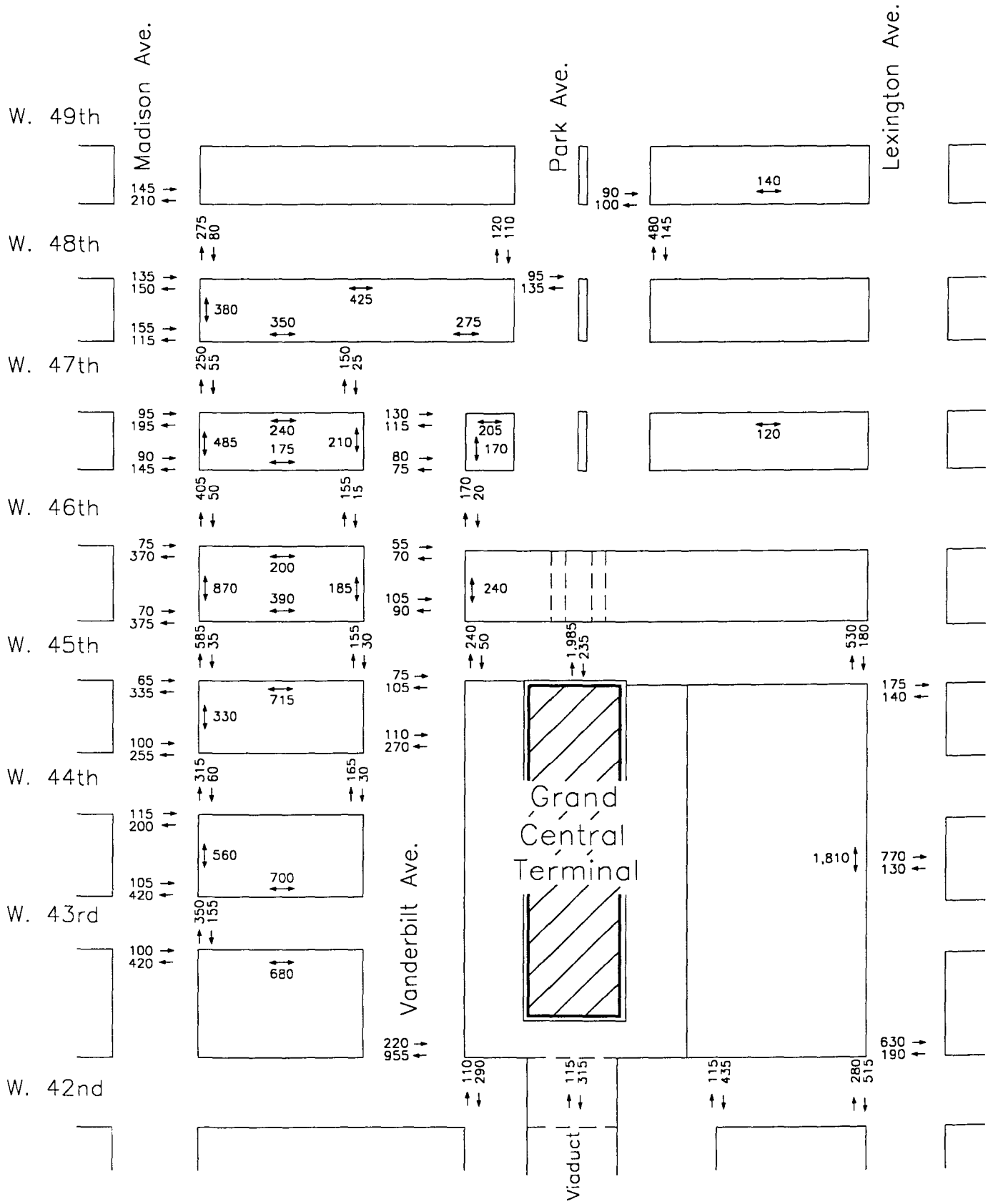


FIGURE M-4

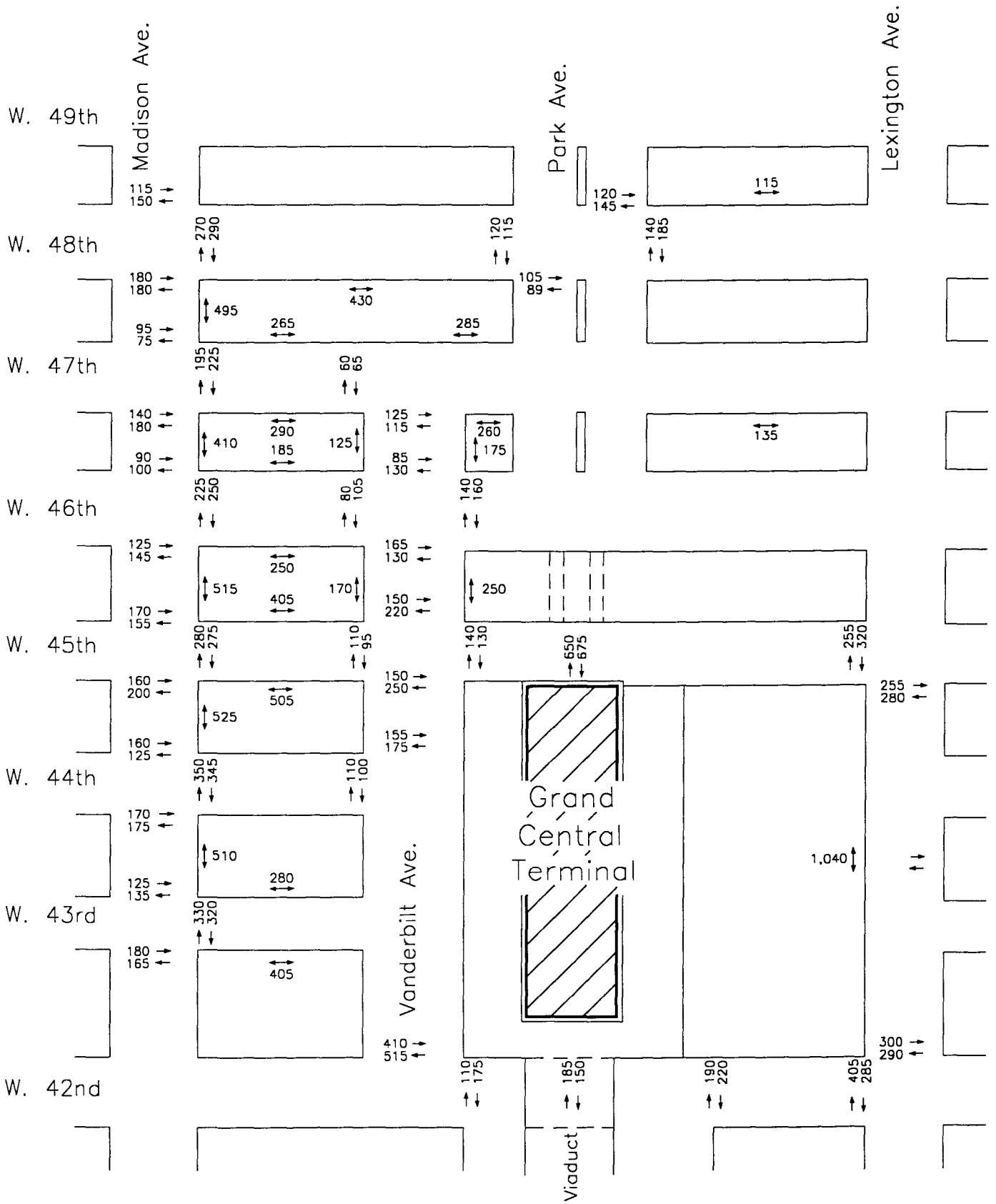
EXISTING GCT EXTERNAL PEDESTRIAN VOLUMES



LIRR–GCT
EAST SIDE ACCESS

EXISTING PEDESTRIAN VOLUMES
AM PEAK 15 MINUTES

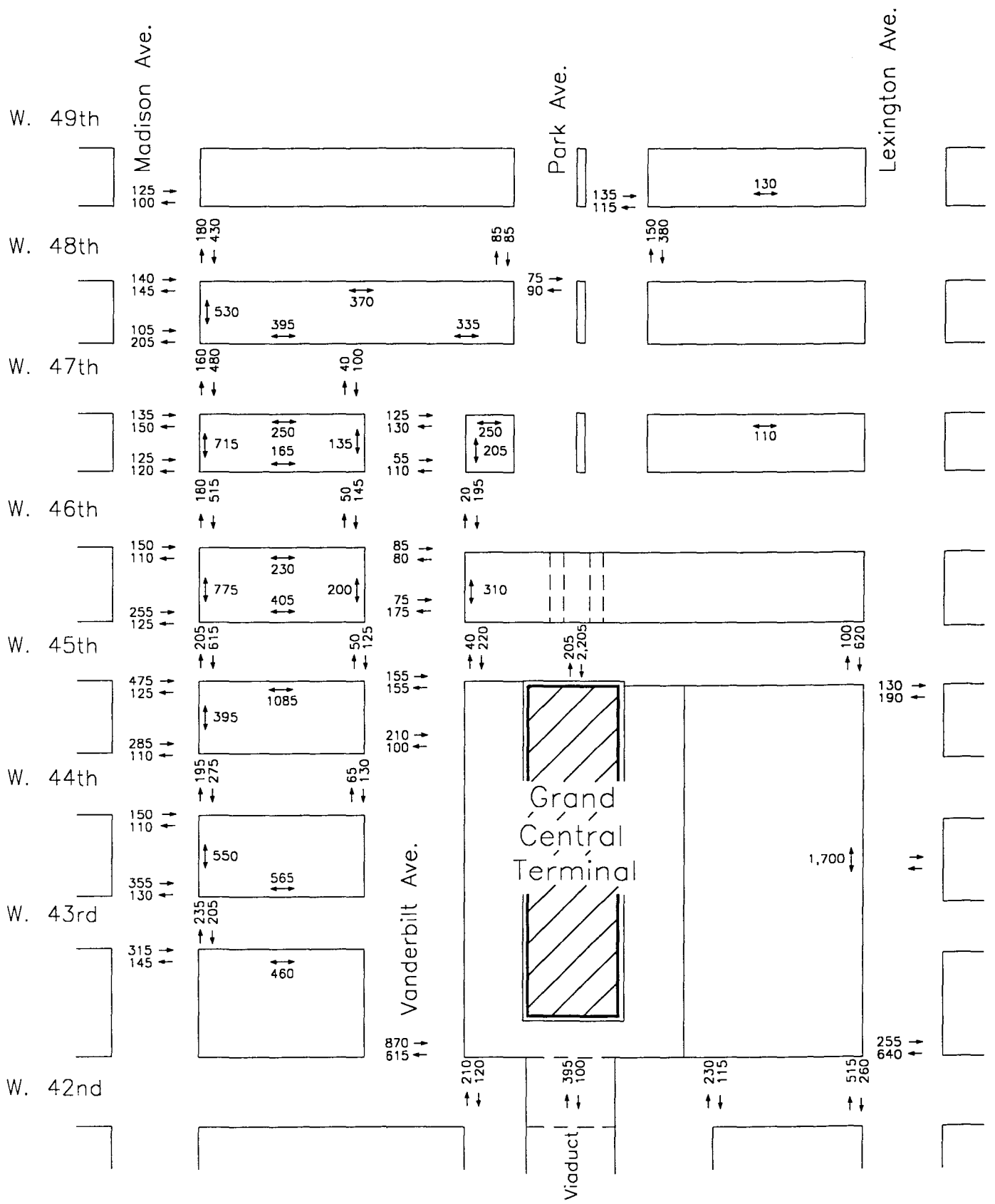
Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



LIRR–GCT
EAST SIDE ACCESS

EXISTING PEDESTRIAN VOLUMES
MIDDAY PEAK 15 MINUTES

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



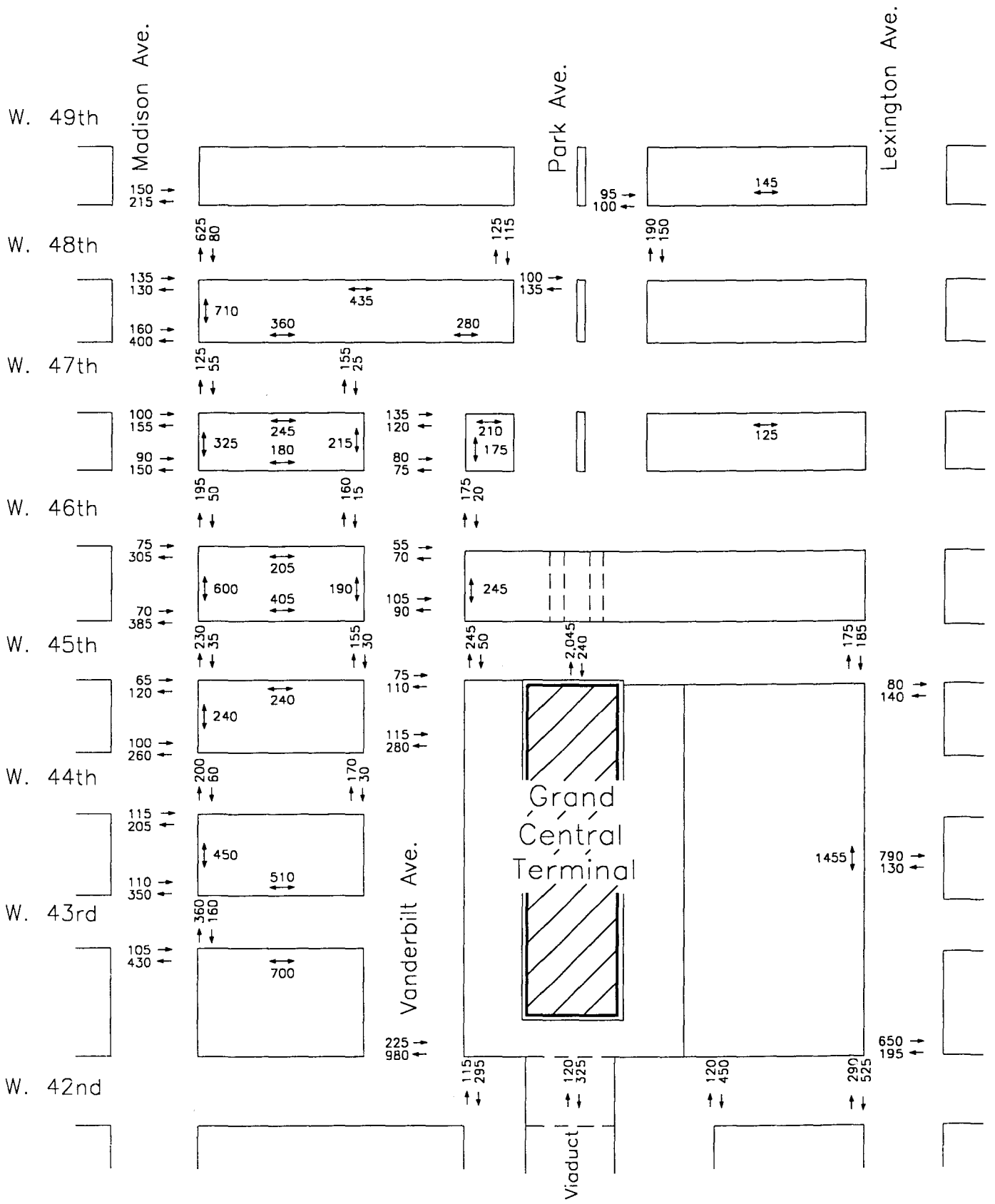
LIRR–GCT
EAST SIDE ACCESS

EXISTING PEDESTRIAN VOLUMES
PM PEAK 15 MINUTES

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE M-5

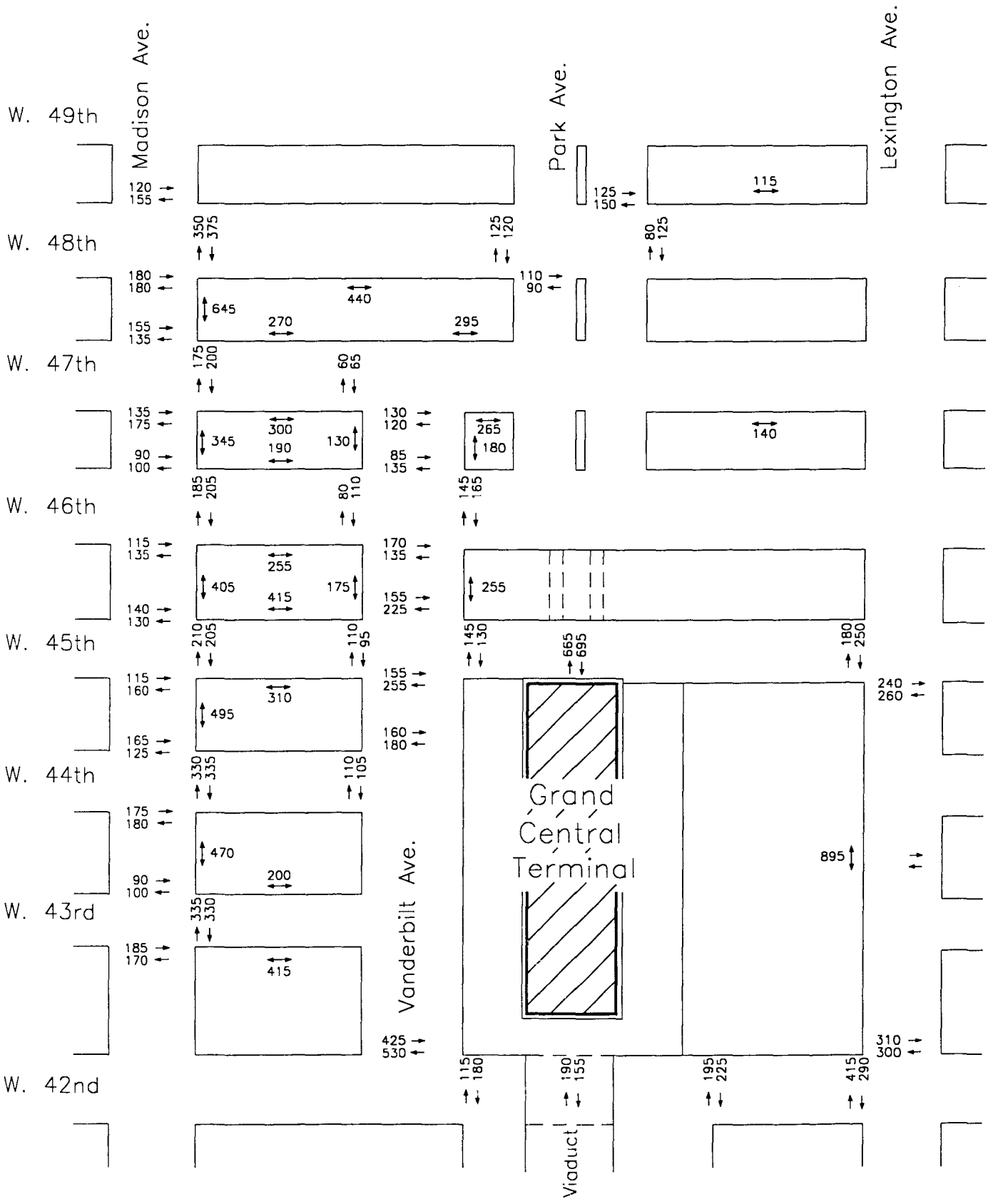
2010 NO BUILD
GCT EXTERNAL
PEDESTRIAN VOLUMES



LIRR–GCT
EAST SIDE ACCESS

2010 NO BUILD PEDESTRIAN VOLUMES
AM PEAK 15 MINUTES

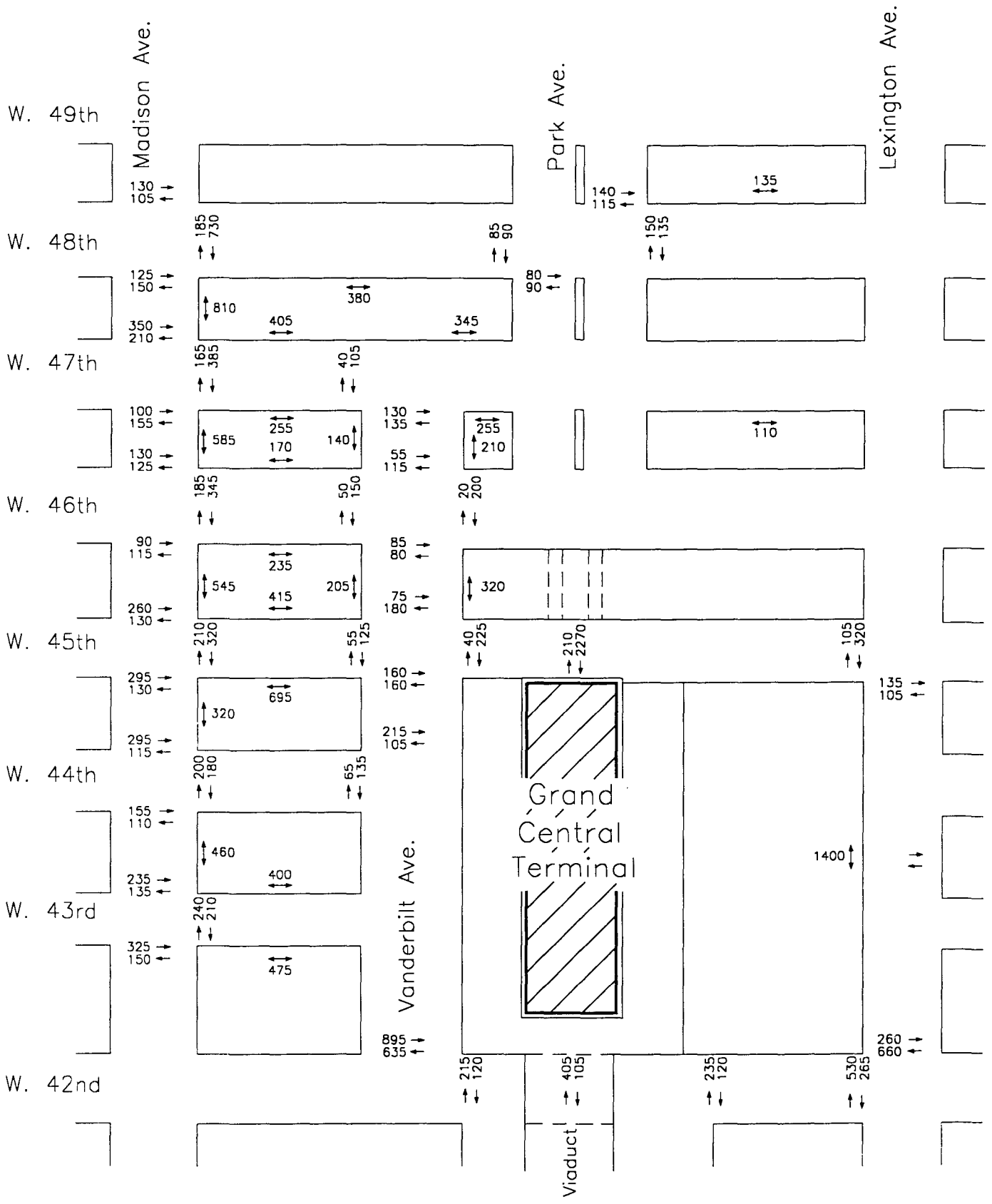
Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



LIRR–GCT
EAST SIDE ACCESS

2010 NO BUILD PEDESTRIAN VOLUMES
MIDDAY PEAK 15 MINUTES

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



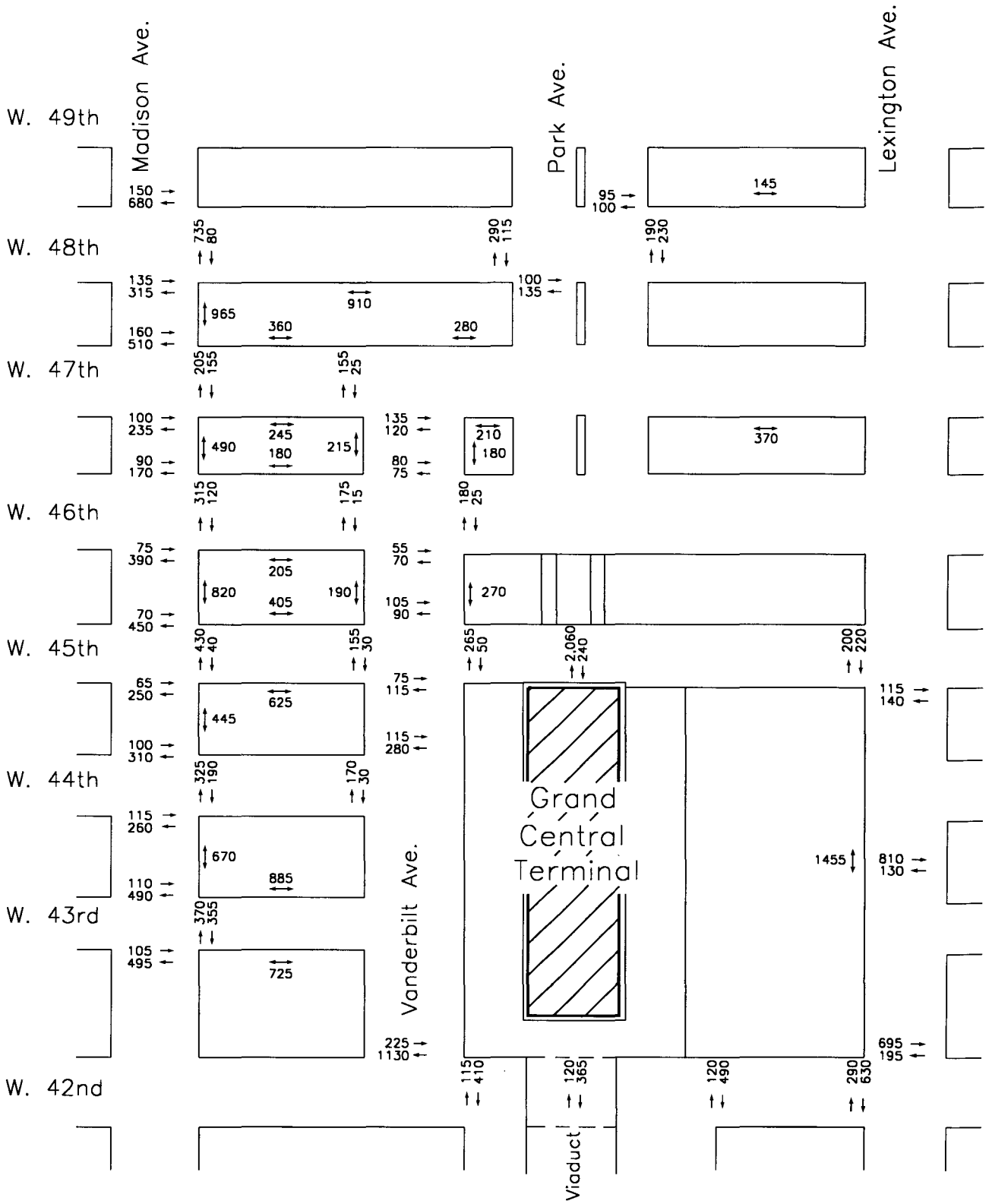
LIRR–GCT
EAST SIDE ACCESS

2010 NO BUILD PEDESTRIAN VOLUMES
PM PEAK 15 MINUTES

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE M-6

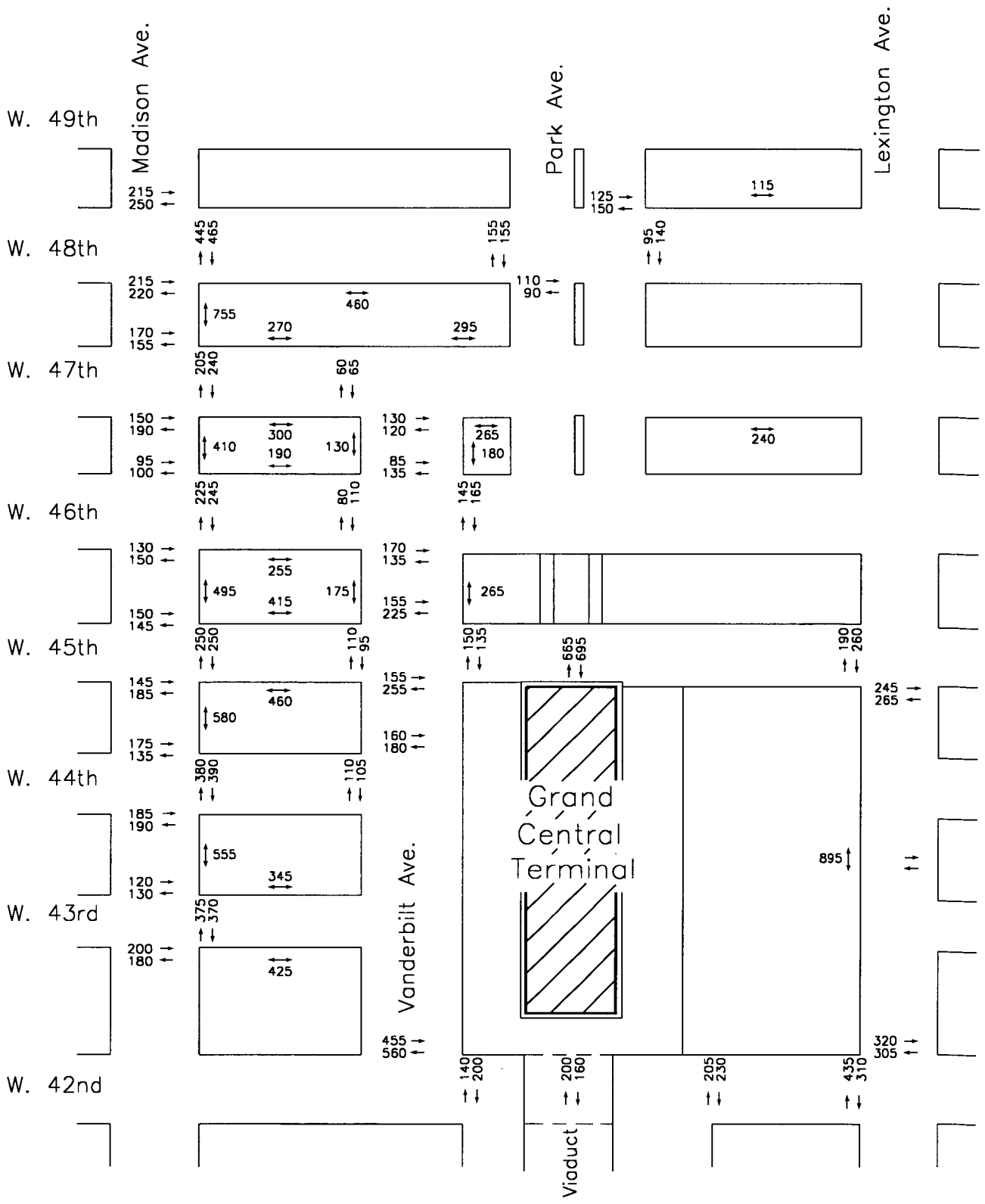
2010 BUILD
GCT EXTERNAL
PEDESTRIAN VOLUMES



LIRR–GCT
EAST SIDE ACCESS

2010 BUILD PEDESTRIAN VOLUMES
AM PEAK 15 MINUTES

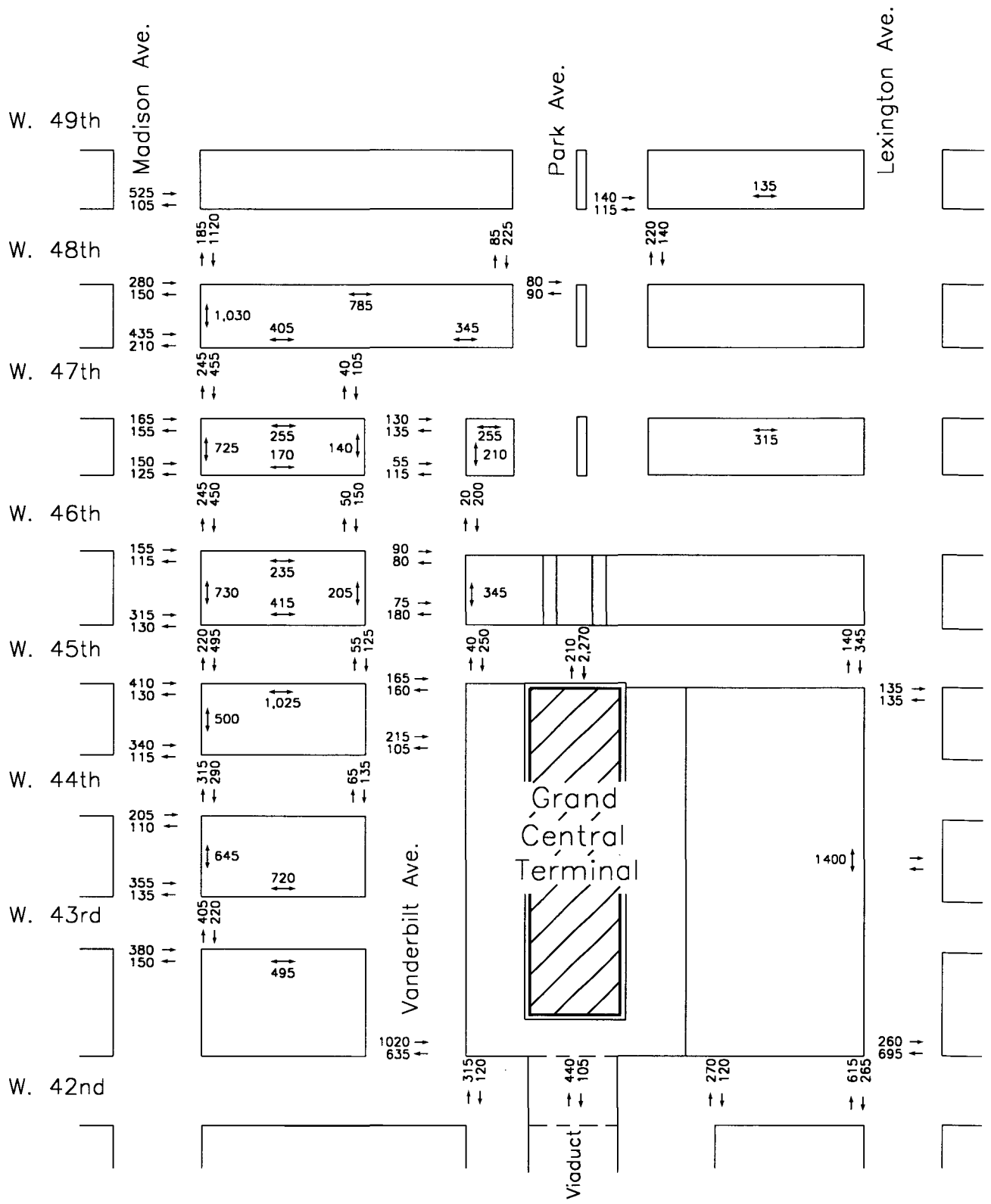
Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



LIRR–GCT
EAST SIDE ACCESS

2010 BUILD PEDESTRIAN VOLUMES
MIDDAY PEAK 15 MINUTES

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



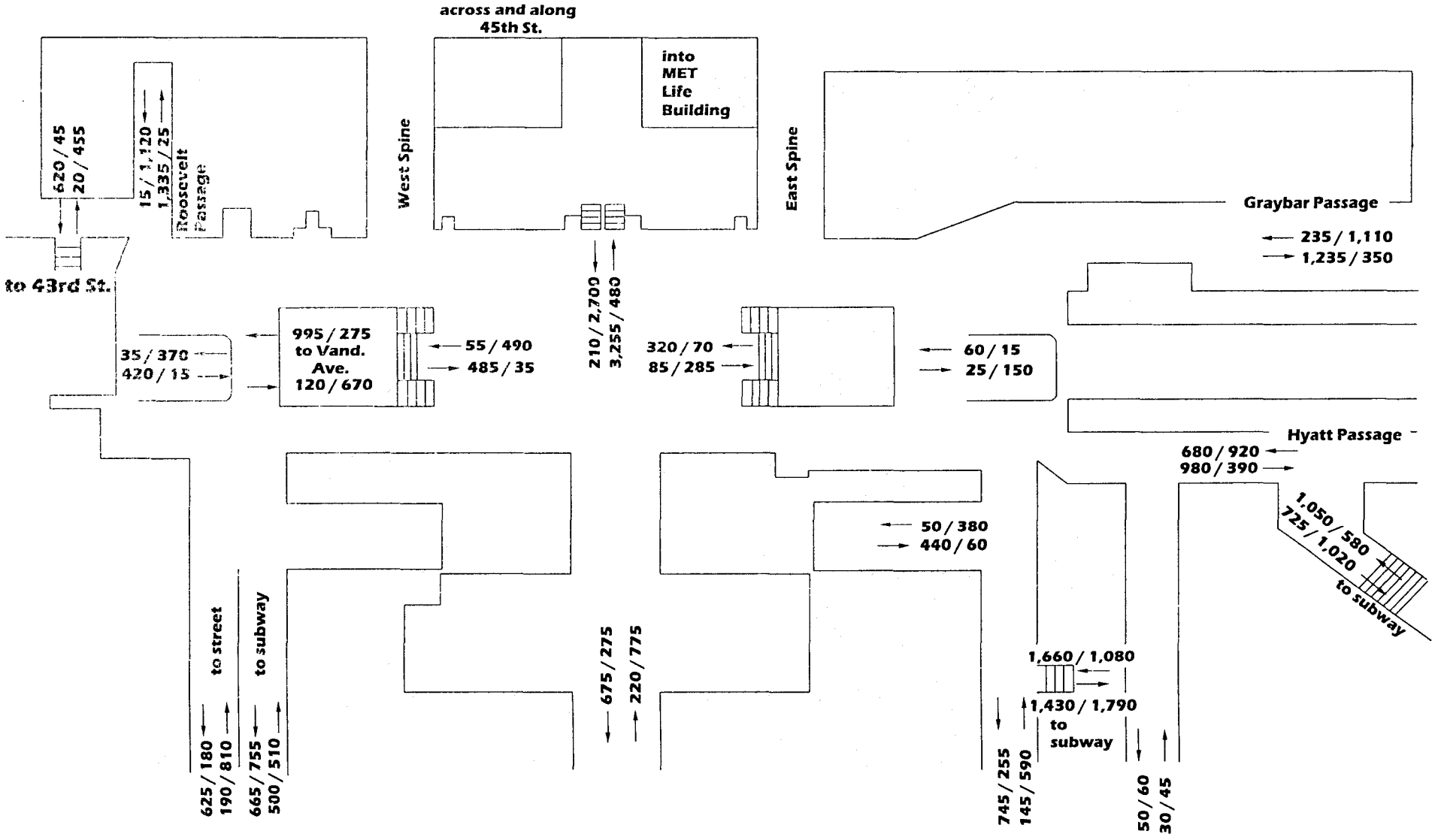
LIRR–GCT
EAST SIDE ACCESS

2010 BUILD PEDESTRIAN VOLUMES
PM PEAK 15 MINUTES

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE M-7

GCT UPPER CONCOURSE PEDESTRIAN VOLUMES



AM / PM

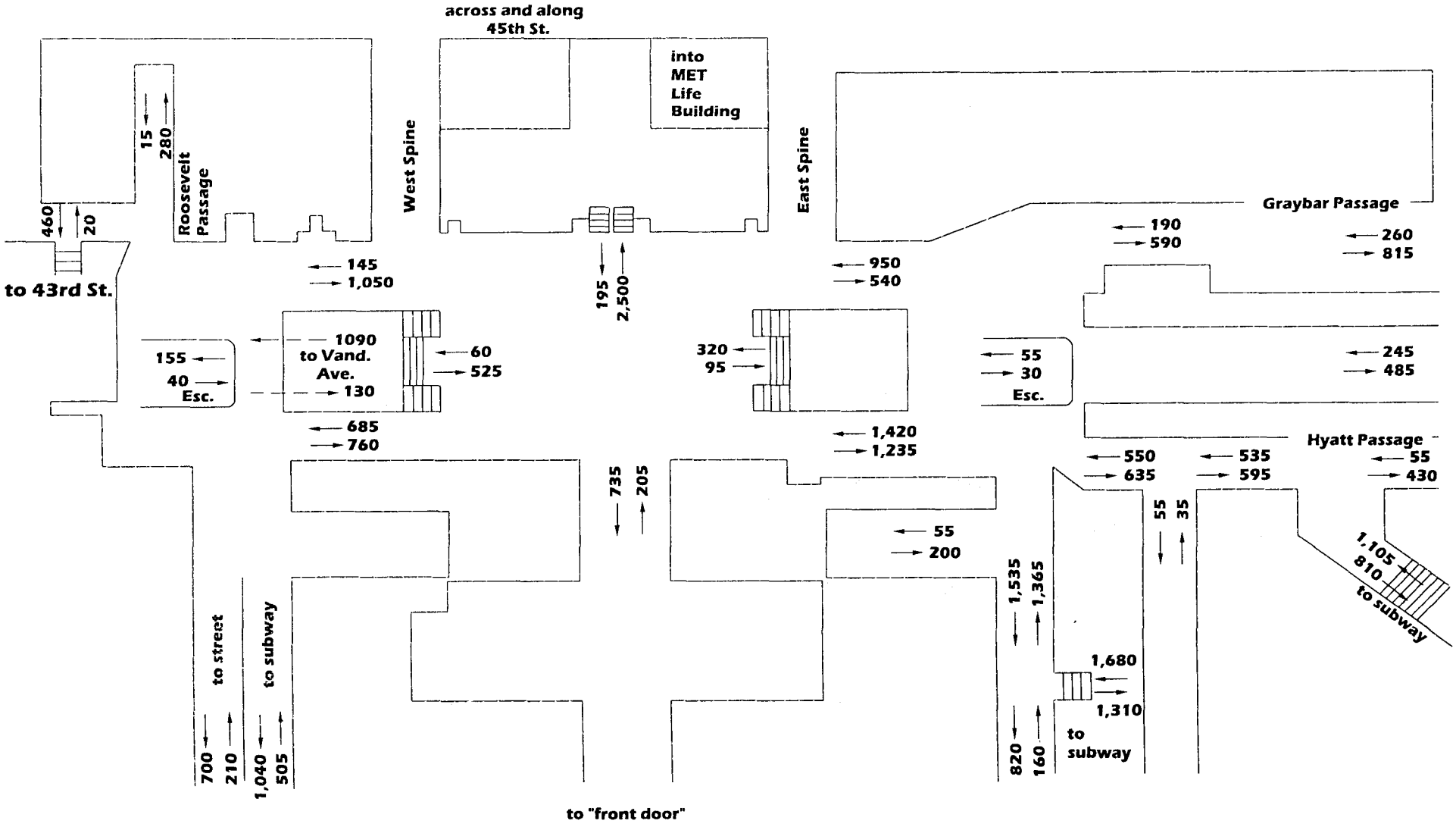
GCT UPPER CONCOURSE

1999 Existing Peak 15-Minute

Pedestrian Flows

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



GCT UPPER CONCOURSE

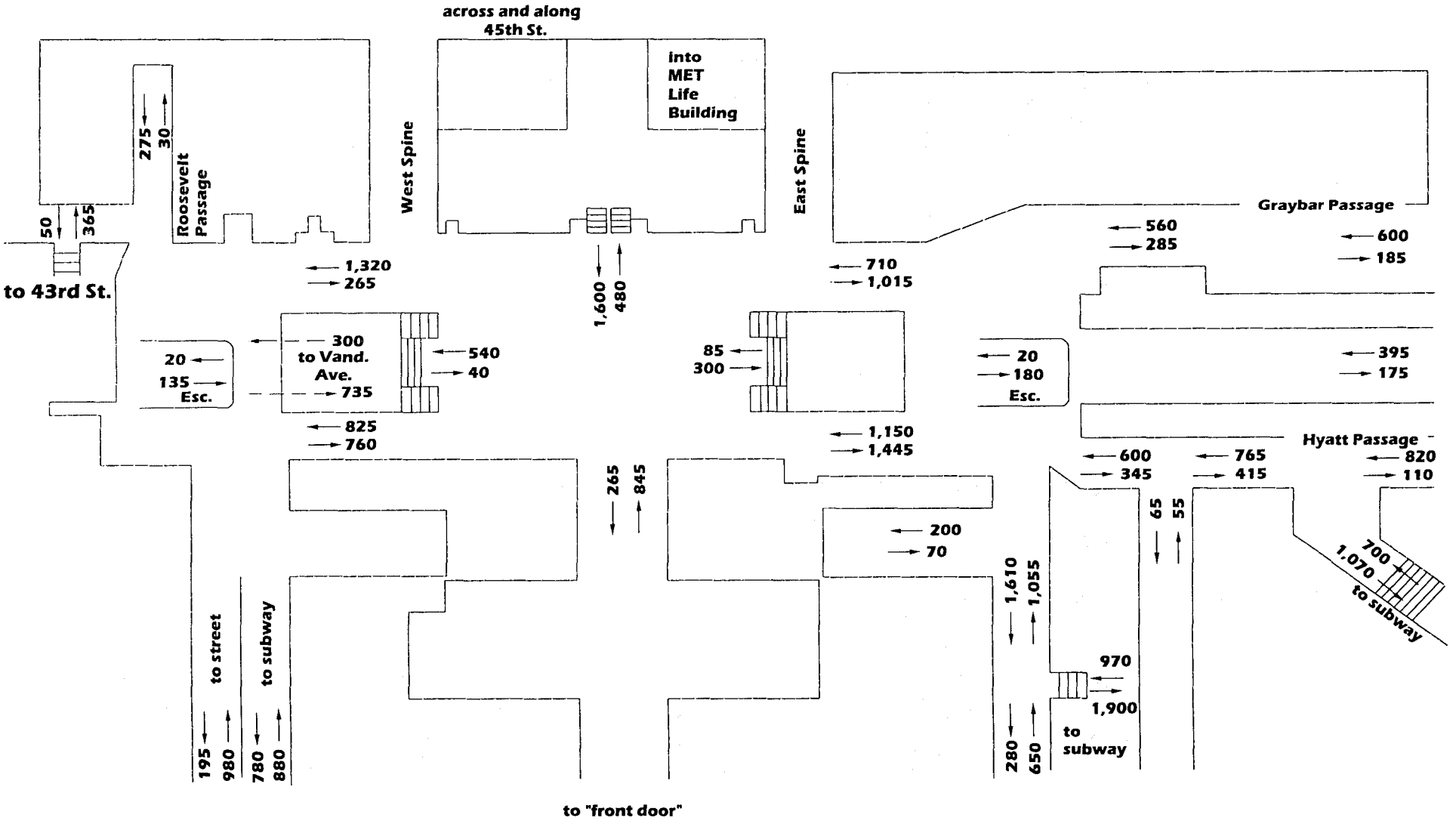
2010 Future No Build Conditions

Pedestrian Flows

AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



GCT UPPER CONCOURSE

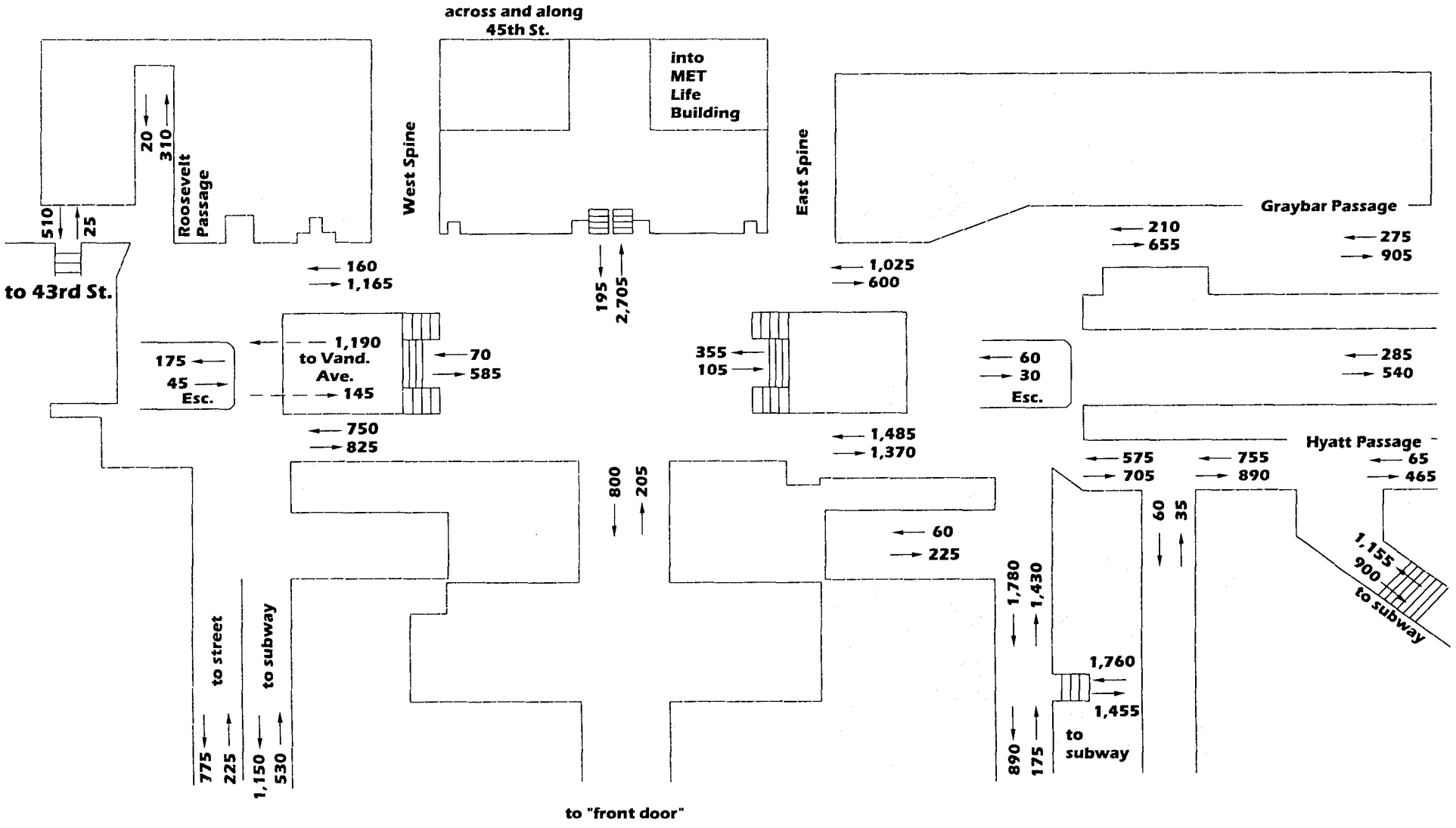
2010 Future No Build Conditions

Pedestrian Flows

PM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



GCT UPPER CONCOURSE

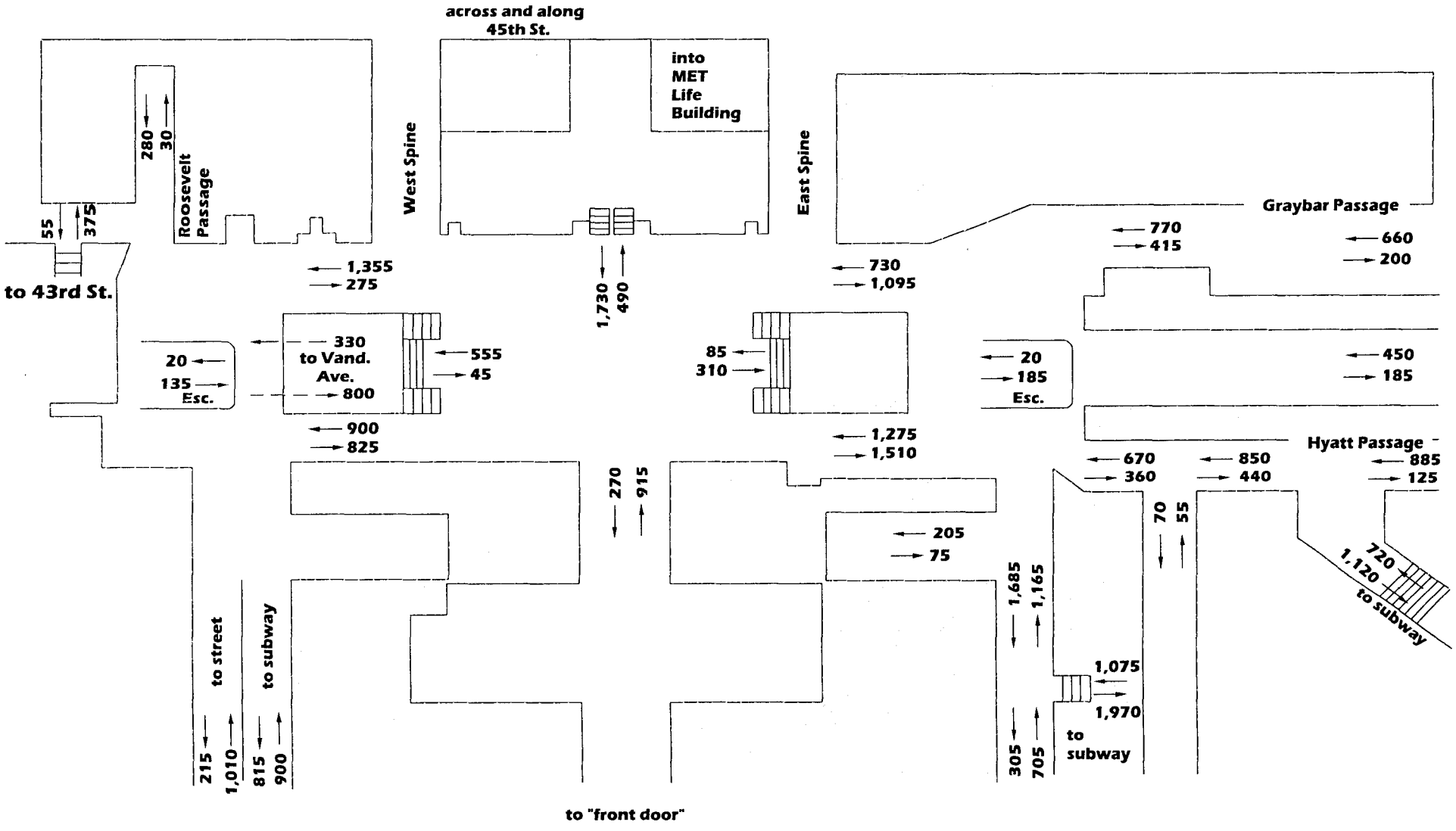
2020 Future No Build Conditions

Pedestrian Flows

AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



GCT UPPER CONCOURSE

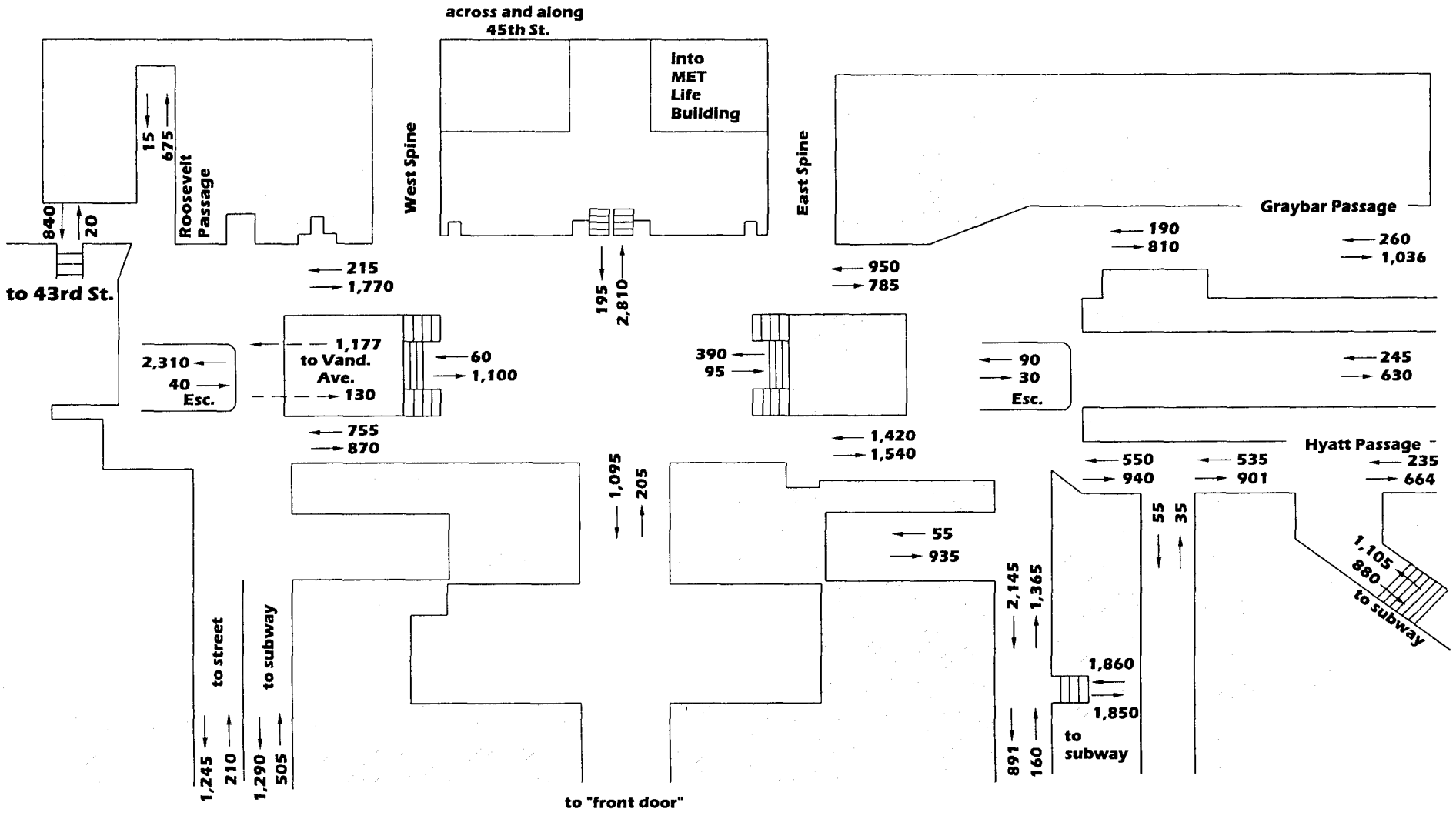
2020 Future No Build Conditions

Pedestrian Flows

PM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



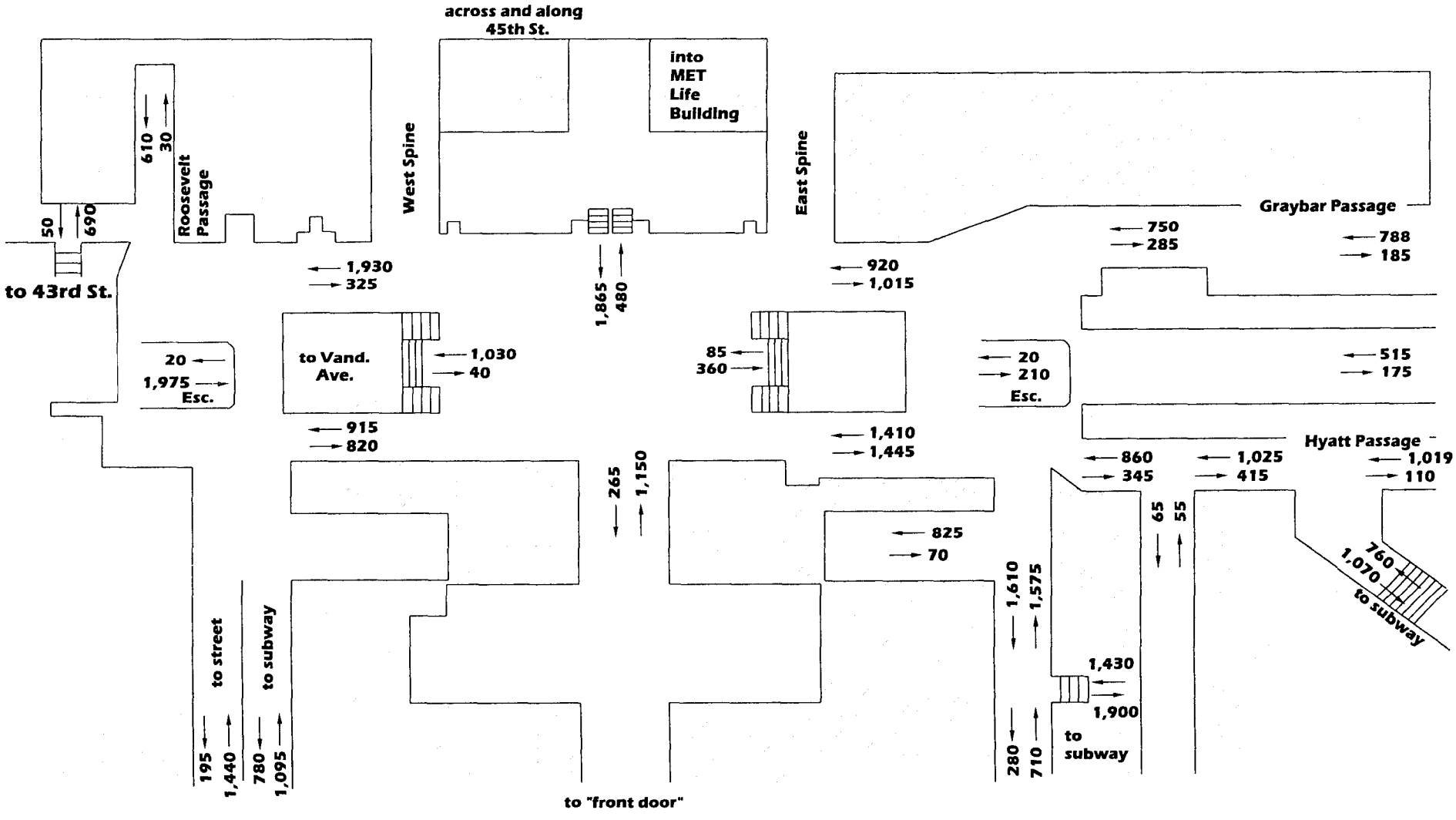
GCT UPPER CONCOURSE

2010 Future Build Conditions

AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



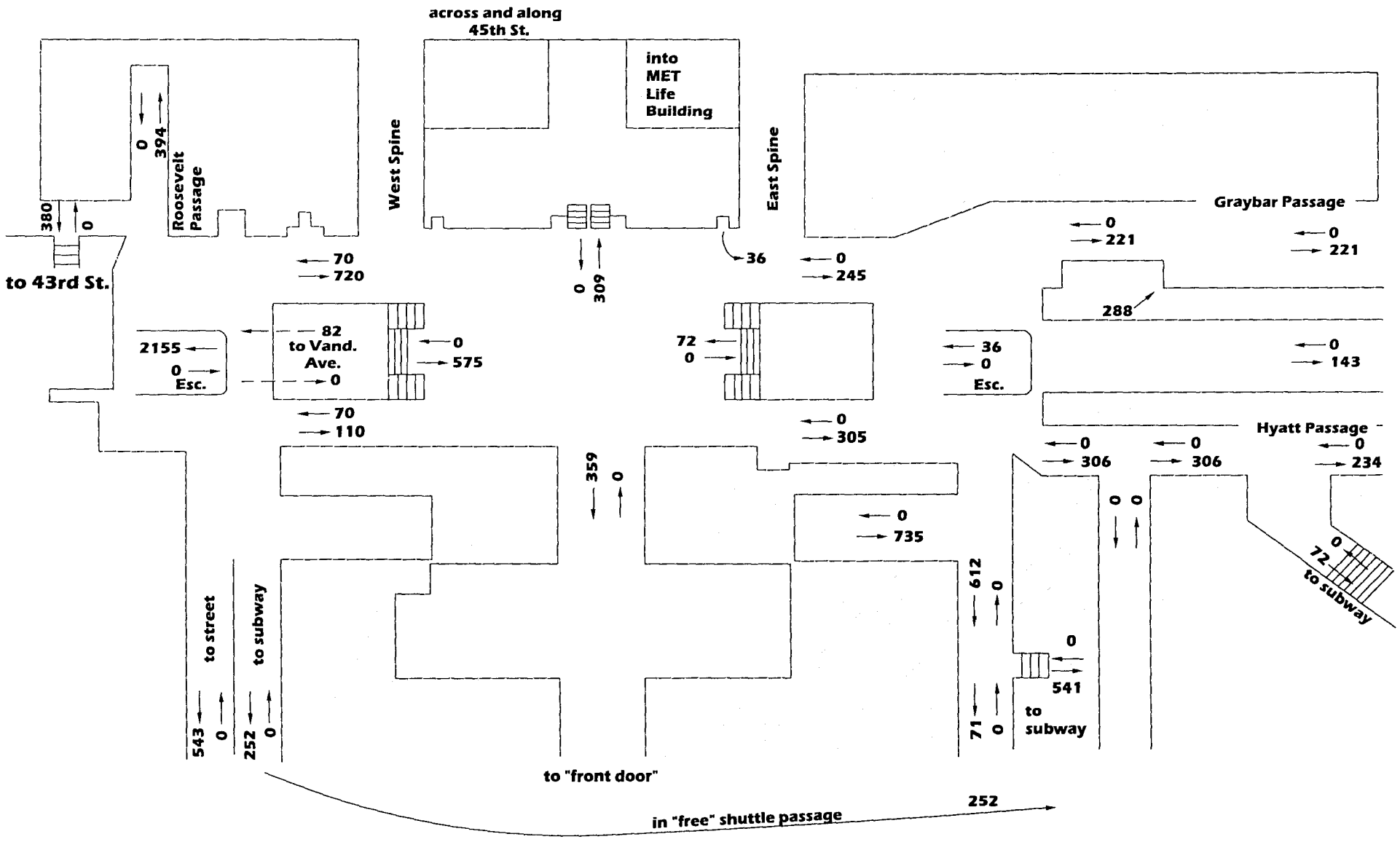
GCT UPPER CONCOURSE

2010 Future Build Conditions

PM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



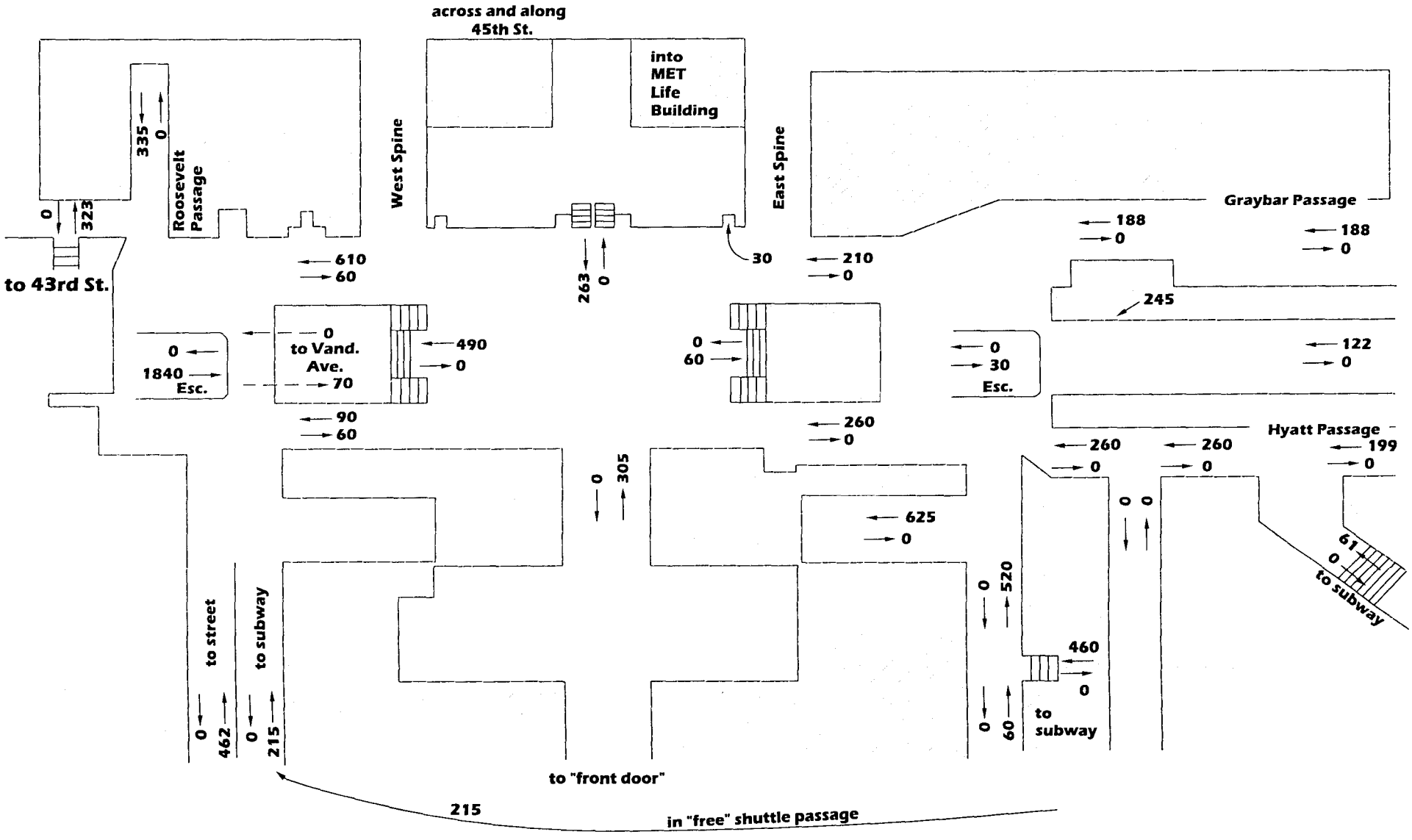
GCT UPPER CONCOURSE

2010 Future Build Increment

Pedestrian Flows
AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



GCT UPPER CONCOURSE

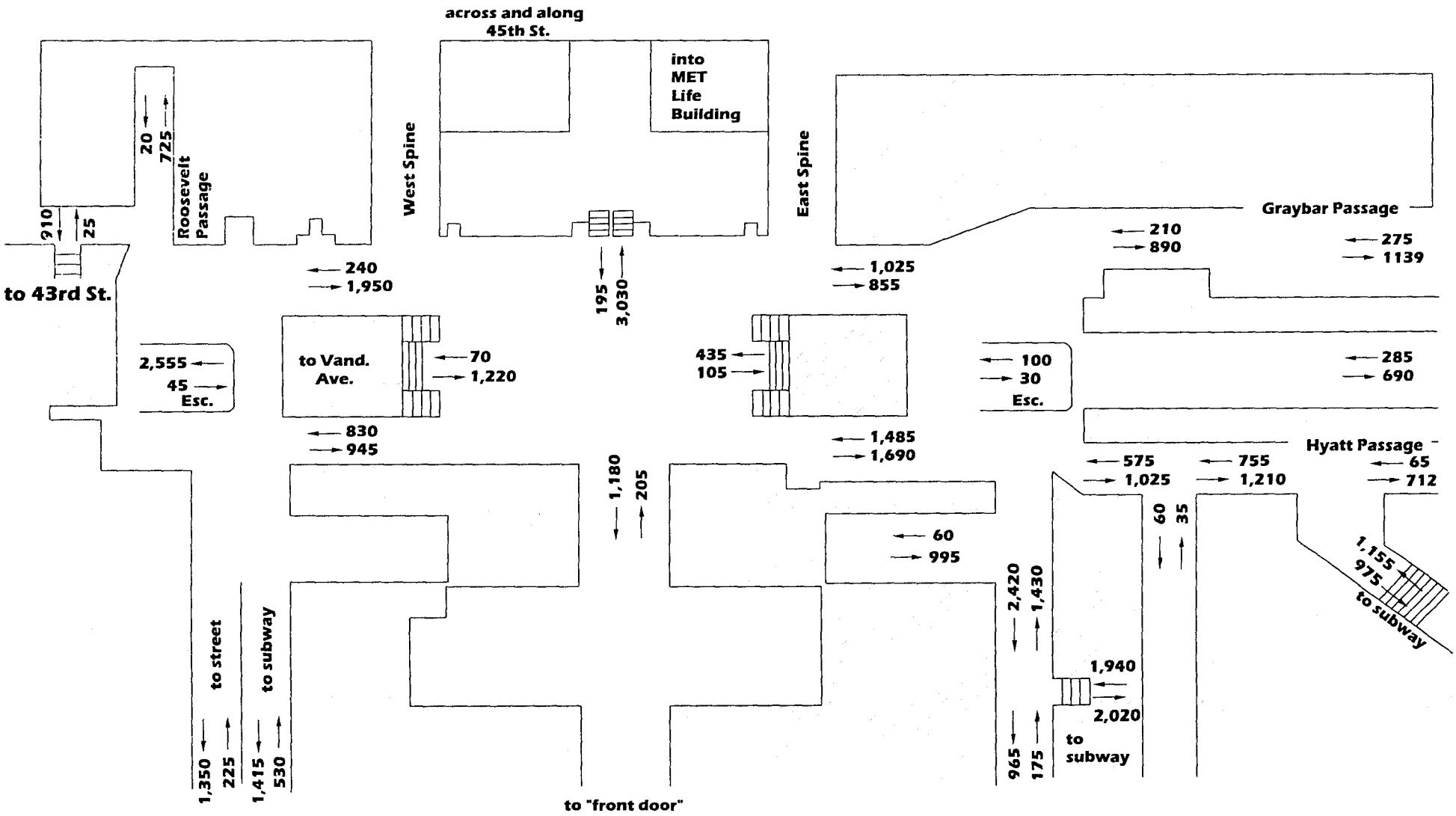
2010 Future Build Increment

Pedestrian Flows

PM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



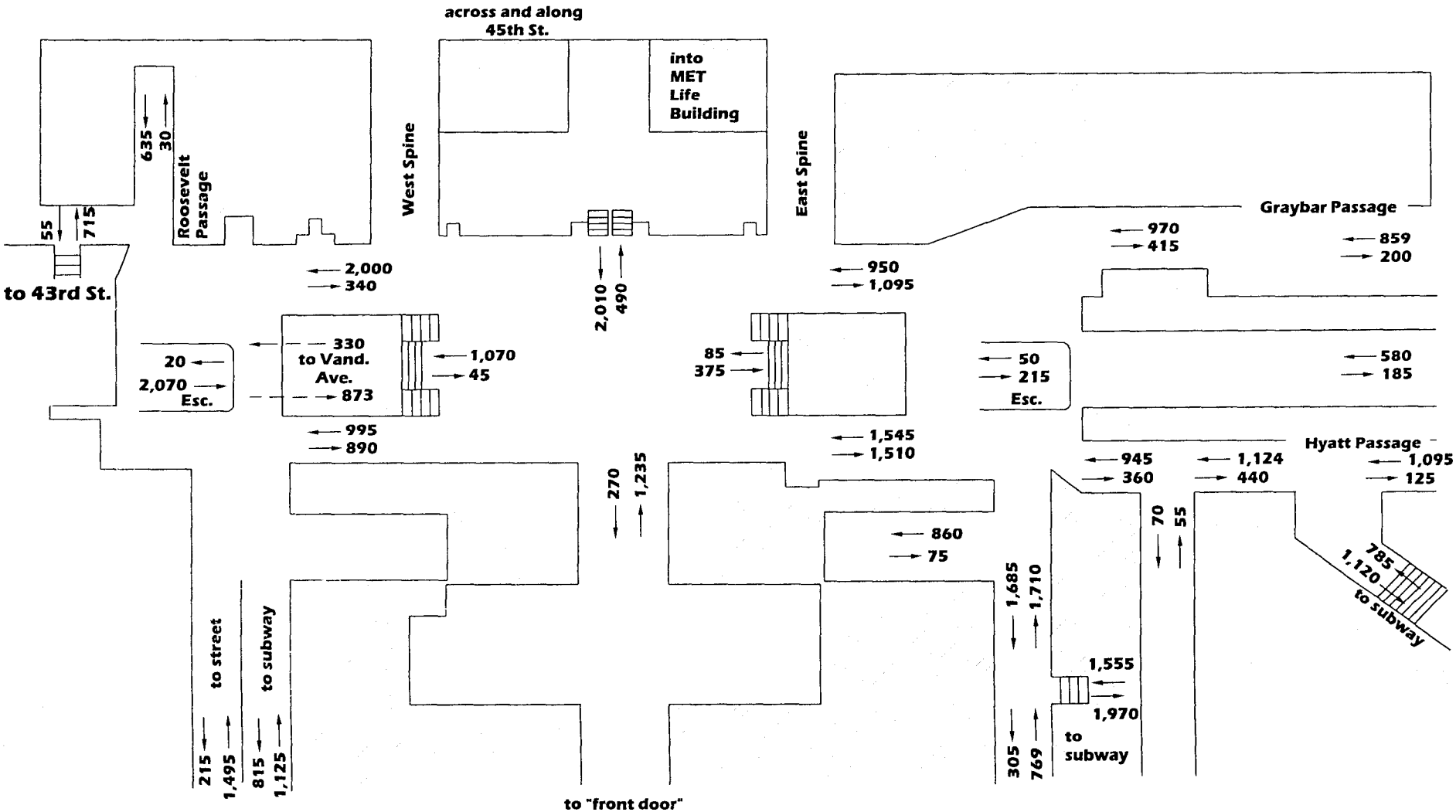
GCT UPPER CONCOURSE

2020 Future Build Conditions

AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



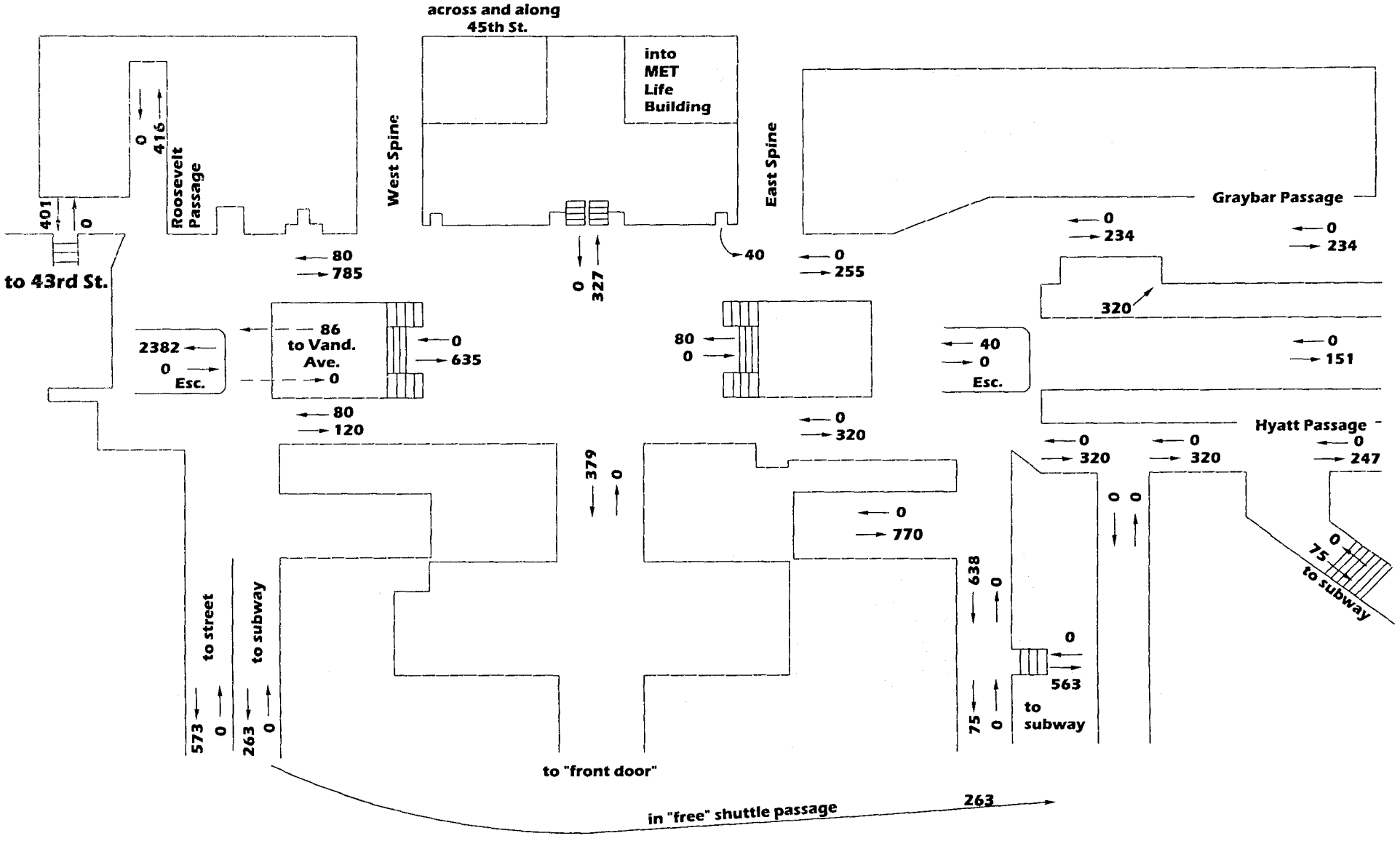
GCT UPPER CONCOURSE

2020 Future Build Conditions

PM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



GCT UPPER CONCOURSE

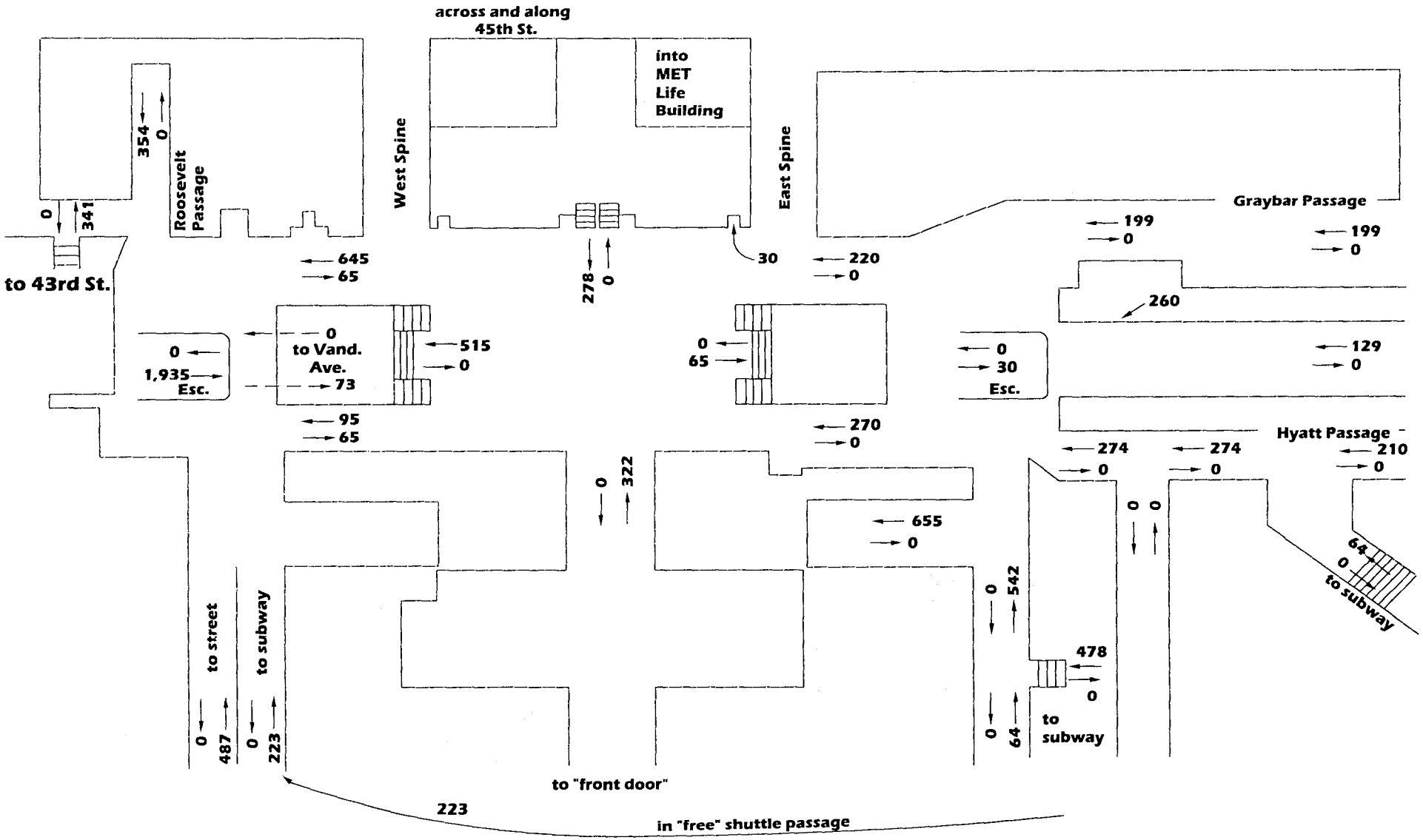
2020 Future Build Increment

Pedestrian Flows

AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



GCT UPPER CONCOURSE

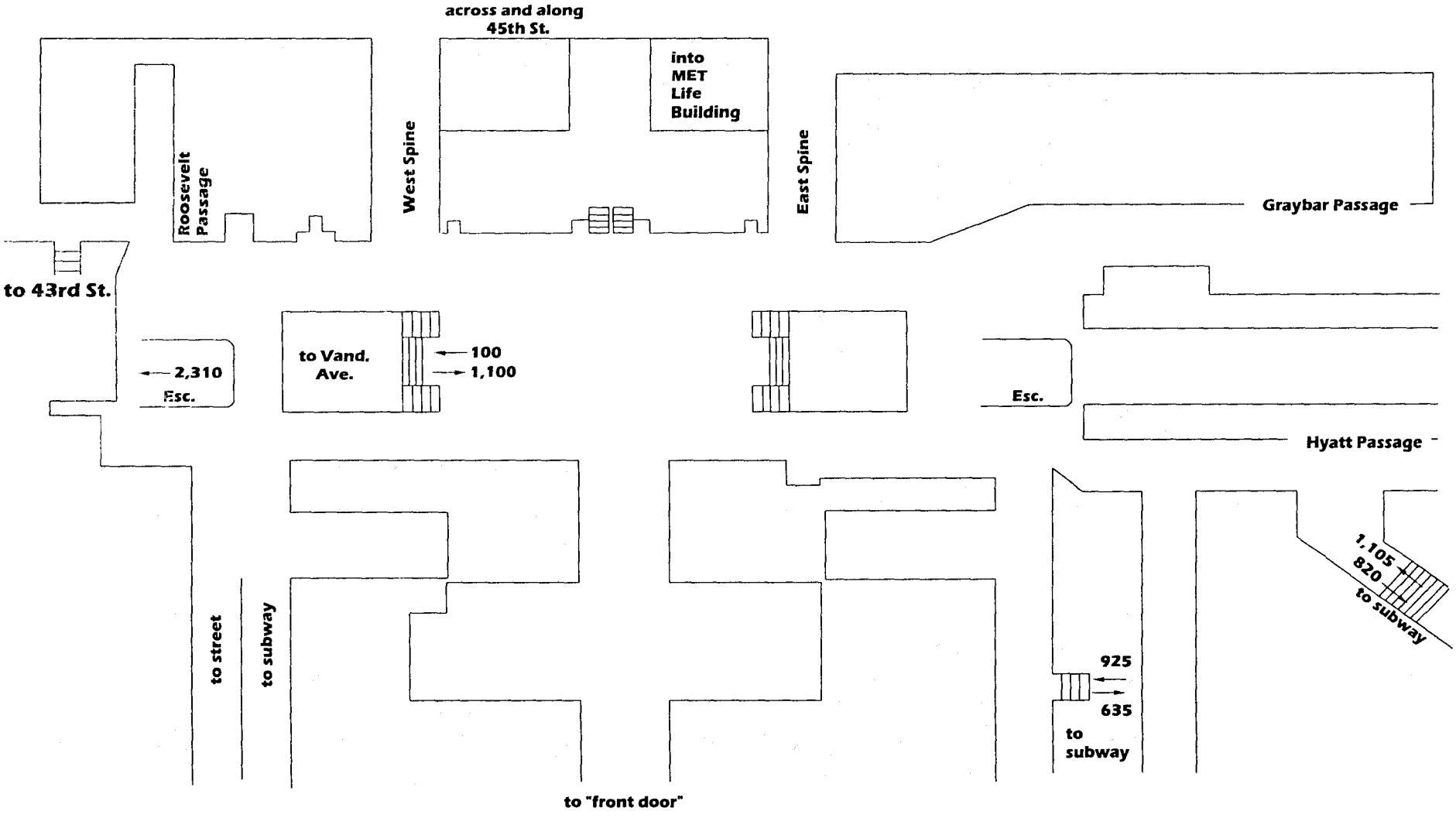
2020 Future Build Increment

Pedestrian Flows

PM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



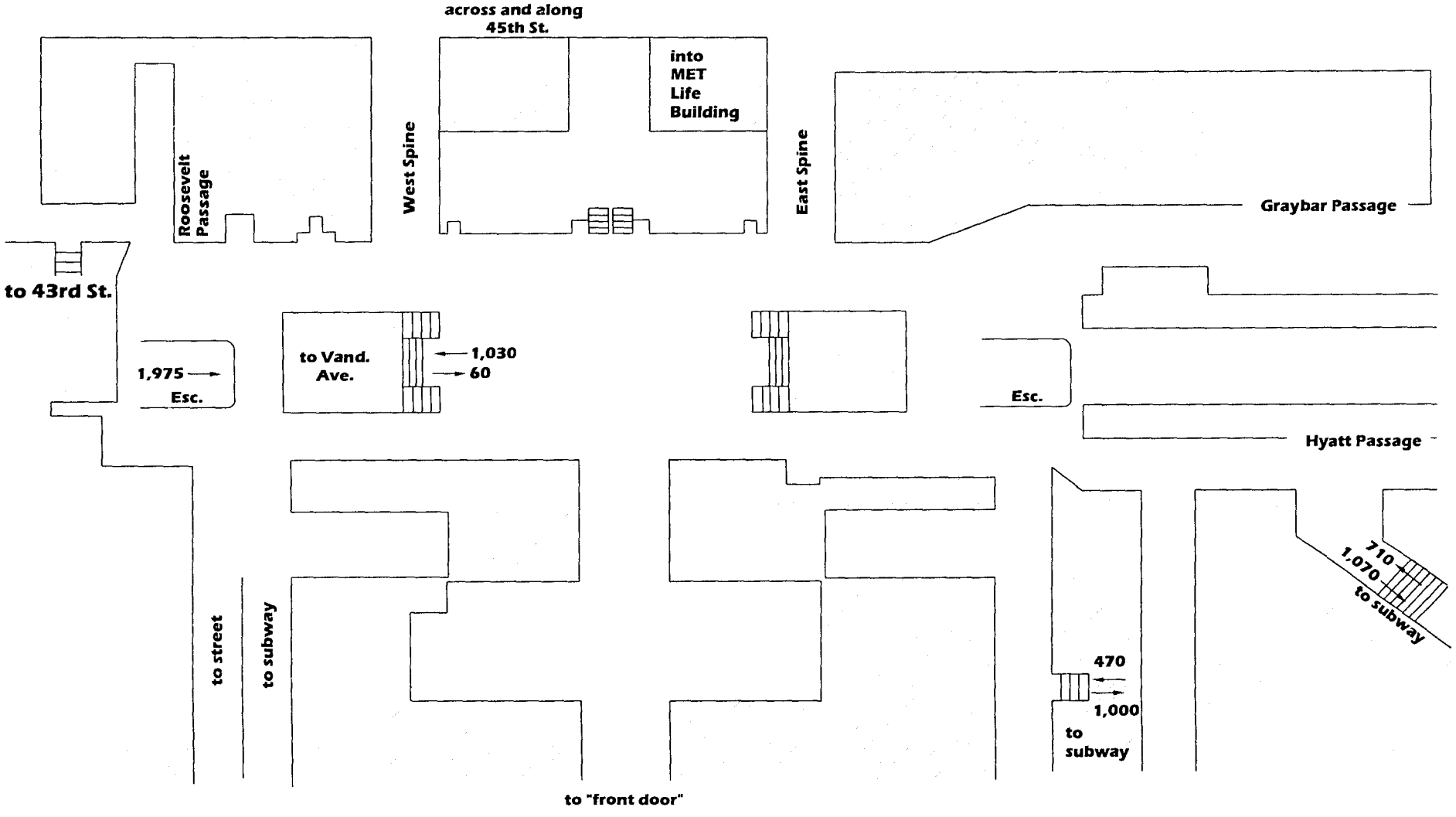
GCT UPPER CONCOURSE

2010 Mitigated Build Conditions

AM Peak 15 minutes

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



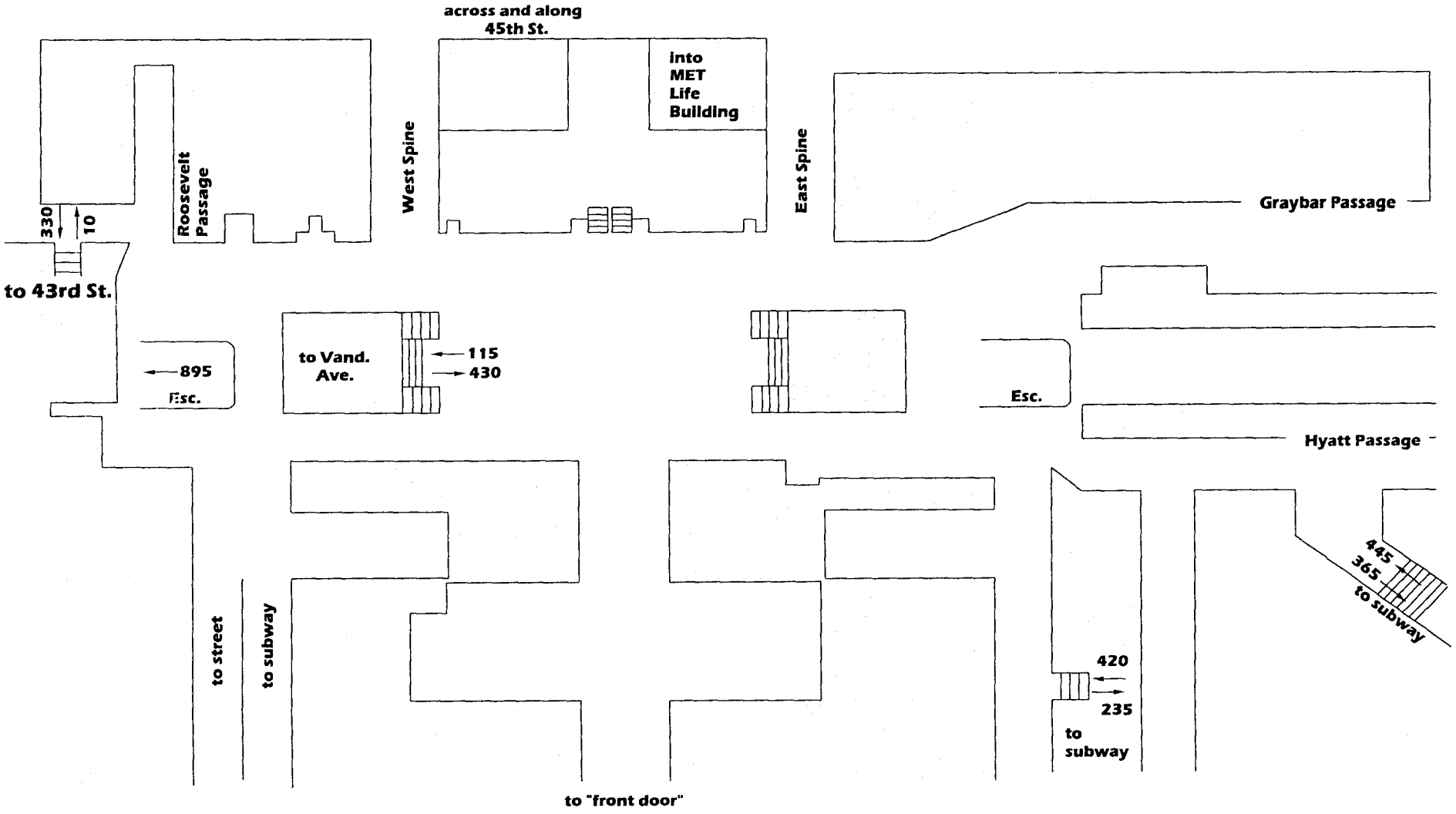
GCT UPPER CONCOURSE

2010 Mitigated Build Conditions

PM Peak 15 minutes

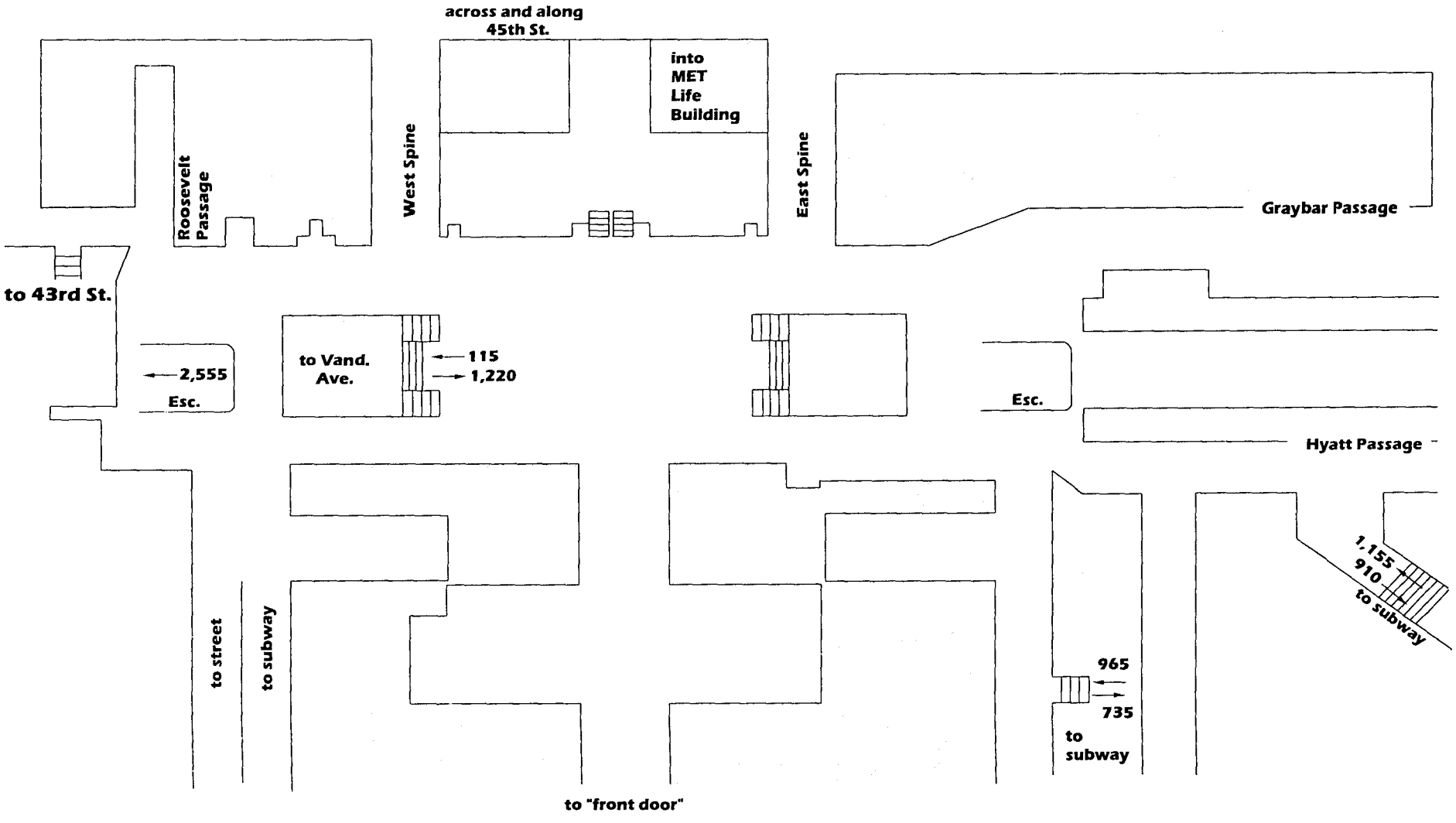
Eng-Wong, Taub & Associates

Traffic and Transportation Consultants



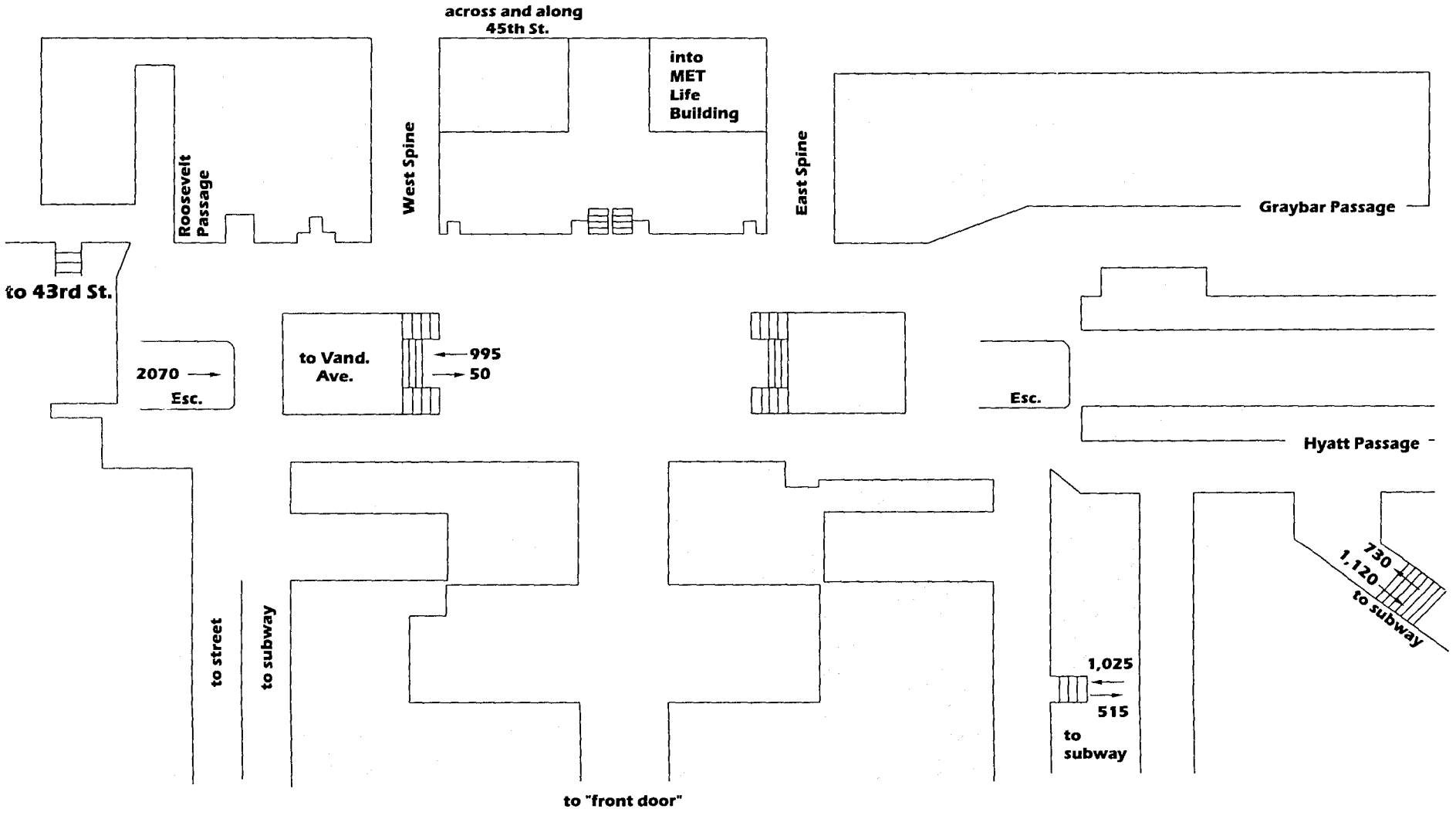
GCT UPPER CONCOURSE
2020 Mitigated Build Conditions
AM Peak 5 minutes

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



GCT UPPER CONCOURSE
2020 Mitigated Build Conditions
AM Peak 15 minutes

Eng-Wong, Taub & Associates
Traffic and Transportation Consultants



GCT UPPER CONCOURSE

2020 Mitigated Build Conditions

PM Peak 15 minutes

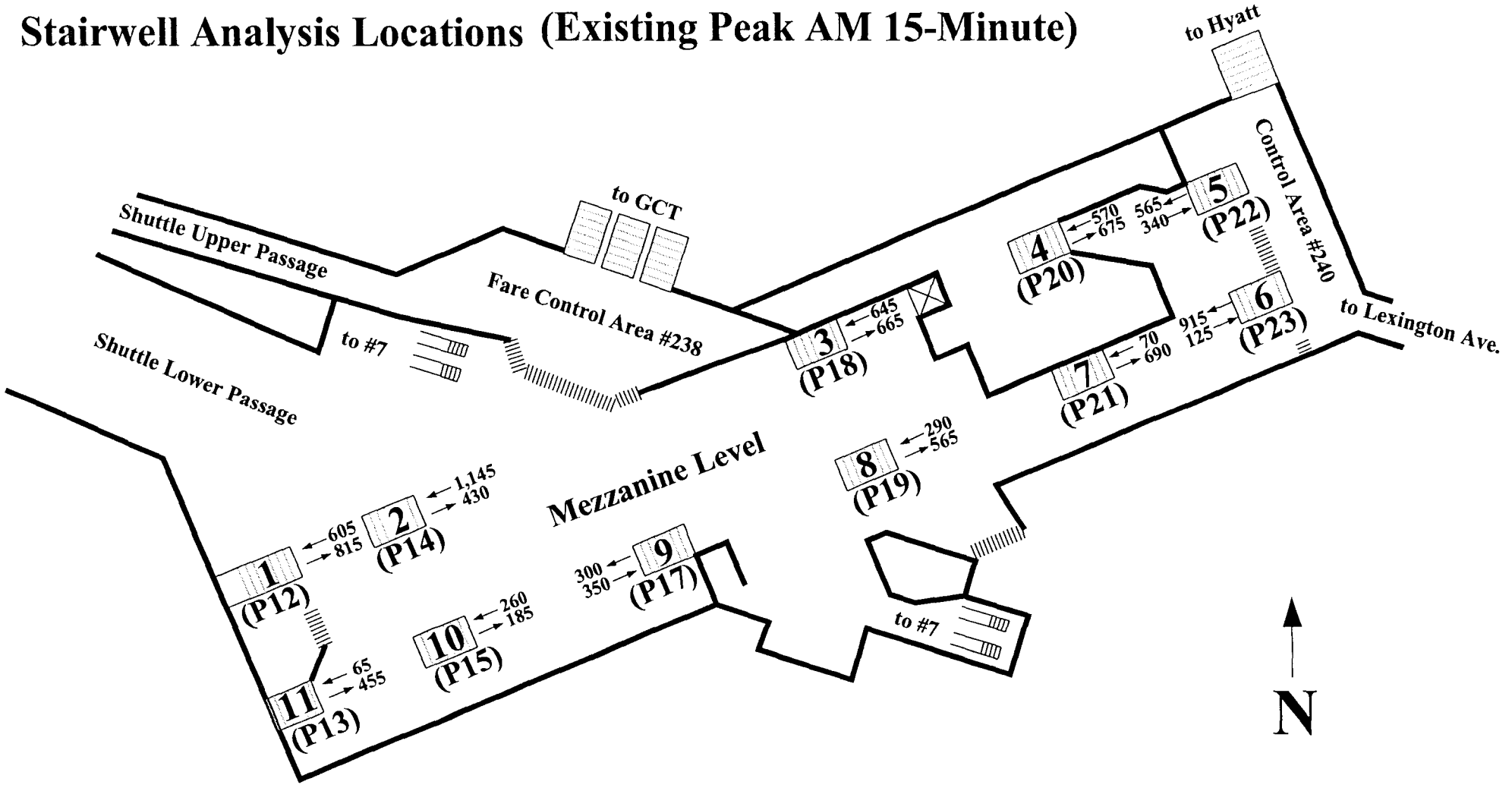
Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

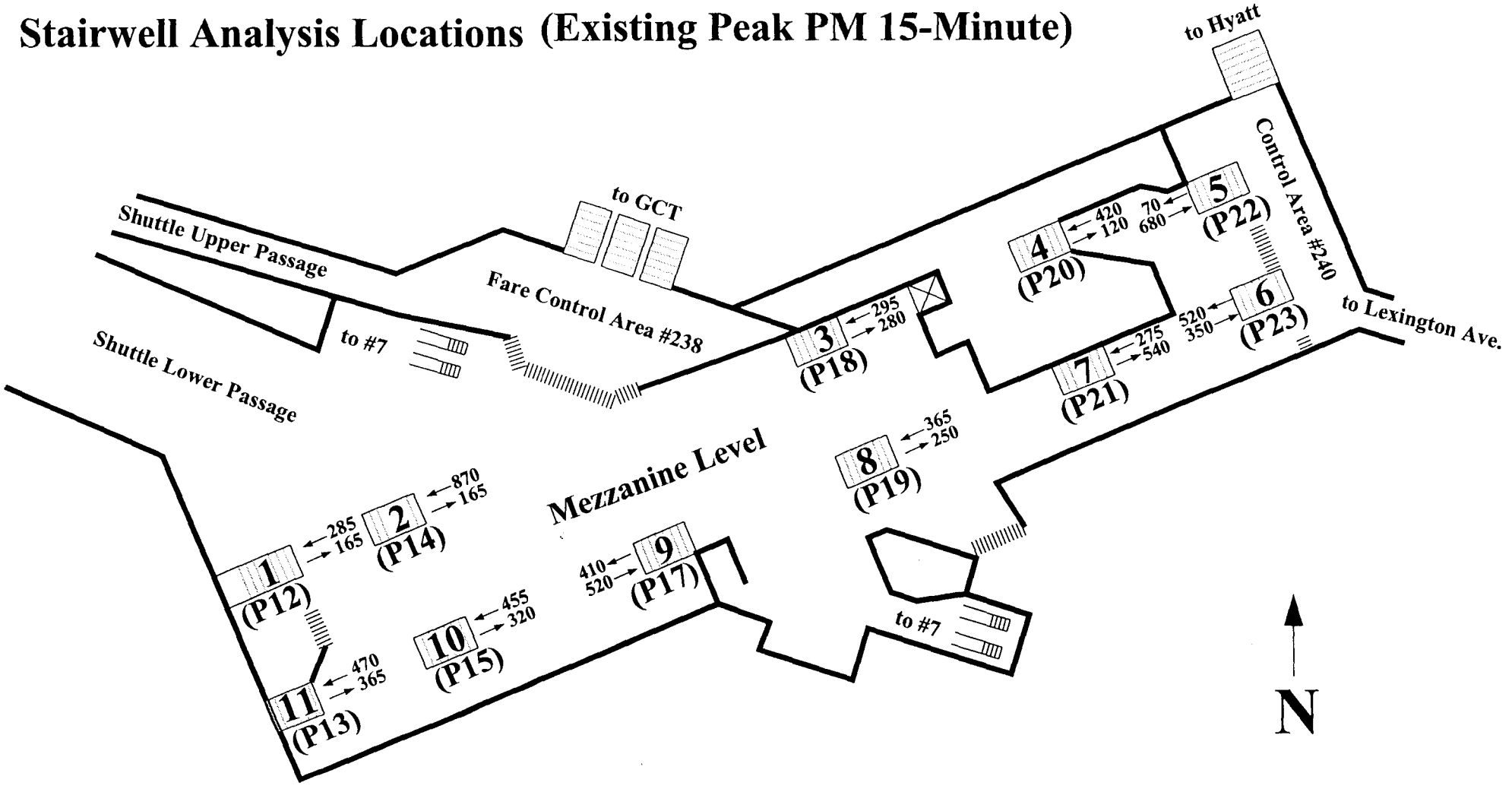
FIGURE M-8

LEXINGTON AVENUE SUBWAY STAIRWELL VOLUMES

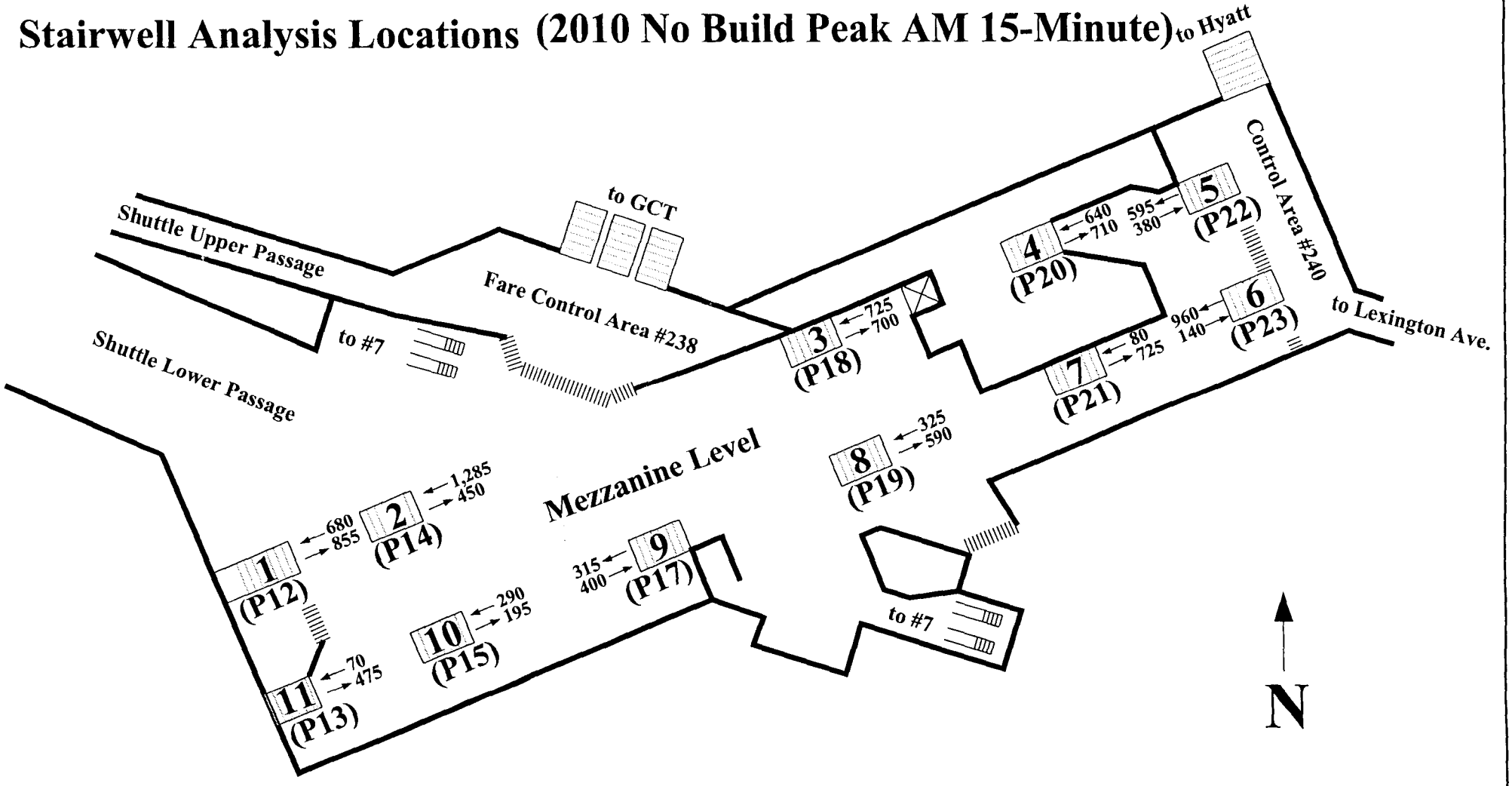
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (Existing Peak AM 15-Minute)



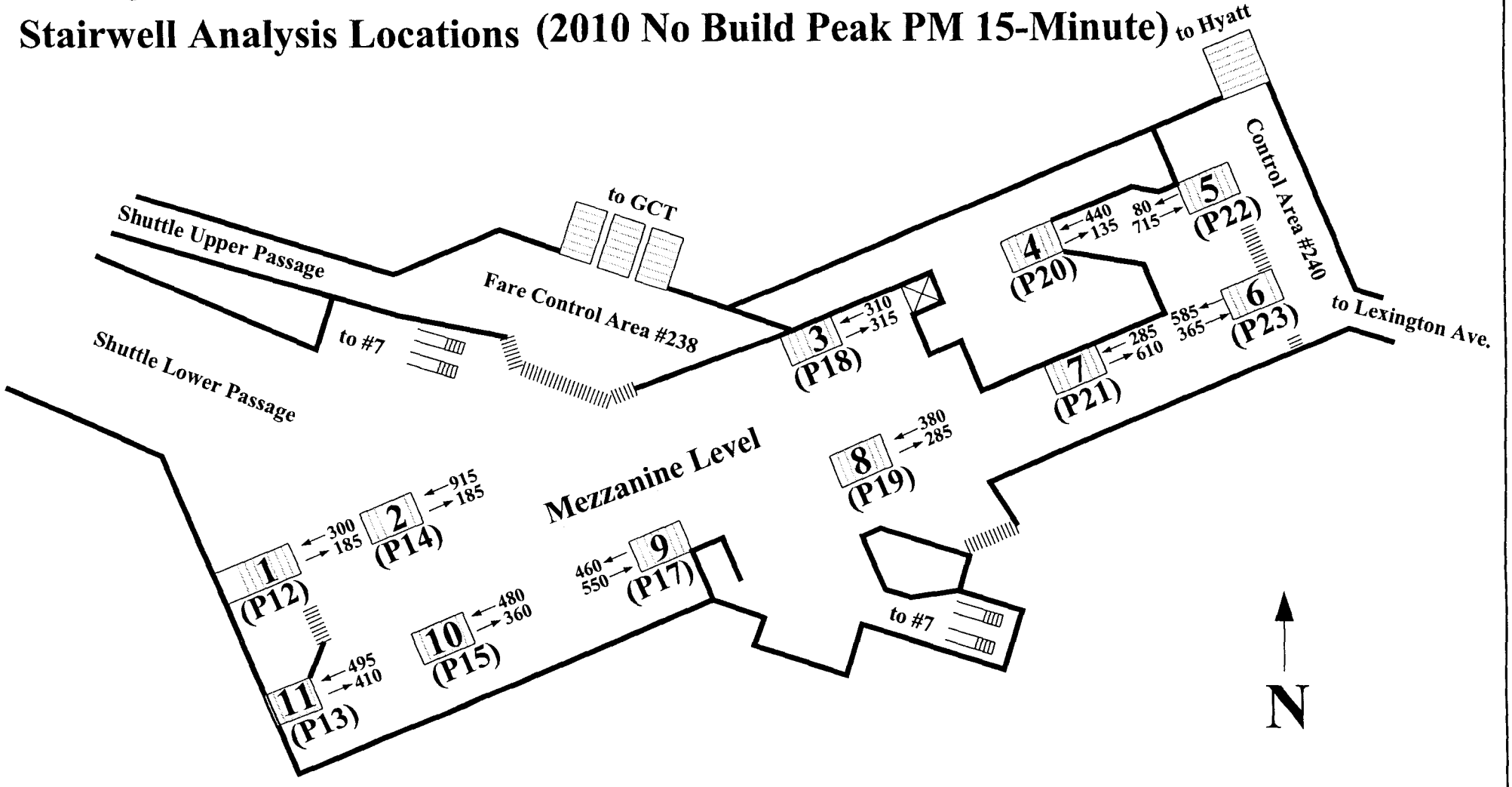
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (Existing Peak PM 15-Minute)



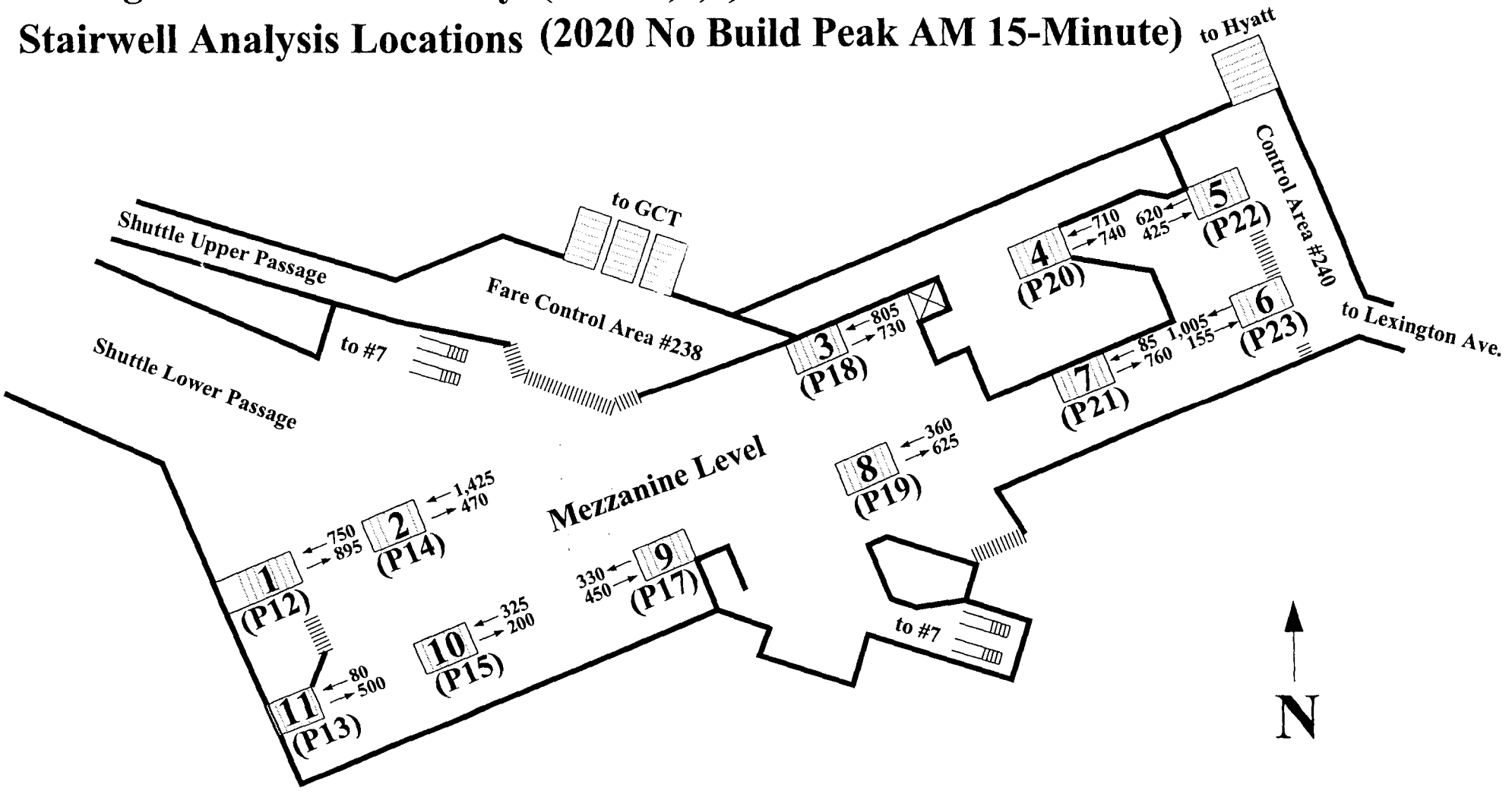
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2010 No Build Peak AM 15-Minute)



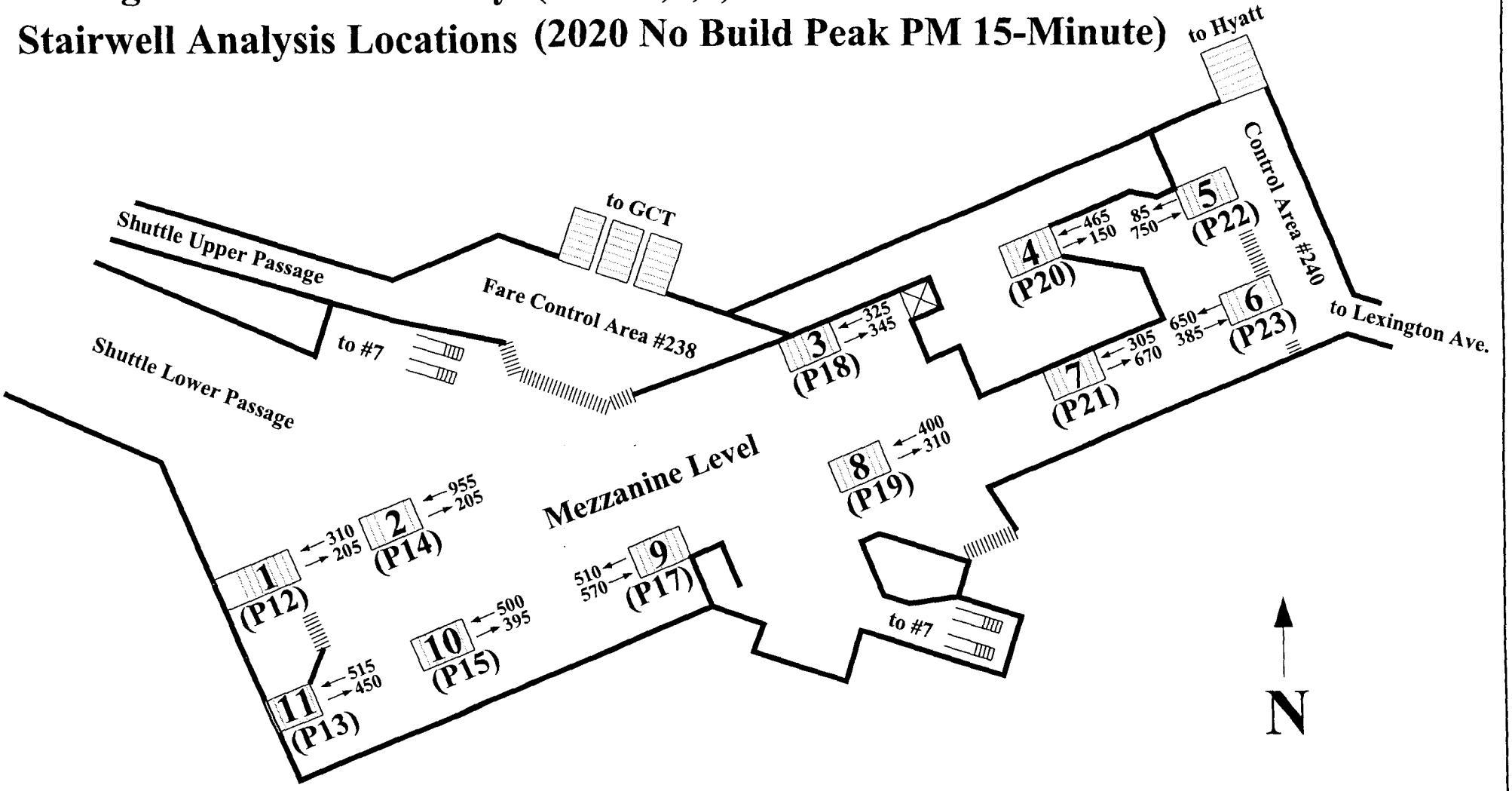
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2010 No Build Peak PM 15-Minute)



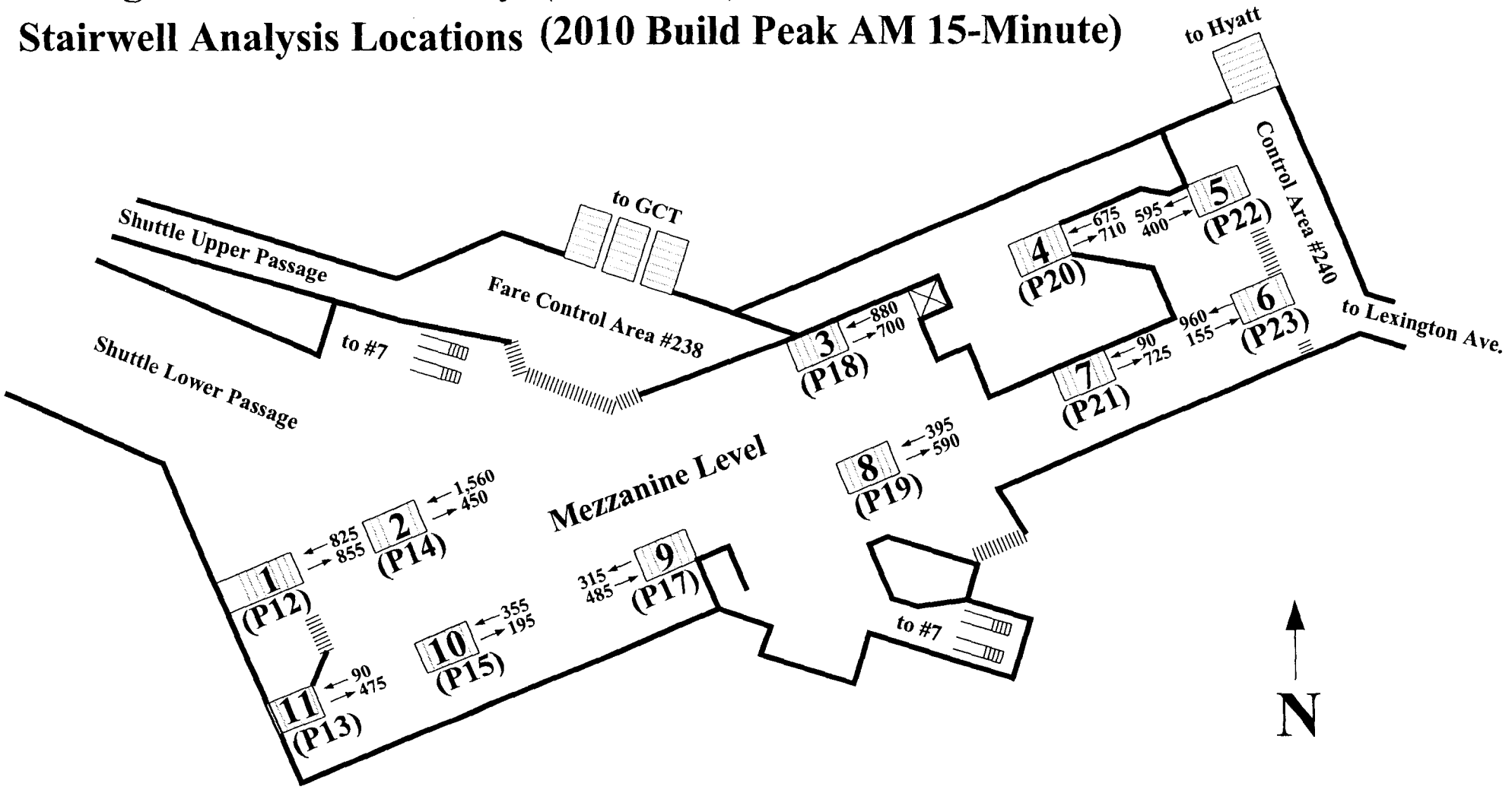
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2020 No Build Peak AM 15-Minute)



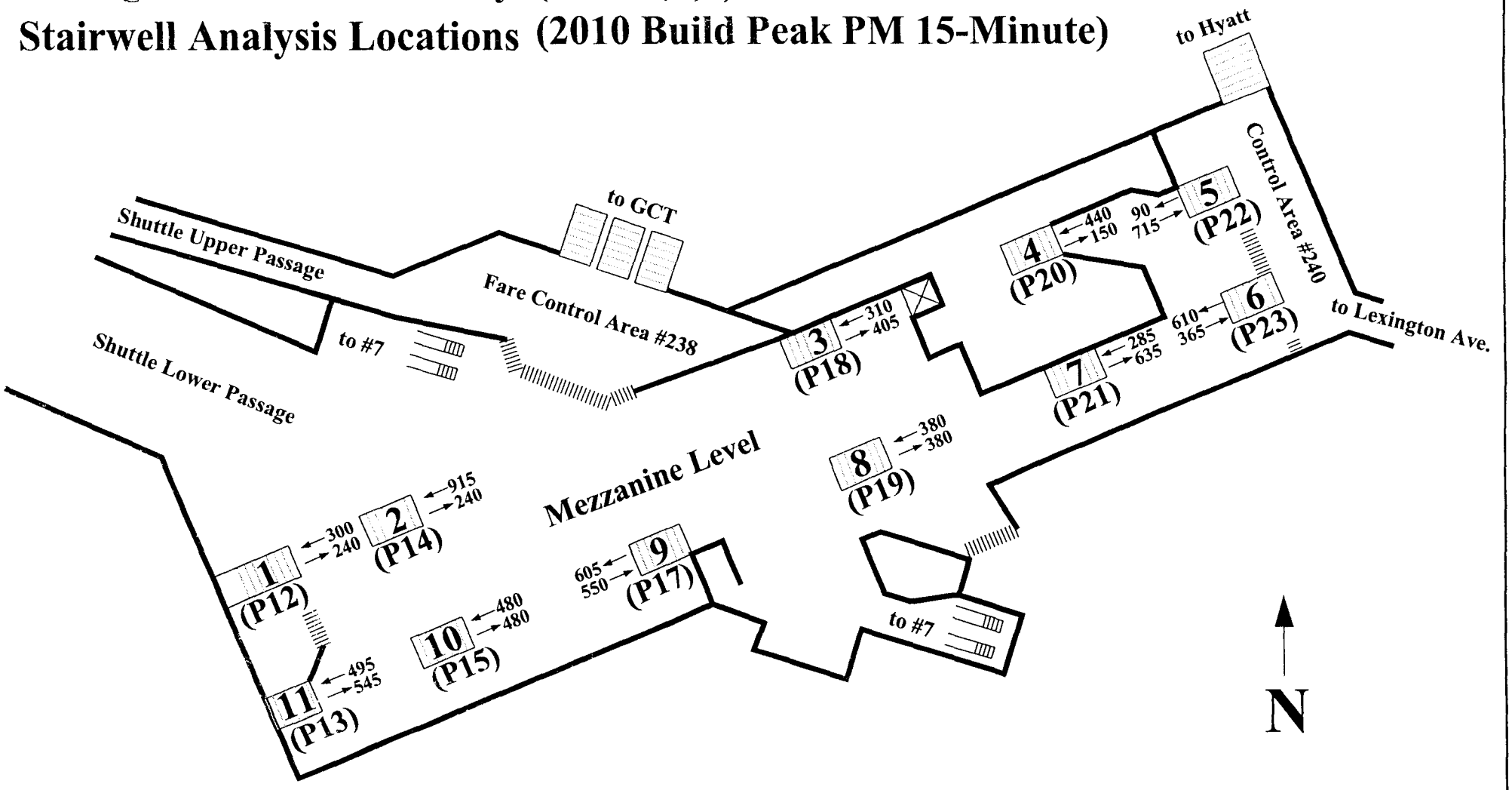
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2020 No Build Peak PM 15-Minute)



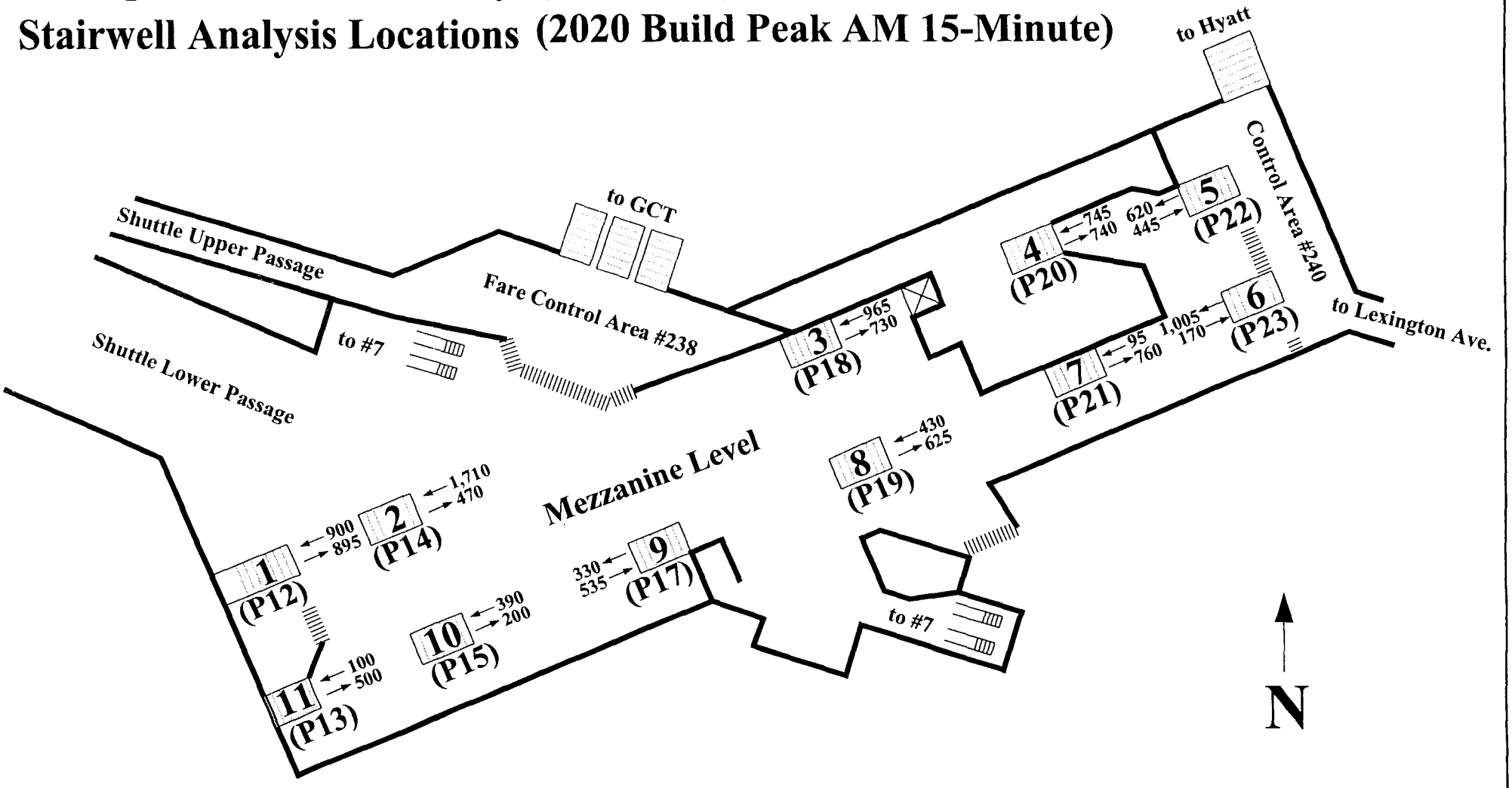
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2010 Build Peak AM 15-Minute)



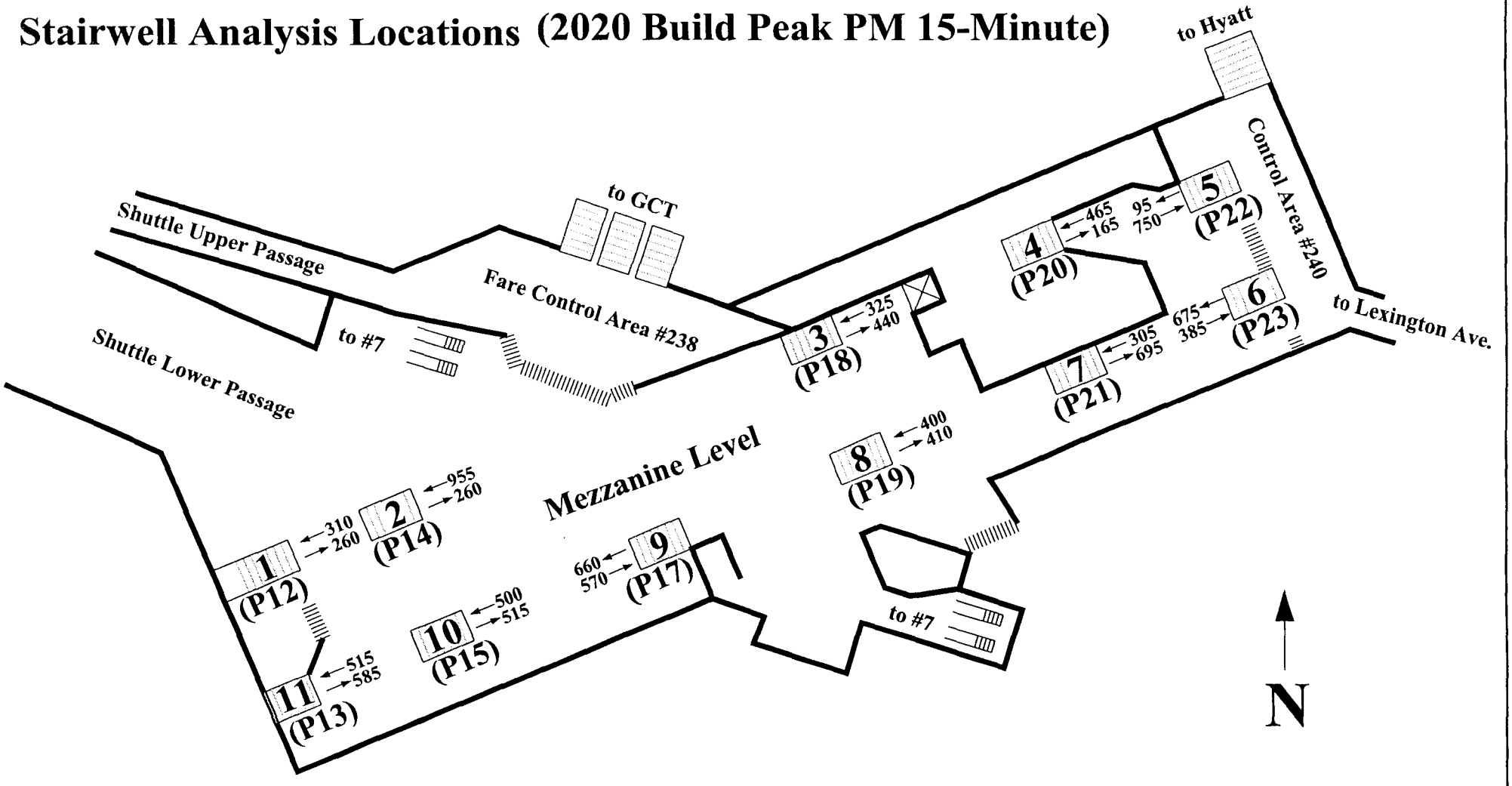
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2010 Build Peak PM 15-Minute)



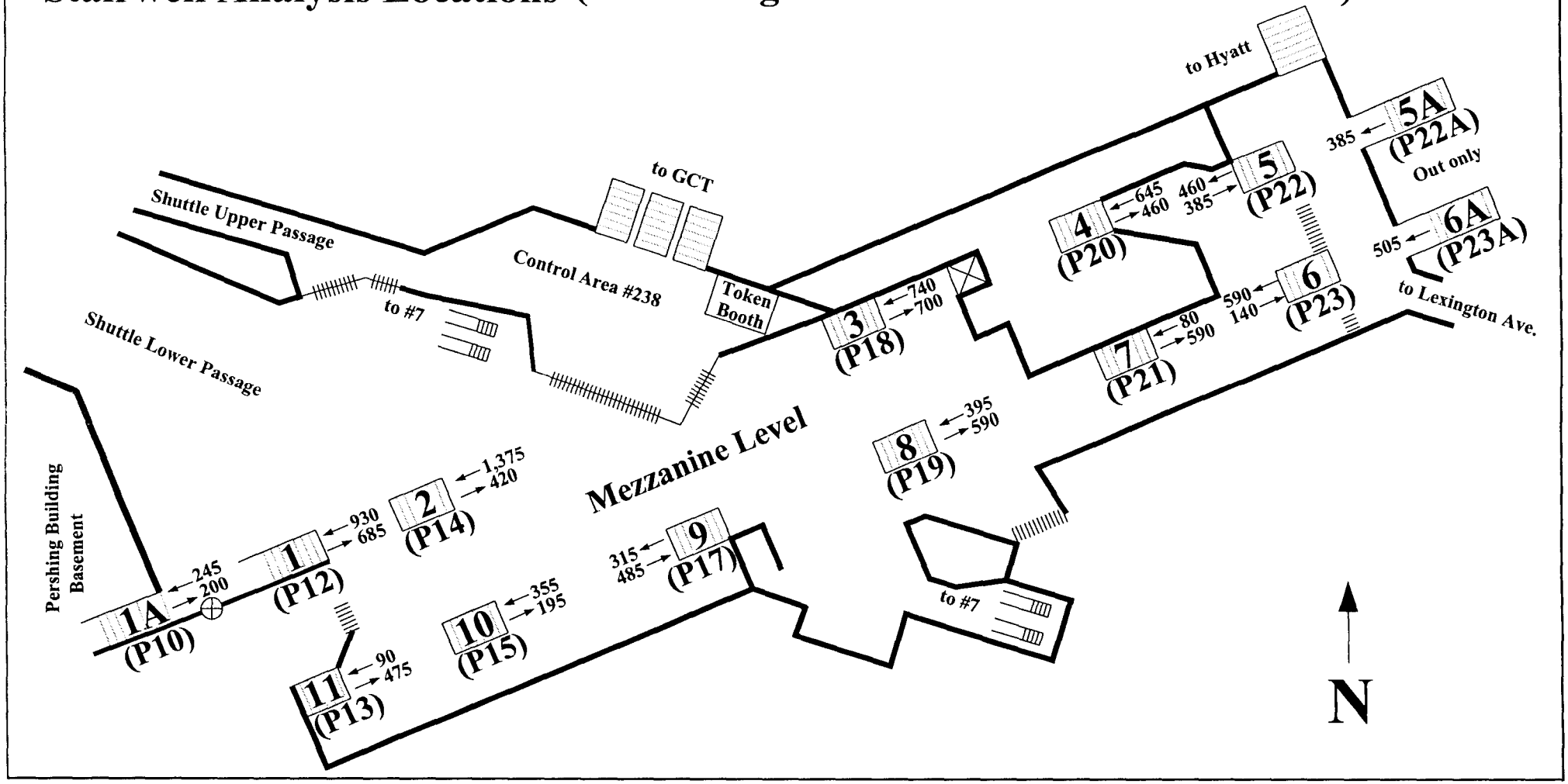
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2020 Build Peak AM 15-Minute)



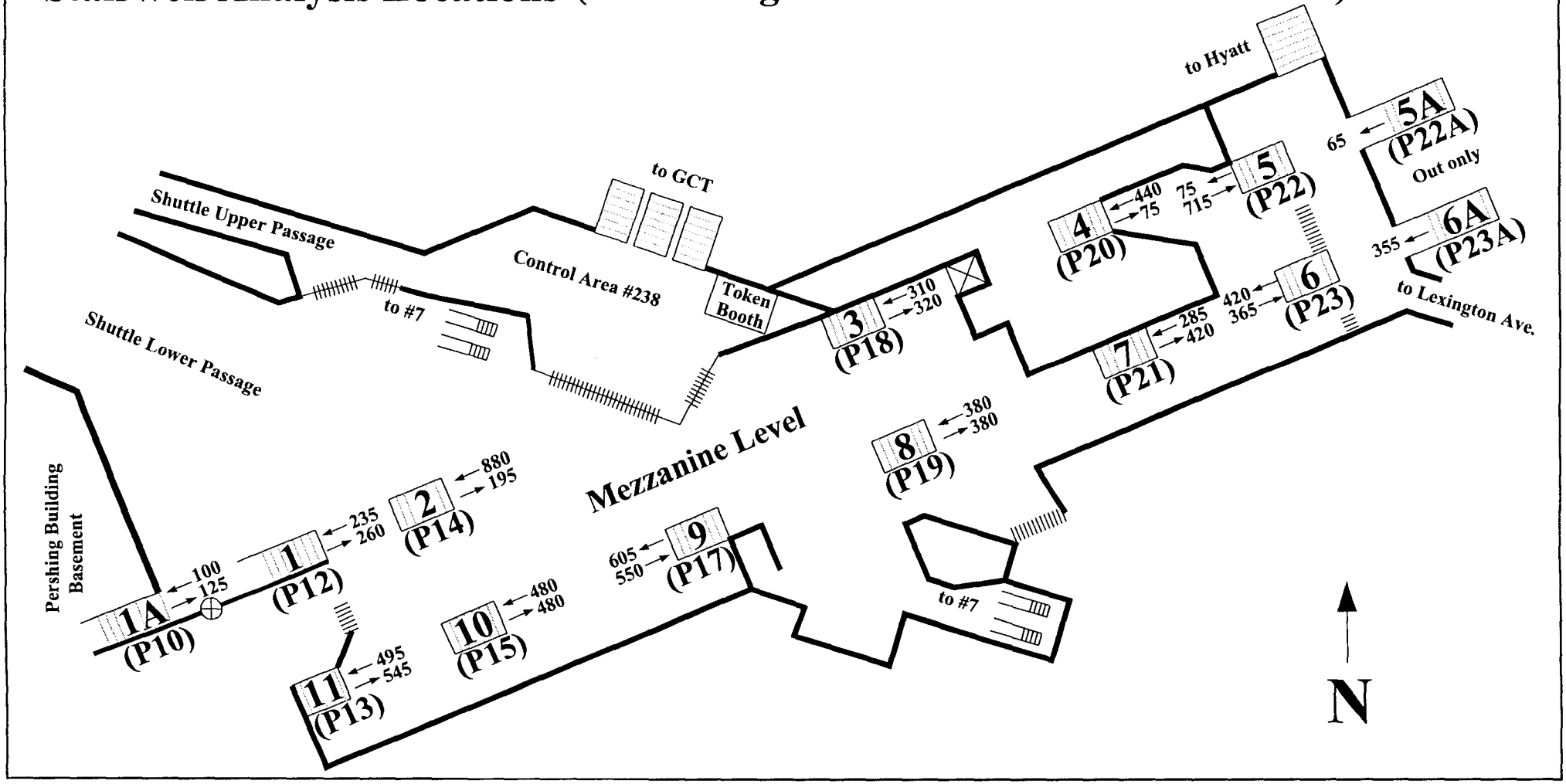
Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2020 Build Peak PM 15-Minute)



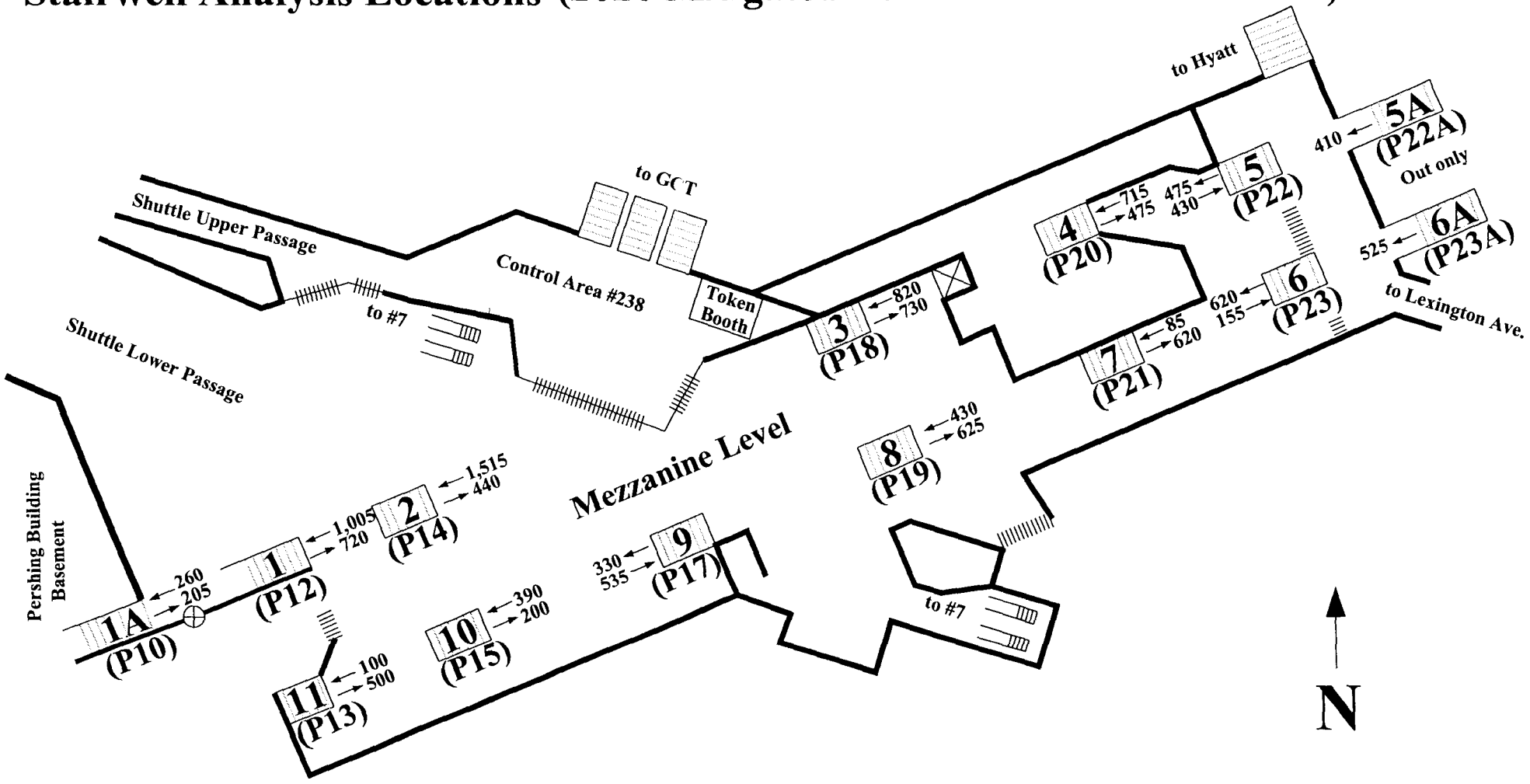
Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2010 Mitigated Build Peak AM 15-Minute)



Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2010 Mitigated Build Peak PM 15-Minute)



Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations (2020 Mitigated Build Peak AM 15-Minute)



Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations (2020 Mitigated Build Peak PM 15-Minute)

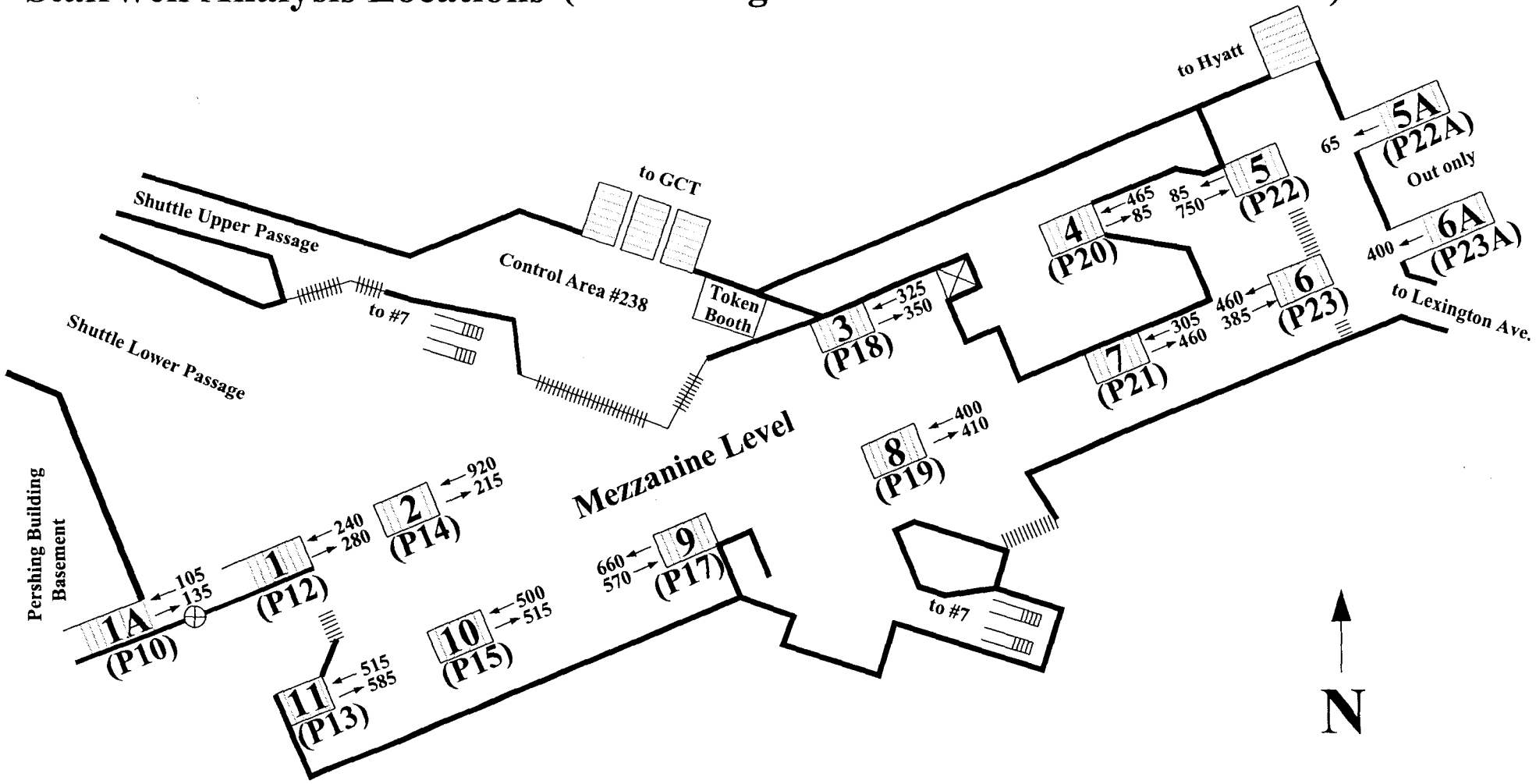


TABLE M-1

EXISTING
LIRR / GCT TRAFFIC
LEVELS OF SERVICE

Table M-1

EXISTING 1998 TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(1) SEVENTH AVENUE & 42nd STREET													
Seventh Avenue	SB	LTR	0.99	28.8	D	LTR	0.60	11.3	B	LTR	0.73	12.8	B
42nd Street	EB	TR	0.74	20.1	C	TR	0.75	19.8	C	TR	0.65	17.9	C
42nd Street	WB	LT	0.56	16.6	C	LT	0.50	15.7	C	LT	0.72	19.4	C
Overall Intersection		-	**0.88**	**25.4**	**D**	-	**0.67**	**14.3**	**B**	-	**0.72**	**14.9**	**B**
(2) BROADWAY & 42nd STREET													
Broadway	SB	LTR	0.69	13.3	B	LTR	0.55	11.6	B	LTR	0.58	12.0	B
42nd Street	EB	TR	0.51	14.9	B	TR	0.60	16.0	C	TR	0.48	14.6	B
42nd Street	WB	L	0.98	63.8	F	LT	0.92	31.9	D	LT	1.01	48.7	E
		T	1.00	52.3	E	-	-	-	-	-	-	-	-
Overall Intersection		-	**0.83**	**24.4**	**C**	-	**0.72**	**17.9**	**C**	-	**0.78**	**23.8**	**C**
(3) SIXTH AVENUE & 42nd STREET													
Sixth Avenue	NB	LT	0.99	26.5	D	LT	0.81	14.7	B	LTR	0.97	24.1	C
		R	0.67	16.7	C	R	0.30	9.5	B	R	0.55	12.9	B
42nd Street	EB	LT	0.74	19.2	C	LT	0.70	18.3	C	LT	0.67	17.5	C
42nd Street	WB	TR	0.72	18.5	C	TR	0.61	16.5	C	TR	0.63	16.9	C
		R	1.02	81.2	F	R	1.00	69.0	F	R	1.02	76.7	F
Overall Intersection		-	**1.00**	**25.9**	**D**		**0.89**	**18.2**	**C**	-	**0.99**	**24.0**	**C**
(4) FIFTH AVENUE & 48th STREET													
Fifth Avenue	SB	LT	0.75	9.9	B	LT	0.80	13.6	B	LT	0.67	9.1	B
48th Street	EB	TR	0.49	15.2	C	TR	0.54	13.4	B	TR	0.76	19.7	C
Overall Intersection		-	**0.63**	**10.9**	**B**	-	**0.67**	**13.5**	**B**	-	**0.71**	**12.2**	**B**
(5) FIFTH AVENUE & 47th STREET													
Fifth Avenue	SB	TR	0.65	8.8	B	TR	0.75	12.8	B	TR	0.64	8.9	B
47th Street	WB	LT	0.67	17.5	C	LT	0.59	14.0	B	LT	0.51	15.4	C
Overall Intersection		-	**0.66**	**11.2**	**B**	-	**0.67**	**13.1**	**B**	-	**0.59**	**10.2**	**B**
(6) FIFTH AVENUE & 46th STREET													
Fifth Avenue	SB	LT	0.67	9.1	B	LT	0.81	13.8	B	LT	0.67	9.1	B
46th Street	EB	TR	0.48	15.1	C	TR	0.49	12.9	B	TR	0.61	16.6	C
Overall Intersection		-	**0.59**	**10.4**	**B**	-	**0.65**	**13.6**	**B**	-	**0.64**	**10.9**	**B**
(7) FIFTH AVENUE & 45th STREET													
Fifth Avenue	SB	TR	0.74	9.9	B	TR	0.81	13.8	B	TR	0.68	9.3	B
45th Street	WB	LT	0.55	15.8	C	LT	0.96	43.1	E	LT	0.51	15.4	C
Overall Intersection		-	**0.66**	**11.3**	**B**	-	**0.89**	**18.5**	**C**	-	**0.61**	**10.6**	**B**
(8) FIFTH AVENUE & 44th STREET													
Fifth Avenue	SB	LT	0.72	9.6	B	LT	0.78	13.3	B	LT	0.68	9.2	B
44th Street	EB	TR	0.57	16.1	C	TR	0.45	12.6	B	TR	0.60	16.6	C
Overall Intersection		-	**0.65**	**11.0**	**B**	-	**0.62**	**13.2**	**B**	-	**0.64**	**10.8**	**B**
(9) FIFTH AVENUE & 43rd STREET													
Fifth Avenue	SB	TR	0.74	9.8	B	TR	0.82	14.1	B	TR	0.72	9.6	B
43rd Street	WB	LT	0.48	15.1	C	LT	1.03	58.4	E	LT	0.46	14.9	B
Overall Intersection		-	**0.63**	**10.8**	**B**		**0.93**	**21.9**	**C**	-	**0.60**	**10.6**	**B**
(10) FIFTH AVENUE & 42nd STREET													
Fifth Avenue	SB	LTR	0.66	12.3	B	LTR	0.67	12.4	B	LTR	0.63	12.0	B
42nd Street	EB	TR	0.85	23.2	C	TR	0.80	20.9	C	TR	0.81	21.5	C
42nd Street	WB	LT	0.98	39.5	D	LT	0.91	28.3	D	LT	0.96	34.4	D
Overall Intersection		-	**0.80**	**21.3**	**C**	-	**0.78**	**18.0**	**C**	-	**0.78**	**19.6**	**C**

Table M-1

EXISTING 1998 TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM)				Midday Peak Hour (12 - 1 PM)				PM Peak Hour (5:15 - 6:15 PM)			
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS
(11) FIFTH AVENUE & 41st STREET													
Fifth Avenue	SB	LT	0.65	5.9	B	LT	0.63	5.7	B	LT	0.64	5.8	B
Overall Intersection		-	**0.40**	**5.9**	**B**	-	**0.38**	**5.7**	**B**	-	**0.39**	**5.8**	**B**
(12) FIFTH AVENUE & 40th STREET													
Fifth Avenue	SB	LT	0.68	9.2	B	LT	0.64	8.8	B	LT	0.65	8.9	B
40th Street	EB	TR	0.55	15.8	C	TR	0.52	15.5	C	TR	0.67	17.7	C
Overall Intersection		-	**0.62**	**10.8**	**B**	-	**0.59**	**10.2**	**B**	-	**0.66**	**11.3**	**B**
(13) MADISON AVENUE & 40th STREET													
Madison Avenue	NB	TR	0.80	11.2	B	TR	0.90	17.2	C	TR	0.84	12.0	B
40th Street	EB	LT	0.65	17.4	C	LT	0.44	12.4	B	LT	0.53	15.6	C
Overall Intersection		-	**0.73**	**13.0**	**B**	-	**0.67**	**16.2**	**C**	-	**0.70**	**12.9**	**B**
(14) MADISON AVENUE & 41st STREET													
Madison Avenue	NB	TR	0.84	12.0	B	TR	0.89	16.8	C	TR	0.81	11.2	B
41st Street	EB	LT	0.71	23.0	C	LT	0.54	14.3	B	LT	0.48	15.4	C
Overall Intersection		-	**0.78**	**13.1**	**B**	-	**0.72**	**16.6**	**C**	-	**0.66**	**11.7**	**B**
(15) MADISON AVENUE & 42nd STREET													
Madison Avenue	NB	LTR	0.83	16.2	C	LTR	0.88	20.3	C	LTR	0.80	15.1	C
42nd Street	EB	LT	1.00	43.3	E	LT	1.00	48.0	E	LT	0.87	24.7	C
42nd Street	WB	T	0.86	24.2	C	T	0.70	15.9	C	TR	0.81	21.3	C
Overall Intersection		-	**0.91**	**25.2**	**D**	-	**0.79**	**25.7**	**D**	-	**0.83**	**19.1**	**C**
(16) MADISON AVENUE & 43rd STREET													
Madison Avenue	NB	LT	0.56	8.3	B	LT	0.62	11.4	B	LT	0.55	8.1	B
43rd Street	WB	TR	0.52	15.5	C	TR	0.39	12.0	B	TR	0.42	14.5	B
Overall Intersection		-	**0.54**	**10.0**	**B**	-	**0.51**	**11.5**	**B**	-	**0.49**	**9.5**	**B**
(17) MADISON AVENUE & 44th STREET													
Madison Avenue	NB	TR	0.54	8.1	B	TR	0.55	10.8	B	TR	0.49	7.8	B
44th Street	EB	LT	0.90	31.6	D	LT	0.68	16.6	C	LT	0.58	16.4	C
Overall Intersection		-	**0.70**	**14.1**	**B**	-	**0.62**	**12.0**	**B**	-	**0.53**	**9.8**	**B**
(18) MADISON AVENUE & 45th STREET													
Madison Avenue	NB	LT	0.63	8.8	B	LT	0.65	11.7	B	LT	0.60	8.5	B
45th Street	WB	TR	0.66	17.4	C	TR	0.93	36.4	D	TR	0.52	15.5	C
Overall Intersection		-	**0.64**	**11.2**	**B**	-	**0.79**	**16.4**	**C**	-	**0.57**	**10.2**	**B**
(19) MADISON AVENUE & 46th STREET													
Madison Avenue	NB	TR	0.58	8.4	B	TR	0.65	11.7	B	TR	0.59	8.5	B
46th Street	EB	LT	0.63	16.8	C	LT	0.92	32.3	D	LT	0.65	17.4	C
Overall Intersection		-	**0.60**	**10.7**	**B**	-	**0.78**	**16.2**	**C**	-	**0.62**	**11.0**	**B**
(20) MADISON AVENUE & 47th STREET													
Madison Avenue	NB	LT	0.62	8.7	B	LT	0.63	11.5	B	LT	0.53	8.0	B
47th Street	WB	TR	0.68	17.6	C	TR	0.54	13.4	B	TR	0.53	15.5	C
Overall Intersection		-	**0.65**	**11.5**	**B**	-	**0.59**	**12.0**	**B**	-	**0.53**	**10.1**	**B**
(21) MADISON AVENUE & 48th STREET													
Madison Avenue	NB	TR	0.65	8.9	B	TR	0.66	11.8	B	TR	0.54	8.1	B
48th Street	EB	LT	0.44	14.7	B	LT	0.53	13.3	B	LT	0.64	17.0	C
Overall Intersection		-	**0.56**	**10.2**	**B**	-	**0.60**	**12.2**	**B**	-	**0.59**	**10.8**	**B**

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EXISTING 1998 TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(22) VANDERBILT AVENUE & 47th STREET													
Vanderbilt Avenue	NB	L	0.18	12.8	B	L	0.11	12.5	B	L	0.16	12.7	B
47th Street	WB	LT	0.81	16.3	C	LT	0.72	14.0	B	LT	0.58	11.7	B
Overall Intersection		-	**0.53**	**16.1**	**C**	-	**0.46**	**13.9**	**B**	-	**0.40**	**11.8**	**B**
(23) VANDERBILT AVENUE & 46th STREET													
Vanderbilt Avenue	NB	TR	0.44	12.8	B	TR	0.70	19.2	C	TR	0.40	12.2	B
Vanderbilt Avenue	SB	LT	0.38	12.0	B	LT	0.35	11.8	B	LT	0.30	11.4	B
46th Street	EB	LTR	0.54	13.4	B	LTR	0.41	12.1	B	LTR	0.52	13.1	B
Overall Intersection		-	**0.49**	**12.9**	**B**	-	**0.55**	**13.6**	**B**	-	**0.46**	**12.6**	**B**
(24) VANDERBILT AVENUE & 45th STREET													
Vanderbilt Avenue	NB	LT	0.89	35.5	D	LT	0.29	11.3	B	LT	0.35	11.7	B
Vanderbilt Avenue	SB	TR	0.73	18.1	C	TR	0.50	13.2	B	TR	0.34	11.7	B
45th Street	WB	LTR	0.81	22.4	C	LTR	0.37	11.8	B	LTR	0.87	25.3	D
Overall Intersection		-	**0.85**	**24.1**	**C**	-	**0.43**	**12.1**	**B**	-	**0.61**	**19.0**	**C**
(27) VANDERBILT AVENUE & 42nd STREET													
42nd Street	EB	LT	0.83	20.0	C	LT	0.73	16.5	C	LT	0.81	19.1	C
42nd Street	WB	TR	0.86	20.9	C	TR	0.80	18.1	C	TR	0.81	18.4	C
Overall Intersection		-	**0.41**	**20.5**	**C**	-	**0.38**	**17.4**	**C**	-	**0.39**	**18.7**	**C**
(28) PARK AVENUE & 40th STREET													
Park Avenue	NB	TR	0.43	8.6	B	TR	0.49	8.7	B	TR	0.56	9.7	B
Park Avenue	SB	T	0.28	7.7	B	T	0.27	7.3	B	T	0.24	7.5	B
Park Avenue (tunnel)	NB	T	0.62	10.8	B	T	0.60	10.1	B	T	0.57	10.1	B
Park Avenue (viaduct)	SB	T	0.65	10.7	B	T	0.53	9.0	B	T	0.65	10.8	B
40th Street	EB	LT	0.91	36.0	D	LT	0.74	23.3	C	LTR	0.97	46.9	E
		R	0.42	17.1	C	R	0.49	19.0	C	R	0.49	18.3	C
Overall Intersection		-	**0.75**	**13.7**	**B**	-	**0.65**	**11.0**	**B**	-	**0.78**	**15.7**	**C**
(29) PARK AVENUE(SB) & 41st STREET													
Park Avenue	SB	LT	0.36	8.2	B	LT	0.26	7.6	B	LT	0.23	7.4	B
41st Street	EB	TR	0.41	16.6	C	TR	0.55	18.7	C	TR	0.67	21.3	C
Overall Intersection		-	**0.38**	**11.4**	**B**	-	**0.37**	**13.1**	**B**	-	**0.40**	**15.6**	**C**
(30) PARK AVENUE(NB) & 41st STREET													
Park Avenue	NB	TR	0.22	7.3	B	TR	0.27	7.6	B	TR	0.19	7.2	B
41st Street	EB	LT	0.46	17.2	C	LT	0.40	16.5	C	LT	0.62	19.9	C
Overall Intersection		-	**0.31**	**11.2**	**B**	-	**0.33**	**10.4**	**B**	-	**0.36**	**13.1**	**B**
(31) PARK AVENUE & 42nd STREET													
Park Avenue	NB	LR	0.20	14.4	B	LR	0.33	15.4	C	LR	0.29	15.0	B
		R	0.84	43.6	E	R	1.05	101.9	F	R	0.76	32.9	D
42nd Street	EB	TR	1.03	52.1	E	T	0.49	14.7	B	T	0.52	15.0	B
		-	-	-	-	R	0.63	15.5	C	R	0.98	62.8	F
42nd Street	WB	LT	0.71	12.4	B	LT	0.64	11.1	B	LT	0.61	10.8	B
Overall Intersection		-	**0.76**	**31.4**	**D**	-	**0.80**	**19.0**	**C**	-	**0.89**	**17.8**	**C**
(32) PARK AVENUE & 46th STREET													
Park Avenue	NB	TR	0.78	17.6	C	TR	0.94	26.3	D	TR	0.81	18.5	C
Park Avenue	SB	L	0.99	91.3	F	L	1.05	116.1	F	L	0.32	11.9	B
		T	0.98	32.1	D	T	0.85	20.1	C	T	0.86	20.3	C
46th Street	EB	LTR	0.45	12.0	B	LTR	0.61	13.9	B	LTR	0.56	13.0	B
Overall Intersection		-	**0.75**	**24.0**	**C**	-	**0.86**	**23.7**	**C**	-	**0.70**	**17.3**	**C**

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EXISTING 1998 TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(33) PARK AVENUE & 47th STREET													
Park Avenue	NB	DFL	0.73	28.6	D	DFL	0.93	67.0	F	DFL	0.79	37.1	D
		T	0.81	9.3	B	T	0.80	9.0	B	T	0.84	10.1	B
Park Avenue	SB	T	0.55	6.2	B	TR	0.73	7.7	B	TR	0.75	8.0	B
		R	0.90	23.2	C	-	-	-	-	-	-	-	-
47th Street	WB	LTR	0.86	25.8	D	LTR	0.77	21.8	C	LTR	0.86	26.7	D
Overall Intersection		-	**0.89**	**12.7**	**B**	-	**0.90**	**11.8**	**B**	-	**0.85**	**12.3**	**B**
(34) PARK AVENUE & 48th STREET													
Park Avenue	NB	TR	0.65	6.9	B	TR	0.62	6.7	B	TR	0.72	7.5	B
Park Avenue	SB	DFL	1.05	112.3	F	DFL	0.73	28.6	D	DFL	0.73	28.6	D
	SB	T	0.96	16.5	C	T	0.85	10.2	B	T	0.92	13.7	B
48th Street	EB	LTR	0.72	21.0	C	LTR	0.89	29.3	D	LTR	0.73	21.1	C
Overall Intersection		-	**0.95**	**15.2**	**C**	-	**0.86**	**12.2**	**B**	-	**0.85**	**12.2**	**B**
(35) LEXINGTON AVENUE & 48th STREET													
Lexington Avenue	SB	LT	0.82	9.2	B	LT	0.86	15.5	C	LT	0.75	8.0	B
48th Street	EB	TR	0.70	20.2	C	TR	0.48	12.8	B	TR	0.67	19.5	C
Overall Intersection		-	**0.77**	**11.9**	**B**	-	**0.67**	**14.9**	**B**	-	**0.72**	**11.1**	**B**
(36) LEXINGTON AVENUE & 47th STREET													
Lexington Avenue	SB	TR	0.98	19.7	C	TR	0.92	18.4	C	TR	0.84	9.7	B
47th Street	WB	LT	0.73	20.7	C	LT	0.92	30.4	D	LT	0.61	18.5	C
Overall Intersection		-	**0.89**	**20.0**	**C**	-	**0.92**	**21.6**	**C**	-	**0.75**	**11.9**	**B**
(37) LEXINGTON AVENUE & 46th STREET													
Lexington Avenue	SB	LT	0.83	9.3	B	LT	0.84	14.8	B	LT	0.69	7.3	B
46th Street	EB	TR	0.77	24.3	C	TR	0.94	33.9	D	TR	0.76	21.2	C
Overall Intersection		-	**0.81**	**11.9**	**B**	-	**0.89**	**19.9**	**C**	-	**0.72**	**11.9**	**B**
(38) LEXINGTON AVENUE & 45th STREET													
Lexington Avenue	SB	TR	1.05	40.9	E	TR	1.05	47.5	E	TR	0.93	18.4	C
45th Street	WB	LT	0.72	21.0	C	LT	0.87	27.5	D	LT	0.65	19.3	C
Overall Intersection		-	**0.82**	**36.6**	**D**	-	**0.90**	**43.4**	**E**	-	**0.73**	**18.6**	**C**
(39) LEXINGTON AVENUE & 44th STREET													
Lexington Avenue	SB	LT	0.84	15.1	C	LT	1.05	50.3	E	LT	0.98	25.1	D
Overall Intersection		-	**0.39**	**15.1**	**C**	-	**0.45**	**50.3**	**E**	-	**0.46**	**25.1**	**D**
(40) LEXINGTON AVENUE & 43rd STREET													
Lexington Avenue	SB	T	0.95	21.7	C	T	0.70	10.1	B	T	0.79	14.4	B
43rd Street	WB	L	0.77	27.5	D	L	0.73	25.3	D	L	0.77	27.5	D
Overall Intersection		-	**0.77**	**22.3**	**C**	-	**0.67**	**11.9**	**B**	-	**0.69**	**16.0**	**C**
(41) LEXINGTON AVENUE & 42nd STREET													
Lexington Avenue	SB	LTR	1.04	43.6	E	LTR	0.95	23.9	C	LTR	0.97	27.0	D
42nd Street	EB	TR	1.03	52.1	E	TR	0.86	24.3	C	TR	0.85	23.6	C
42nd Street	WB	LT	0.98	38.7	D	LT	0.76	19.7	C	LT	0.78	20.3	C
Overall Intersection		-	**1.04**	**44.2**	**E**	-	**0.91**	**23.0**	**C**	-	**0.92**	**24.6**	**C**

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SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM)				Midday Peak Hour (12 - 1 PM)				PM Peak Hour (5:15 - 6:15 PM)			
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS
(42) LEXINGTON AVENUE & 41st STREET													
Lexington Avenue	SB	LT	0.94	16.9	C	LT	0.73	9.9	B	LT	0.70	9.6	B
41st Street	EB	TR	0.76	24.1	C	TR	0.70	20.8	C	TR	0.70	20.6	C
Overall Intersection		-	**0.86**	**17.7**	**C**	-	**0.71**	**11.3**	**B**	-	**0.70**	**11.2**	**B**
(43) LEXINGTON AVENUE & 40th STREET													
Lexington Avenue	SB	LT	0.88	10.6	B	LT	0.69	7.3	B	LT	0.65	7.0	B
40th Street	EB	TR	0.56	17.9	C	TR	0.56	17.9	C	TR	0.65	19.1	C
Overall Intersection		-	**0.75**	**12.0**	**B**	-	**0.64**	**9.6**	**B**	-	**0.65**	**10.3**	**B**
(44) THIRD AVENUE & 40th STREET													
Third Avenue	NB	TR	0.69	7.1	B	TR	0.68	7.0	B	TR	0.61	6.5	B
40th Street	EB	LT	0.63	19.2	C	LT	0.52	17.5	C	LT	0.63	19.0	C
Overall Intersection		-	**0.66**	**8.8**	**B**	-	**0.61**	**8.2**	**B**	-	**0.62**	**8.6**	**B**
(45) THIRD AVENUE & 41st STREET													
Third Avenue	NB	TR	0.70	7.2	B	TR	0.69	7.1	B	TR	0.61	6.5	B
41st Street	EB	LT	0.25	15.2	C	LT	0.52	18.0	C	LT	0.55	18.3	C
41st Street	WB	R	0.84	30.4	D	R	0.61	21.5	C	R	0.76	30.1	D
Overall Intersection		-	**0.75**	**9.9**	**B**	-	**0.66**	**8.4**	**B**	-	**0.67**	**8.8**	**B**
(46) THIRD AVENUE & 42nd STREET													
Third Avenue	NB	LT	0.98	27.3	D	LT	0.88	19.1	C	LT	0.81	16.7	C
		R	0.63	17.6	C	R	0.98	58.3	E	R	0.66	18.7	C
42nd Street	EB	LT	0.75	17.2	C	LT	0.77	17.8	C	LT	0.85	21.1	C
42nd Street	WB	T	0.72	22.8	C	T	0.52	19.8	C	T	0.58	20.5	C
		R	0.93	61.7	F	R	0.91	54.3	E	R	1.00	78.7	F
Overall Intersection		-	**0.86**	**25.8**	**D**	-	**0.88**	**22.2**	**C**	-	**0.83**	**20.3**	**C**
(47) THIRD AVENUE & 43rd STREET													
Third Avenue	NB	LT	0.80	8.3	B	LT	0.73	7.5	B	LT	0.70	7.2	B
43rd Street	WB	TR	1.02	64.4	F	TR	0.90	39.8	D	TR	0.93	42.6	E
Overall Intersection		-	**0.89**	**13.9**	**B**	-	**0.80**	**10.4**	**B**	-	**0.79**	**10.7**	**B**
(48) THIRD AVENUE & 44th STREET													
Third Avenue	NB	TR	0.88	9.9	B	TR	0.78	8.0	B	TR	0.75	7.7	B
44th Street	EB	LT	0.63	21.5	C	LT	0.70	23.6	C	LT	0.52	18.1	C
Overall Intersection		-	**0.78**	**10.4**	**B**	-	**0.75**	**8.9**	**B**	-	**0.66**	**8.3**	**B**
(49) THIRD AVENUE & 45th STREET													
Third Avenue	NB	LT	0.84	8.9	B	LT	0.75	7.7	B	LT	0.71	7.3	B
45th Street	WB	T	0.63	19.6	C	TR	0.91	38.4	D	TR	0.91	36.9	D
		R	0.84	38.6	D	-	-	-	-	-	-	-	-
Overall Intersection		-	**0.84**	**11.1**	**B**	-	**0.81**	**10.9**	**B**	-	**0.79**	**10.8**	**B**
(50) THIRD AVENUE & 46th STREET													
Third Avenue	NB	TR	0.77	7.9	B	TR	0.84	14.2	B	TR	0.64	6.7	B
46th Street	EB	LT	0.94	42.1	E	LT	0.45	12.5	B	LT	0.71	20.1	C
Overall Intersection		-	**0.84**	**11.6**	**B**	-	**0.65**	**13.9**	**B**	-	**0.66**	**9.5**	**B**
(51) THIRD AVENUE & 47th STREET													

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EXISTING 1998 TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(51) THIRD AVENUE & 47th STREET													
Third Avenue	NB	LT	0.77	7.9	B	LT	0.83	14.0	B	LT	0.66	6.9	B
47th Street	WB	TR	0.60	18.4	C	TR	1.00	48.9	E	TR	1.02	65.5	F
Overall Intersection		-	**0.70**	**9.6**	**B**	-	**0.92**	**19.3**	**C**	-	**0.80**	**13.6**	**B**
(52) THIRD AVENUE & 48th STREET													
Third Avenue	NB	TR	0.73	7.5	B	TR	0.81	13.6	B	TR	0.62	6.6	B
48th Street	EB	LT	1.04	67.1	F	LT	0.97	43.0	E	LT	0.67	19.5	C
Overall Intersection		-	**0.85**	**15.0**	**B**	-	**0.89**	**17.8**	**C**	-	**0.64**	**9.0**	**B**
(53) SECOND AVENUE & 42nd STREET													
Second Avenue	SB	LTR	0.87	16.0	C	LTR	0.85	15.7	C	LTR	0.84	15.2	C
42nd Street	EB	TR	0.73	19.1	C	TR	0.72	18.8	C	TR	0.75	19.3	C
42nd Street	WB	LT	1.04	59.9	E	LT	0.76	20.7	C	LT	0.82	23.0	C
Overall Intersection		-	**0.95**	**22.3**	**C**	-	**0.81**	**16.9**	**C**	-	**0.83**	**16.9**	**C**
(54) FIRST AVENUE & 42nd STREET													
First Avenue	NB	LTR	0.27	11.2	B	LTR	0.22	10.8	B	LTR	0.21	10.8	B
42nd Street	EB	L	1.01	67.5	F	L	0.86	31.1	D	L	0.92	42.1	E
		T	0.72	18.4	C	T	0.75	19.1	C	T	0.81	22.3	C
42nd Street	WB	TR	0.51	17.2	C	T	0.29	15.4	C	T	0.37	16.0	C
		R	1.00	58.8	E	R	0.81	27.6	D	R	0.98	51.2	E
Overall Intersection		-	**0.64**	**29.9**	**D**		**0.57**	**20.2**	**C**	-	**0.58**	**27.3**	**D**

UNSIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS
(25) VANDERBILT AVENUE & 44th STREET													
44th Street	EB	L	7.4	1.0	B	L	6.2	0.4	B	L	6.3	0.8	B
		R	3.4	0.4	A	R	3.2	0.2	A	R	3.2	0.3	A
(26) VANDERBILT AVENUE & 43rd STREET													
Vanderbilt Avenue	NB	L	2.7	0.2	A	L	2.9	0.2	A	L	2.8	0.1	A
43rd Street	WB	TR	6.8	1.5	B	TR	5.5	0.6	B	TR	6.1	0.8	B

GENERAL NOTES:

1. "MVT" refers to the specific intersection approach lane(s) and how the lane(s) operate and/or specific pavement striping.
refers to exclusive right- or left-turn movement lane(s), and LTR is a mixed lane(s) that
cto left-turn" lane that is formed due to a very heavy left-turn volume; in effect, only left
es change in different time periods. For example, a very heavy right-turn volume
may exceed a single lane capacity, thus forcing drivers to use (or "share") an adjacent lane for additional travel capacity in the AM, but as flows decrease later in the day, a shared lane may not be needed.

2. "v/c" is the volume-to-capacity ratio for the MVT listed in the first column.

3. "Delay" is expressed in seconds per vehicle for the MVT listed in the first column.

4. "LOS" is based on average stopped delay per vehicle (sec/veh) for each signaled lane group, and on total average delay for unsignalized approaches as listed in the 1994 HCM, TRB SR 209.

5. " * " indicates that v/c ratios that exceed 1.05 and corresponding average delays are greater than 120 seconds.

6. 95% queue length is expressed in vehicles.

TABLE M-2

2010 NO BUILD
LIRR / GCT TRAFFIC
LEVELS OF SERVICE

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(1) SEVENTH AVENUE & 42nd STREET													
Seventh Avenue	SB	LTR	1.05	120.0+	*F**	LTR	0.68	12.1	B	LTR	0.81	14.5	B
42nd Street	EB	TR	0.79	21.8	C	TR	0.85	23.8	C	TR	0.80	22.0	C
42nd Street	WB	LT	0.60	17.1	C	LT	0.64	17.6	C	LT	0.90	28.4	D
Overall Intersection		-	**0.94**	**120.0+**	**F***	-	**0.75**	**16.2**	**C**	-	**0.85**	**18.7**	**C**
(2) BROADWAY & 42nd STREET													
Broadway	SB	LTR	0.73	14.1	B	LTR	0.60	12.2	B	LTR	0.67	13.1	B
42nd Street	EB	TR	0.54	15.3	C	TR	0.67	17.2	C	TR	0.56	15.5	C
42nd Street	WB	L	1.09	120.0+	*F**	LT	1.17	120.0+	*F**	LT	1.20+	120.0+	*F**
		T	1.06	120.0+	*F**	-	-	-	-	-	-	-	-
Overall Intersection		-	**0.89**	**120.0+**	**F***	-	**0.86**	**120.0+**	**F***	-	**0.94**	**120.0+**	**F***
(3) SIXTH AVENUE & 42nd STREET													
Sixth Avenue	NB	LT	1.05	43.1	E	LT	0.87	16.7	C	LTR	1.08	120.0+	F*
		R	0.77	23.2	C	R	0.37	10.1	B	R	0.47	11.3	B
42nd Street	EB	LT	0.79	20.7	C	LT	0.79	20.7	C	LT	0.79	20.9	C
42nd Street	WB	TR	0.79	20.6	C	TR	0.71	18.2	C	TR	0.74	19.0	C
		R	1.08	105.2	*F**	R	1.16	120.0+	*F**	R	1.16	120.0+	*F**
Overall Intersection		-	**1.06**	**120.0+**	**F***	-	**1.00**	**120.0+**	**F***	-	**1.12**	**120.0+**	**F***
(4) FIFTH AVENUE & 48th STREET													
Fifth Avenue	SB	LT	0.79	10.6	B	LT	0.85	14.8	B	LT	0.72	9.6	B
48th Street	EB	TR	0.52	15.6	C	TR	0.59	14.0	B	TR	0.82	21.7	C
Overall Intersection		-	**0.67**	**11.5**	**B**	-	**0.72**	**14.6**	**B**	-	**0.76**	**13.1**	**B**
(5) FIFTH AVENUE & 47th STREET													
Fifth Avenue	SB	TR	0.69	9.2	B	TR	0.81	13.7	B	TR	0.69	9.3	B
47th Street	WB	LT	0.73	18.3	C	LT	0.63	14.7	B	LT	0.55	15.9	C
Overall Intersection		-	**0.70**	**11.8**	**B**	-	**0.72**	**13.9**	**B**	-	**0.63**	**10.7**	**B**
(6) FIFTH AVENUE & 46th STREET													
Fifth Avenue	SB	LT	0.72	9.5	B	LT	0.87	15.1	C	LT	0.72	9.6	B
46th Street	EB	TR	0.52	15.4	C	TR	0.54	13.5	B	TR	0.65	17.3	C
Overall Intersection		-	**0.63**	**10.8**	**B**	-	**0.70**	**14.8**	**B**	-	**0.69**	**11.4**	**B**
(7) FIFTH AVENUE & 45th STREET													
Fifth Avenue	SB	TR	0.79	10.6	B	TR	0.86	15.1	C	TR	0.73	9.7	B
45th Street	WB	LT	0.60	16.3	C	LT	1.05	66.0	F	LT	0.55	15.8	C
Overall Intersection		-	**0.71**	**11.9**	**B**	-	**0.96**	**23.2**	**C**	-	**0.65**	**11.1**	**B**
(8) FIFTH AVENUE & 44th STREET													
Fifth Avenue	SB	LT	0.77	10.2	B	LT	0.83	14.3	B	LT	0.72	9.7	B
44th Street	EB	TR	0.62	16.8	C	TR	0.50	13.0	B	TR	0.65	17.5	C
Overall Intersection		-	**0.70**	**11.6**	**B**	-	**0.66**	**14.0**	**B**	-	**0.69**	**11.3**	**B**
(9) FIFTH AVENUE & 43rd STREET													
Fifth Avenue	SB	TR	0.79	10.5	B	TR	0.88	15.6	C	TR	0.77	10.3	B
43rd Street	WB	LT	0.52	15.5	C	LT	1.10	120.0+	*F**	LT	0.49	15.2	C
Overall Intersection		-	**0.67**	**11.5**	**B**	-	**0.99**	**120.0+**	**F***	-	**0.65**	**11.2**	**B**
(10) FIFTH AVENUE & 42nd STREET													
Fifth Avenue	SB	LTR	0.70	12.9	B	LTR	0.72	13.1	B	LTR	0.68	12.5	B
42nd Street	EB	TR	0.90	26.6	D	TR	0.88	25.5	D	TR	0.93	29.4	D
42nd Street	WB	LT	1.06	120.0+	*F**	LT	1.05	55.4	E	LT	1.13	120.0+	*F**
Overall Intersection		-	**0.86**	**120.0+**	**F***	-	**0.86**	**26.1**	**D**	-	**0.88**	**120.0+**	**F***

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM)				Midday Peak Hour (12 - 1 PM)				PM Peak Hour (5:15 - 6:15 PM)			
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS
(11) FIFTH AVENUE & 41st STREET													
Fifth Avenue	SB	LT	0.69	6.2	B	LT	0.67	6.0	B	LT	0.68	6.2	B
Overall Intersection		-	**0.42**	**6.2**	**B**	-	**0.41**	**6.0**	**B**	-	**0.42**	**6.2**	**B**
(12) FIFTH AVENUE & 40th STREET													
Fifth Avenue	SB	LT	0.72	9.7	B	LT	0.68	9.2	B	LT	0.69	9.4	B
40th Street	EB	TR	0.59	16.3	C	TR	0.56	16.0	C	TR	0.74	19.3	C
Overall Intersection		-	**0.66**	**11.3**	**B**	-	**0.63**	**10.7**	**B**	-	**0.71**	**12.1**	**B**
(13) MADISON AVENUE & 40th STREET													
Madison Avenue	NB	TR	0.85	12.4	B	TR	0.96	22.2	C	TR	0.90	14.3	B
40th Street	EB	LT	0.70	18.4	C	LT	0.48	12.8	B	LT	0.58	16.2	C
Overall Intersection		-	**0.79**	**14.2**	**B**	-	**0.72**	**20.1**	**C**	-	**0.76**	**14.8**	**B**
(14) MADISON AVENUE & 41st STREET													
Madison Avenue	NB	TR	0.89	13.9	B	TR	0.95	21.2	C	TR	0.86	12.7	B
41st Street	EB	LT	0.77	27.0	D	LT	0.59	15.3	C	LT	0.50	15.8	C
Overall Intersection		-	**0.84**	**15.2**	**C**	-	**0.77**	**20.5**	**C**	-	**0.70**	**13.0**	**B**
(15) MADISON AVENUE & 42nd STREET													
Madison Avenue	NB	LTR	0.89	18.4	C	LTR	0.95	25.9	D	LTR	0.86	17.1	C
42nd Street	EB	LT	1.09	120.0+	*F**	LT	1.11	120.0+	*F**	LT	1.03	51.1	E
42nd Street	WB	T	0.92	28.7	D	T	0.79	18.0	C	T	0.92	28.5	D
Overall Intersection		-	**0.98**	**120.0+**	**F***	-	**0.87**	**120.0+**	**F***	-	**0.93**	**28.8**	**D**
(16) MADISON AVENUE & 43rd STREET													
Madison Avenue	NB	LT	0.60	8.5	B	LT	0.66	11.8	B	LT	0.58	8.4	B
43rd Street	WB	TR	0.54	15.8	C	TR	0.41	12.2	B	TR	0.44	14.7	B
Overall Intersection		-	**0.58**	**10.3**	**B**	-	**0.54**	**11.9**	**B**	-	**0.52**	**9.7**	**B**
(17) MADISON AVENUE & 44th STREET													
Madison Avenue	NB	TR	0.57	8.3	B	TR	0.59	11.1	B	TR	0.52	8.0	B
44th Street	EB	LT	0.95	38.7	D	LT	0.73	18.1	C	LT	0.62	17.0	C
Overall Intersection		-	**0.74**	**16.1**	**C**	-	**0.66**	**12.5**	**B**	-	**0.56**	**10.1**	**B**
(18) MADISON AVENUE & 45th STREET													
Madison Avenue	NB	LT	0.67	9.1	B	LT	0.69	12.1	B	LT	0.64	8.9	B
45th Street	WB	TR	0.71	18.3	C	TR	1.00	50.4	E	TR	0.55	15.9	C
Overall Intersection		-	**0.68**	**11.7**	**B**	-	**0.84**	**19.5**	**C**	-	**0.60**	**10.6**	**B**
(19) MADISON AVENUE & 46th STREET													
Madison Avenue	NB	TR	0.62	8.7	B	TR	0.69	12.1	B	TR	0.63	8.8	B
46th Street	EB	LT	0.67	17.6	C	LT	0.97	40.8	E	LT	0.69	18.1	C
Overall Intersection		-	**0.64**	**11.2**	**B**	-	**0.83**	**18.3**	**C**	-	**0.66**	**11.5**	**B**
(20) MADISON AVENUE & 47th STREET													
Madison Avenue	NB	LT	0.66	9.0	B	LT	0.67	11.8	B	LT	0.57	8.3	B
47th Street	WB	TR	0.73	18.5	C	TR	0.58	13.9	B	TR	0.57	16.0	C
Overall Intersection		-	**0.69**	**12.1**	**B**	-	**0.63**	**12.4**	**B**	-	**0.57**	**10.4**	**B**
(21) MADISON AVENUE & 48th STREET													
Madison Avenue	NB	TR	0.69	9.3	B	TR	0.70	12.2	B	TR	0.58	8.3	B
48th Street	EB	LT	0.47	15.0	B	LT	0.57	13.8	B	LT	0.69	17.8	C
Overall Intersection		-	**0.59**	**10.5**	**B**	-	**0.64**	**12.6**	**B**	-	**0.62**	**11.2**	**B**

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(22) VANDERBILT AVENUE & 47th STREET													
Vanderbilt Avenue	NB	L	0.21	13.0	B	L	0.12	12.5	B	L	0.19	12.9	B
47th Street	WB	LT	0.86	18.7	C	LT	0.77	15.2	A	LT	0.62	12.2	B
Overall Intersection		-	**0.57**	**18.4**	**C**	-	**0.49**	**15.1**	**C**	-	**0.43**	**12.3**	**B**
(23) VANDERBILT AVENUE & 46th STREET													
Vanderbilt Avenue	NB	TR	0.49	13.4	B	TR	0.78	23.8	C	TR	0.44	12.6	B
Vanderbilt Avenue	SB	LT	0.40	12.1	B	LT	0.37	11.9	B	LT	0.32	11.5	B
46th Street	EB	LTR	0.58	13.8	B	LTR	0.43	12.3	B	LTR	0.54	13.4	B
Overall Intersection		-	**0.53**	**13.3**	**B**	-	**0.61**	**14.7**	**B**	-	**0.49**	**12.8**	**B**
(24) VANDERBILT AVENUE & 45th STREET													
Vanderbilt Avenue	NB	LT	1.05	76.9	F	LT	0.30	11.4	B	LT	0.37	11.9	B
Vanderbilt Avenue	SB	TR	0.78	20.2	C	TR	0.53	13.7	B	TR	0.37	12.0	B
45th Street	WB	LTR	0.86	26.4	D	LTR	0.39	12.0	B	LTR	0.94	33.9	D
Overall Intersection		-	**0.96**	**36.8**	**D**	-	**0.46**	**12.4**	**B**	-	**0.66**	**23.6**	**C**
(27) VANDERBILT AVENUE & 42nd STREET													
42nd Street	EB	LT	0.88	22.9	C	LT	0.82	19.2	C	LT	0.91	25.3	D
42nd Street	WB	TR	0.91	24.7	C	TR	0.88	22.1	C	TR	0.90	23.5	C
Overall Intersection		-	**0.44**	**23.9**	**C**	-	**0.43**	**20.8**	**C**	-	**0.44**	**24.3**	**C**
(28) PARK AVENUE & 40th STREET													
Park Avenue	NB	TR	0.46	8.8	B	TR	0.52	9.0	B	TR	0.60	10.2	B
Park Avenue	SB	T	0.30	7.8	B	T	0.30	7.4	B	T	0.26	7.6	B
Park Avenue (tunnel)	NB	T	0.66	11.5	B	T	0.64	10.6	B	T	0.60	10.5	B
Park Avenue (viaduct)	SB	T	0.69	11.3	B	T	0.56	9.3	B	T	0.69	11.4	B
40th Street	EB	LT	0.97	45.7	E	LT	0.80	26.2	D	LT	1.06	120.0+	*F**
		R	0.52	19.4	C	R	0.56	21.1	C	R	0.56	20.4	C
Overall Intersection		-	**0.80**	**15.5**	**C**	-	**0.70**	**11.7**	**B**	-	**0.84**	**120.0+**	**F***
(29) PARK AVENUE(SB) & 41st STREET													
Park Avenue	SB	LT	0.39	8.4	B	LT	0.28	7.7	B	LT	0.25	7.5	B
41st Street	EB	TR	0.45	17.1	C	TR	0.59	19.7	C	TR	0.69	22.2	C
Overall Intersection		-	**0.41**	**11.8**	**B**	-	**0.40**	**13.6**	**B**	-	**0.42**	**16.0**	**C**
(30) PARK AVENUE(NB) & 41st STREET													
Park Avenue	NB	TR	0.24	7.4	B	TR	0.29	7.7	B	TR	0.20	7.3	B
41st Street	EB	LT	0.49	17.6	C	LT	0.42	16.7	C	LT	0.65	20.7	C
Overall Intersection		-	**0.34**	**11.4**	**B**	-	**0.34**	**10.4**	**B**	-	**0.38**	**13.5**	**B**
(31) PARK AVENUE & 42nd STREET													
Park Avenue	NB	LR	0.27	14.9	B	LR	0.37	15.8	C	LR	0.31	15.2	C
		R	1.02	92.7	F	R	1.20+	120.0+	*F**	R	0.98	80.2	F
42nd Street	EB	TR	1.11	120.0+	*F**	T	0.55	15.3	C	T	0.59	15.8	C
		-			-	R	1.20+	120.0+	*F**	R	1.20+	120.0+	*F**
42nd Street	WB	LT	0.77	13.6	B	LT	0.72	12.4	B	LT	0.70	12.1	B
Overall Intersection		-	**0.87**	**120.0+**	**F***	-	**1.20+**	**120.0+**	**F***	-	**1.16**	**120.0+**	**F***
(32) PARK AVENUE & 46th STREET													
Park Avenue	NB	TR	0.83	19.0	C	TR	0.99	35.3	D	TR	0.87	20.4	C
Park Avenue	SB	L	1.11	120.0+	*F**	L	1.19	120.0+	*F**	L	1.20+	120.0+	*F**
		T	1.04	46.0	E	T	0.90	23.3	C	T	0.91	23.6	C
46th Street	EB	LTR	0.48	12.3	B	LTR	0.66	14.6	B	LTR	0.60	13.5	B
Overall Intersection		-	**0.83**	**120.0+**	**F***	-	**0.96**	**120.0+**	**F***	-	**1.12**	**120.0+**	**F***

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM)				Midday Peak Hour (12 - 1 PM)				PM Peak Hour (5:15 - 6:15 PM)			
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS
(33) PARK AVENUE & 47th STREET													
Park Avenue	NB	DFL	0.79	37.1	D	DFL	0.99	87.5	F	DFL	0.85	48.5	E
		T	0.86	10.7	B	T	0.85	10.2	B	T	0.90	12.1	B
Park Avenue	SB	T	0.58	6.4	B	TR	0.78	8.4	B	TR	0.80	8.7	B
		R	1.04	55.3	E	-	-	-	-	-	-	-	-
47th Street	WB	LTR	0.91	30.1	D	LTR	0.82	24.0	C	LTR	0.93	33.6	D
Overall Intersection		-	**0.99**	**16.6**	**C**	-	**0.97**	**13.3**	**B**	-	**0.92**	**14.7**	**B**
(34) PARK AVENUE & 48th STREET													
Park Avenue	NB	TR	0.69	7.2	B	TR	0.66	7.0	B	TR	0.76	8.1	B
Park Avenue	SB	DFL	1.19	120.0+	*F**	DFL	0.85	48.5	E	DFL	0.85	48.5	E
		T	1.01	27.1	D	T	0.90	12.2	B	T	0.98	20.0	C
48th Street	EB	LTR	0.78	22.8	C	LTR	0.97	40.6	E	LTR	0.79	23.1	C
Overall Intersection		-	**1.08**	**120.0+**	**F***	-	**0.93**	**15.4**	**C**	-	**0.91**	**15.6**	**C**
(35) LEXINGTON AVENUE & 48th STREET													
Lexington Avenue	SB	LT	0.88	10.7	B	LT	0.92	18.1	C	LT	0.80	8.7	B
48th Street	EB	TR	0.75	21.7	C	TR	0.52	13.2	B	TR	0.72	20.5	C
Overall Intersection		-	**0.83**	**13.3**	**B**	-	**0.72**	**16.9**	**C**	-	**0.77**	**11.9**	**B**
(36) LEXINGTON AVENUE & 47th STREET													
Lexington Avenue	SB	TR	1.04	34.1	D	TR	0.98	24.3	C	TR	0.89	11.3	B
47th Street	WB	LT	0.79	22.3	C	LT	0.99	41.4	E	LT	0.64	19.0	C
Overall Intersection		-	**0.94**	**31.0**	**D**	-	**0.98**	**28.9**	**D**	-	**0.79**	**13.2**	**B**
(37) LEXINGTON AVENUE & 46th STREET													
Lexington Avenue	SB	LT	0.89	10.9	B	LT	0.89	16.5	C	LT	0.73	7.8	B
46th Street	EB	TR	0.84	28.6	D	TR	1.01	48.6	E	TR	0.81	22.9	C
Overall Intersection		-	**0.87**	**13.9**	**B**	-	**0.95**	**25.0**	**C**	-	**0.76**	**12.8**	**B**
(38) LEXINGTON AVENUE & 45th STREET													
Lexington Avenue	SB	TR	1.12	120.0+	*F**	TR	1.12	**120.0+**	*F**	TR	0.99	25.3	D
45th Street	WB	LT	0.79	23.4	C	LT	0.95	38.9	D	LT	0.69	20.3	C
Overall Intersection		-	**0.88**	**120.0+**	**F***	-	**0.97**	**120.0+**	**F***	-	**0.78**	**24.2**	**C**
(39) LEXINGTON AVENUE & 44th STREET													
Lexington Avenue	SB	LT	0.89	16.8	C	LT	1.12	**120.0+**	*F**	LT	1.04	40.2	E
Overall Intersection		-	**0.42**	**16.8**	**C**	-	**0.48**	**120.0+**	**F***	-	**0.49**	**40.2**	**E**
(40) LEXINGTON AVENUE & 43rd STREET													
Lexington Avenue	SB	T	1.01	31.9	D	T	0.74	10.6	B	T	0.84	15.5	C
43rd Street	WB	L	0.97	58.7	E	L	0.92	48.0	E	L	0.97	58.7	E
Overall Intersection		-	**0.87**	**34.7**	**D**	-	**0.77**	**15.0**	**B**	-	**0.79**	**20.7**	**C**
(41) LEXINGTON AVENUE & 42nd STREET													
Lexington Avenue	SB	LTR	1.11	120.0+	*F**	LTR	1.00	33.6	D	LTR	1.03	41.2	E
42nd Street	EB	TR	1.09	120.0+	*F**	TR	0.95	33.5	D	TR	0.95	32.9	D
42nd Street	WB	LT	1.06	120.0+	*F**	LT	0.88	25.3	D	LT	0.92	28.4	D
Overall Intersection		-	**1.10**	**120.0+**	**F***	-	**0.98**	**31.5**	**D**	-	**1.00**	**36.1**	**D**

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(42) LEXINGTON AVENUE & 41st STREET													
Lexington Avenue	SB	LT	1.00	25.5	D	LT	0.78	10.6	B	LT	0.75	10.2	B
41st Street	EB	TR	0.82	28.4	D	TR	0.75	23.4	C	TR	0.75	22.9	C
Overall Intersection		-	**0.92**	**25.8**	**D**	-	**0.77**	**12.3**	**B**	-	**0.75**	**12.1**	**B**
(43) LEXINGTON AVENUE & 40th STREET													
Lexington Avenue	SB	LT	0.93	12.9	B	LT	0.73	7.8	B	LT	0.69	7.3	B
40th Street	EB	TR	0.60	18.4	C	TR	0.61	18.6	C	TR	0.71	20.5	C
Overall Intersection		-	**0.80**	**14.0**	**B**	-	**0.68**	**10.2**	**B**	-	**0.70**	**11.0**	**B**
(44) THIRD AVENUE & 40th STREET													
Third Avenue	NB	TR	0.73	7.5	B	TR	0.72	7.4	B	TR	0.66	6.8	B
40th Street	EB	LT	0.68	20.2	C	LT	0.57	18.2	C	LT	0.69	20.2	C
Overall Intersection		-	**0.71**	**9.2**	**B**	-	**0.66**	**8.7**	**B**	-	**0.67**	**9.1**	**B**
(45) THIRD AVENUE & 41st STREET													
Third Avenue	NB	TR	0.74	7.6	B	TR	0.74	7.6	B	TR	0.66	6.8	B
41st Street	EB	LT	0.27	15.3	C	LT	0.56	18.6	C	LT	0.57	18.7	C
41st Street	WB	R	0.96	49.1	E	R	0.69	25.5	D	R	0.89	46.7	E
Overall Intersection		-	**0.83**	**12.0**	**B**	-	**0.72**	**9.0**	**B**	-	**0.75**	**9.9**	**B**
(46) THIRD AVENUE & 42nd STREET													
Third Avenue	NB	LT	1.05	43.4	E	LT	0.95	23.3	C	LT	0.87	18.3	C
		R	0.73	23.2	C	R	1.14	120.0+	*F**	R	0.76	24.9	C
42nd Street	EB	LT	0.81	19.4	C	LT	0.87	22.5	C	LT	0.97	34.4	D
42nd Street	WB	T	0.76	23.8	C	T	0.59	20.6	C	T	0.67	21.8	C
		R	1.09	120.0+	*F**	R	1.06	120.0+	*F**	R	1.16	120.0+	*F**
Overall Intersection		-	**0.93**	**120.0+**	**F***	-	**1.00**	**120.0+**	**F***	-	**0.92**	**120.0+**	**F***
(47) THIRD AVENUE & 43rd STREET													
Third Avenue	NB	LT	0.85	9.2	B	LT	0.78	8.0	B	LT	0.75	7.7	B
43rd Street	WB	TR	1.13	120.0+	*F**	TR	0.99	57.3	E	TR	1.01	63.8	F
Overall Intersection		-	**0.96**	**120.0+**	**F***	-	**0.86**	**12.5**	**B**	-	**0.85**	**13.2**	**B**
(48) THIRD AVENUE & 44th STREET													
Third Avenue	NB	TR	0.94	12.2	B	TR	0.83	8.7	B	TR	0.80	8.3	B
44th Street	EB	LT	0.70	24.2	C	LT	0.75	26.6	D	LT	0.57	19.1	C
Overall Intersection		-	**0.84**	**12.8**	**B**	-	**0.80**	**9.8**	**B**	-	**0.71**	**8.9**	**B**
(49) THIRD AVENUE & 45th STREET													
Third Avenue	NB	LT	0.89	10.0	B	LT	0.80	8.2	B	LT	0.76	7.8	B
45th Street	WB	T	0.66	20.4	C	TR	0.99	55.9	E	TR	0.97	47.4	E
		R	0.97	65.2	F	-	-	-	-	-	-	-	-
Overall Intersection		-	**0.92**	**13.4**	**B**	-	**0.87**	**13.4**	**B**	-	**0.84**	**12.5**	**B**
(50) THIRD AVENUE & 46th STREET													
Third Avenue	NB	TR	0.82	8.6	B	TR	0.90	15.7	C	TR	0.68	7.0	B
46th Street	EB	LT	1.02	62.8	F	LT	0.49	12.9	B	LT	0.76	21.3	C
Overall Intersection		-	**0.90**	**14.6**	**B**	-	**0.69**	**15.2**	**C**	-	**0.71**	**10.0**	**B**

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		AM Peak Hour (8 - 9 AM) Mvt.	v/c	Delay	LOS	Midday Peak Hour (12 - 1 PM) Mvt.	v/c	Delay	LOS	PM Peak Hour (5:15 - 6:15 PM) Mvt.	v/c	Delay	LOS
(51) THIRD AVENUE & 47th STREET													
Third Avenue	NB	LT	0.82	8.6	B	LT	0.90	15.5	C	LT	0.71	7.2	B
47th Street	WB	TR	0.65	19.1	C	TR	1.08	120.0+	*F**	TR	1.12	120.0+	*F**
Overall Intersection		-	**0.75**	**10.3**	**B**	-	**0.98**	**120.0+**	**F***	-	**0.87**	**120.0+**	**F***
(52) THIRD AVENUE & 48th STREET													
Third Avenue	NB	TR	0.78	8.0	B	TR	0.86	14.8	B	TR	0.66	6.9	B
48th Street	EB	LT	1.13	120.0+	*F**	LT	1.05	65.1	F	LT	0.71	20.5	C
Overall Intersection		-	**0.92**	**120.0+**	**F***	-	**0.96**	**21.9**	**C**	-	**0.68**	**9.4**	**B**
(53) SECOND AVENUE & 42nd STREET													
Second Avenue	SB	LTR	0.93	18.5	C	LTR	0.92	18.2	C	LTR	0.90	17.1	C
42nd Street	EB	TR	0.78	20.7	C	TR	0.79	20.7	C	TR	0.82	21.7	C
42nd Street	WB	LT	1.14	120.0+	*F**	LT	0.86	26.0	D	LT	0.94	35.0	D
Overall Intersection		-	**1.02**	**120.0+**	**F***	-	**0.89**	**19.6**	**C**	-	**0.92**	**20.4**	**C**
(54) FIRST AVENUE & 42nd STREET													
First Avenue	NB	LTR	0.29	11.3	B	LTR	0.24	10.9	B	LTR	0.23	10.9	B
42nd Street	EB	L	1.13	120.0+	*F**	L	0.96	46.2	E	L	1.06	120.0+	*F**
		T	0.77	20.3	C	T	0.81	22.0	C	T	0.88	28.4	D
42nd Street	WB	TR	0.54	17.6	C	T	0.31	15.5	C	T	0.40	16.2	C
		R	1.07	120.0+	*F**	R	0.86	32.6	D	R	1.11	120.0+	*F**
Overall Intersection		-	**0.70**	**120.0+**	**F***		**0.61**	**24.6**	**C**	-	**0.67**	**120.0+**	**F***

Table M-2

2010 NO BUILD TRAFFIC LEVELS OF SERVICE

UNSIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS
(25) VANDERBILT AVENUE & 44th STREET													
44th Street	EB	L	10.3	1.5	C	L	6.5	0.5	B	L	6.6	0.9	B
		R	3.5	0.4	A	R	3.3	0.2	A	R	3.3	0.4	A
(26) VANDERBILT AVENUE & 43rd STREET													
Vanderbilt Avenue	NB	L	2.8	0.2	A	L	2.9	0.2	A	L	2.8	0.1	A
43rd Street	WB	TR	7.4	1.7	B	TR	5.7	0.7	B	TR	6.4	0.9	B

GENERAL NOTES:

1. "MVT" refers to the specific intersection approach lane(s) and how the lane(s) operate and/or specific pavement striping. refers to exclusive right- or left-turn movement lane(s), and LTR is a mixed lane(s) that acto left-turn" lane that is formed due to a very heavy left-turn volume; in effect, only left es change in different time periods. For example, a very heavy right-turn volume may exceed a single lane capacity, thus forcing drivers to use (or "share") an adjacent lane for additional travel capacity in the AM, but as flows decrease later in the day, a shared lane may not be needed.

2. "v/c" is the volume-to-capacity ratio for the MVT listed in the first column.

3. "Delay" is expressed in seconds per vehicle for the MVT listed in the first column.

4. "LOS" is based on average stopped delay per vehicle (sec/veh) for each signaled lane group, and on total average delay for unsignalized approaches as listed in the 1994 HCM: TRB SR 209.

5. " * " indicates that Delay and Level of Service are not meaningful when any v/c is greater than 1.2 or 1/PHF. Also, it is beyond the scope of HCM to assess delay for an approach which operates in oversaturated conditions.

6. 95% queue length is expressed in vehicles.

TABLE M-3

2010 BUILD / MITIGATED LIRR / GCT TRAFFIC LEVELS OF SERVICE

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE
AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(1) SEVENTH AVENUE & 42nd STREET														
Seventh Avenue	SB	LTR	1.05	47.4	*F**	LTR	0.96	23.8	C					
42nd Street	EB	TR	0.79	21.8	C	TR	0.76	20.6	C			n/a		
42nd Street	WB	LT	0.60	17.1	C	LT	0.56	16.6	C					
Overall Intersection		-	**0.94**	**38.3**	F*	-	**0.87**	**22.1**	**C**					
(2) BROADWAY & 42nd STREET														
Broadway	SB	LTR	0.73	14.1	B	LTR	0.72	13.9	B					
42nd Street	EB	TR	0.54	15.3	C	TR	0.50	14.9	B			n/a		
42nd Street	WB	L	1.09	106.8	*F**	L	1.02	76.8	F					
		T	1.06	71.4	*F**	T	1.02	58.6	E					
Overall Intersection		-	**0.89**	**31.5**	**F***	-	**0.86**	**26.9**	**D**					
(3) SIXTH AVENUE & 42nd STREET														
Sixth Avenue	NB	LT	1.05	43.1	E	LT	1.03	35.8	D					
		R	0.77	23.2	C	R	0.75	21.6	C					
42nd Street	EB	LT	0.79	20.7	C	LT	0.75	19.5	C			n/a		
42nd Street	WB	TR	0.79	20.6	C	TR	0.77	19.9	C					
		R	1.08	105.2	*F**	R	1.06	96.2	*F**					
Overall Intersection		-	**1.06**	**37.6**	**F***	-	**1.04**	**32.5**	**F***					
(4) FIFTH AVENUE & 48th STREET														
Fifth Avenue	SB	LT	0.79	10.6	B	LT	0.80	10.8	B					
48th Street	EB	TR	0.52	15.6	C	TR	0.55	15.9	C			n/a		
Overall Intersection		-	**0.67**	**11.5**	**B**	-	**0.69**	**11.7**	**B**					
(5) FIFTH AVENUE & 47th STREET														
Fifth Avenue	SB	TR	0.69	9.2	B	TR	0.68	9.1	B					
47th Street	WB	LT	0.73	18.5	C	LT	0.75	19.3	C			n/a		
Overall Intersection		-	**0.70**	**11.8**	**B**	-	**0.71**	**11.9**	**B**					
(6) FIFTH AVENUE & 46th STREET														
Fifth Avenue	SB	LT	0.72	9.5	B	LT	0.72	9.5	B					
46th Street	EB	TR	0.52	15.4	C	TR	0.51	15.3	C			n/a		
Overall Intersection		-	**0.63**	**10.8**	**B**	-	**0.63**	**10.7**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE
AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(7) FIFTH AVENUE & 45th STREET														
Fifth Avenue	SB	TR	0.79	10.6	B	TR	0.77	10.2	B					
45th Street	WB	LT	0.60	16.3	C	LT	0.55	15.8	C			n/a		
Overall Intersection		-	**0.71**	**11.9**	**B**	-	**0.67**	**11.5**	**B**					
(8) FIFTH AVENUE & 44th STREET														
Fifth Avenue	SB	LT	0.77	10.2	B	LT	0.73	9.8	B					
44th Street	EB	TR	0.62	16.8	C	TR	0.64	17.2	C			n/a		
Overall Intersection		-	**0.70**	**11.6**	**B**	-	**0.69**	**11.4**	**B**					
(9) FIFTH AVENUE & 43rd STREET														
Fifth Avenue	SB	TR	0.79	10.5	B	TR	0.74	9.9	B					
43rd Street	WB	LT	0.52	15.5	C	LT	0.52	15.5	C			n/a		
Overall Intersection		-	**0.67**	**11.5**	**B**	-	**0.64**	**10.9**	**B**					
(10) FIFTH AVENUE & 42nd STREET														
Fifth Avenue	SB	LTR	0.70	12.9	B	LTR	0.66	12.3	B					
42nd Street	EB	TR	0.90	26.6	D	TR	0.86	24.0	C			n/a		
42nd Street	WB	LT	1.06	62.3	*F**	LT	1.02	47.7	E					
Overall Intersection		-	**0.86**	**27.9**	**F***	-	**0.82**	**23.7**	**C**					
(11) FIFTH AVENUE & 41st STREET														
Fifth Avenue	SB	LT	0.69	6.2	B	LT	0.66	6.0	B			n/a		
Overall Intersection		-	**0.42**	**6.2**	**B**	-	**0.40**	**6.0**	**B**					
(12) FIFTH AVENUE & 40th STREET														
Fifth Avenue	SB	LT	0.72	9.7	B	LT	0.67	9.2	B					
40th Street	EB	TR	0.59	16.3	C	TR	0.58	16.1	C			n/a		
Overall Intersection		-	**0.66**	**11.3**	**B**	-	**0.63**	**10.9**	**B**					
(13) MADISON AVENUE & 40th STREET														
Madison Avenue	NB	TR	0.85	12.4	B	TR	0.84	12.2	B					
40th Street	EB	LT	0.70	18.4	C	LT	0.71	18.7	C			n/a		
Overall Intersection		-	**0.79**	**14.2**	**B**	-	**0.79**	**14.1**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE
AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(14) MADISON AVENUE & 41st STREET														
Madison Avenue	NB	TR	0.89	13.9	B	TR	0.89	13.9	B	TR	0.89	13.9	B	-Daylight the north curb on the EB
41st Street	EB	LT	0.77	27.0	D	LT	1.09	*108.1*	*F**	L	0.67	22.5	C	approach to create a left-turn lane
										T	0.13	12.5	B	eastbound and provide a protected EB LT phase.
Overall Intersection		**-**	**0.84**	**15.2**	**C**	**-**	**0.97**	**23.5**	**F***	**-**	**0.79**	**14.4**	**B**	
(15) MADISON AVENUE & 42nd STREET														
Madison Avenue	NB	LTR	0.89	18.4	C	LTR	0.87	17.5	C					
42nd Street	EB	LT	1.09	74.9	*F**	LT	1.05	57.4	E			n/a		
42nd Street	WB	T	0.92	28.7	D	T	0.90	26.9	D					
Overall Intersection		**-**	**0.98**	**35.5**	**F***	**-**	**0.95**	**30.1**	**D**					
(16) MADISON AVENUE & 43rd STREET														
Madison Avenue	NB	LT	0.60	8.5	B	LT	0.57	8.3	B					
43rd Street	WB	TR	0.54	15.8	C	TR	0.65	17.4	C			n/a		
Overall Intersection		**-**	**0.58**	**10.3**	**B**	**-**	**0.61**	**10.7**	**B**					
(17) MADISON AVENUE & 44th STREET														
Madison Avenue	NB	TR	0.57	8.3	B	TR	0.60	8.5	B					
44th Street	EB	LT	0.95	38.7	D	LT	0.92	33.8	D			n/a		
Overall Intersection		**-**	**0.74**	**16.1**	**C**	**-**	**0.74**	**15.0**	**B**					
(18) MADISON AVENUE & 45th STREET														
Madison Avenue	NB	LT	0.67	9.1	B	LT	0.66	9.0	B					
45th Street	WB	TR	0.71	18.3	C	TR	0.75	19.5	C			n/a		
Overall Intersection		**-**	**0.68**	**11.7**	**B**	**-**	**0.70**	**12.0**	**B**					
(19) MADISON AVENUE & 46th STREET														
Madison Avenue	NB	TR	0.62	8.7	B	TR	0.64	8.9	B					
46th Street	EB	LT	0.67	17.6	C	LT	0.67	17.6	C			n/a		
Overall Intersection		**-**	**0.64**	**11.2**	**B**	**-**	**0.66**	**11.2**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE
AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(20) MADISON AVENUE & 47th STREET														
Madison Avenue	NB	LT	0.66	9.0	B	LT	0.70	9.4	B					
47th Street	WB	TR	0.73	18.5	C	TR	0.76	19.4	C			n/a		
Overall Intersection		-	**0.69**	**12.1**	**B**	-	**0.73**	**12.5**	**B**					
(21) MADISON AVENUE & 48th STREET														
Madison Avenue	NB	TR	0.69	9.3	B	TR	0.79	10.6	B					
48th Street	EB	LT	0.47	15.0	B	LT	0.48	15.1	C			n/a		
Overall Intersection		-	**0.59**	**10.5**	**B**	-	**0.65**	**11.5**	**B**					
(22) VANDERBILT AVENUE & 47th STREET														
Vanderbilt Avenue	NB	L	0.21	13.0	B	L	0.19	12.9	B					
47th Street	WB	LT	0.86	18.7	C	LT	0.86	18.7	C			n/a		
Overall Intersection		-	**0.57**	**18.4**	**C**	-	**0.57**	**18.4**	**C**					
(23) VANDERBILT AVENUE & 46th STREET														
Vanderbilt Avenue	NB	TR	0.49	13.4	B	TR	0.55	14.4	B					
Vanderbilt Avenue	SB	LT	0.40	12.1	B	LT	0.39	12.1	B			n/a		
46th Street	EB	LTR	0.58	13.8	B	LTR	0.58	13.8	B					
Overall Intersection		-	**0.53**	**13.3**	**B**	-	**0.56**	**13.5**	**B**					
(24) VANDERBILT AVENUE & 45th STREET														
Vanderbilt Avenue	NB	LT	1.05	76.9	F	LT	1.06	80.7	*F**					
Vanderbilt Avenue	SB	TR	0.78	20.2	C	TR	0.80	21.5	C			n/a		
45th Street	WB	LTR	0.86	26.4	D	LTR	0.90	30.6	D					
Overall Intersection		-	**0.96**	**36.8**	**D**	-	**0.98**	**40.0**	**F***					
(27) VANDERBILT AVENUE & 42nd STREET														
42nd Street	EB	LT	0.88	22.9	C	LT	0.87	21.6	C					
42nd Street	WB	TR	0.91	24.7	C	TR	0.91	24.3	C			n/a		
Overall Intersection		-	**0.44**	**23.9**	**C**	-	**0.44**	**23.0**	**C**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE
AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(28) PARK AVENUE & 40th STREET														
Park Avenue	NB	TR	0.46	8.8	B	TR	0.47	8.9	B					
Park Avenue	SB	T	0.30	7.8	B	T	0.30	7.8	B					
Park Avenue (tunnel)	NB	T	0.66	11.5	B	T	0.64	11.2	B		n/a			
Park Avenue (viaduct)	SB	T	0.69	11.3	B	T	0.65	10.8	B					
40th Street	EB	LT	0.97	45.7	E	LT	0.94	41.4	E					
		R	0.52	19.4	C	R	0.52	19.4	C					
Overall Intersection		-	**0.80**	**15.5**	**C**	-	**0.77**	**14.7**	**C**					
(29) PARK AVENUE(SB) & 41st STREET														
Park Avenue	SB	LT	0.39	8.4	B	LT	0.40	8.5	B					
41st Street	EB	TR	0.45	17.1	C	TR	0.43	16.8	C		n/a			
Overall Intersection		-	**0.41**	**11.8**	**B**	-	**0.41**	**11.7**	**B**					
(30) PARK AVENUE(NB) & 41st STREET														
Park Avenue	NB	TR	0.24	7.4	B	TR	0.27	7.6	B					
41st Street	EB	LT	0.49	17.6	C	LT	0.42	16.7	C		n/a			
Overall Intersection		-	**0.34**	**11.4**	**B**	-	**0.33**	**10.9**	**B**					
(31) PARK AVENUE & 42nd STREET														
Park Avenue	NB	LR	0.27	14.9	B	LR	0.05	13.5	B	L	0.05	13.5	B	-Remove parking along the NB approach
		R	1.02	92.7	F	R	1.20+	120.0+	*F**	R	0.49	17.2	C	to provide two right-turn lanes and one
42nd Street	EB	TR	1.11	84.6	*F**	TR	1.10	76.2	*F**	TR	1.10	76.7	*F**	left lane, adjust the signal timing to
42nd Street	WB	LT	0.77	13.6	B	LT	0.77	13.6	B	LT	0.77	13.6	B	provide a protected NB movement.
Overall Intersection		-	**0.87**	**48.3**	**F***	-	**1.20+**	**120.0+**	**F***	-	**0.65**	**48.3**	**F***	
(32) PARK AVENUE & 46th STREET														
Park Avenue	NB	TR	0.83	19.0	C	TR	0.81	18.3	C	TR	0.81	18.3	C	-Remove parking along the SB approach
Park Avenue	SB	L	1.11	120.0+	*F**	L	1.19	120.0+	*F**	L	0.13	10.8	B	to provide two left-turn lanes and two
		T	1.04	46.0	E	T	0.99	34.2	D	T	0.93	24.8	C	through lanes.
46th Street	EB	LTR	0.48	12.3	B	LTR	0.50	12.4	B	LTR	0.50	12.4	B	
Overall Intersection		-	**0.83**	**31.7**	**F***	-	**0.88**	**28.0**	**F***	-	**0.71**	**19.5**	**C**	

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE
AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(33) PARK AVENUE & 47th STREET														
Park Avenue	NB	DFL	0.79	37.1	D	DFL	0.79	37.1	D	LT	0.60	6.5	B	-Provide a protected N/S phase.
		T	0.86	10.7	B	T	0.85	10.2	B	-	-	-	-	
Park Avenue	SB	T	0.58	6.4	B	T	0.56	6.2	B	T	0.56	6.2	B	
		R	1.04	55.3	E	R	1.20+	120.0+	*F**	R	0.95	30.2	D	
47th Street	WB	LTR	0.91	30.1	D	LTR	0.93	31.5	D	LTR	0.93	31.5	D	
Overall Intersection		**-**	**0.92**	**16.6**	**C**	**-**	**1.15**	**30.4**	**F***	**-**	**0.94**	**13.1**	**B**	
(34) PARK AVENUE & 48th STREET														
Park Avenue	NB	TR	0.69	7.2	B	TR	0.70	7.4	B	TR	0.69	7.2	B	-Provide a protected N/S phase and
Park Avenue	SB	DFL	1.19	120.0+	*F**	DFL	1.20+	120.0+	*F**	LT	0.72	7.5	B	daylight the south curb of the EB
		T	1.01	27.1	D	T	0.99	21.2	C	-	-	-	-	approach.
48th Street	EB	LTR	0.78	22.8	C	LTR	0.95	37.8	D	LTR	0.89	29.7	D	
Overall Intersection		**-**	**1.08**	**22.0**	**F***	**-**	**1.20+**	**25.0**	**F***	**-**	**0.79**	**10.8**	**B**	
(35) LEXINGTON AVENUE & 48th STREET														
Lexington Avenue	SB	LT	0.88	10.7	B	LT	0.86	10.2	B					
48th Street	EB	TR	0.75	21.7	C	TR	0.82	24.0	C			n/a		
Overall Intersection		**-**	**0.83**	**13.3**	**B**	**-**	**0.84**	**13.7**	**B**					
(36) LEXINGTON AVENUE & 47th STREET														
Lexington Avenue	SB	TR	1.04	34.1	D	TR	1.02	27.2	D					
47th Street	WB	LT	0.79	22.3	C	LT	0.81	23.3	C			n/a		
Overall Intersection		**-**	**0.94**	**31.0**	**D**	**-**	**0.94**	**26.2**	**D**					
(37) LEXINGTON AVENUE & 46th STREET														
Lexington Avenue	SB	LT	0.89	10.9	B	LT	0.86	10.2	B					
46th Street	EB	TR	0.84	28.6	D	TR	0.85	29.2	D			n/a		
Overall Intersection		**-**	**0.87**	**13.9**	**B**	**-**	**0.86**	**13.5**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE
AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(38) LEXINGTON AVENUE & 45th STREET													
Lexington Avenue	SB	TR	1.12	77.9	*F**	TR	1.09	66.3	*F**				
45th Street	WB	LT	0.79	23.4	C	LT	0.88	29.2	D		n/a		
Overall Intersection		-	**0.88**	**65.9**	**F***	-	**0.90**	**57.9**	**F***				
(39) LEXINGTON AVENUE & 44th STREET													
Lexington Avenue	SB	LT	0.89	16.8	C	LT	0.87	16.2	C		n/a		
Overall Intersection		-	**0.42**	**16.8**	**C**	-	**0.41**	**16.2**	**C**				
(40) LEXINGTON AVENUE & 43rd STREET													
Lexington Avenue	SB	T	1.01	31.9	D	T	0.99	26.6	D	T	0.99	26.6	D	-Provide a protected WB signal phase.
43rd Street	WB	L	0.97	58.7	E	L	1.20+	120.0+	*F**	L	0.66	21.4	C	
Overall Intersection		-	**0.87**	**34.7**	**D**	-	**1.20+**	**120.0+**	**F***	-	**0.74**	**26.1**	**D**	
(41) LEXINGTON AVENUE & 42nd STREET													
Lexington Avenue	SB	LTR	1.11	71.7	*F**	LTR	1.08	58.3	*F**				
42nd Street	EB	TR	1.09	75.6	*F**	TR	1.06	64.3	*F**		n/a		
42nd Street	WB	LT	1.06	61.0	*F**	LT	1.04	52.0	*E*				
Overall Intersection		-	**1.10**	**69.9**	**F***	-	**1.07**	**58.0**	**F***				
(42) LEXINGTON AVENUE & 41st STREET													
Lexington Avenue	SB	LT	1.00	25.5	D	LT	0.98	21.4	C				
41st Street	EB	TR	0.82	28.4	D	TR	0.84	30.7	D		n/a		
Overall Intersection		-	**0.92**	**25.8**	**D**	-	**0.92**	**22.4**	**C**				
(43) LEXINGTON AVENUE & 40th STREET													
Lexington Avenue	SB	LT	0.93	12.9	B	LT	0.91	11.8	B				
40th Street	EB	TR	0.60	18.4	C	TR	0.67	19.6	C		n/a		
Overall Intersection		-	**0.80**	**14.0**	**B**	-	**0.81**	**13.5**	**B**				

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE
AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		No Build				Build				Mitigated Build				
		Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mvt.	v/c	Delay	LOS	Mitigation
(44) THIRD AVENUE & 40th STREET														
Third Avenue	NB	TR	0.73	7.5	B	TR	0.71	7.3	B					
40th Street	EB	LT	0.68	20.2	C	LT	0.68	20.4	C			n/a		
Overall Intersection		-	**0.71**	**9.2**	**B**	-	**0.70**	**9.1**	**B**					
(45) THIRD AVENUE & 41st STREET														
Third Avenue	NB	TR	0.74	7.6	B	TR	0.72	7.4	B	TR	0.72	7.4	B	-Provide a protected E/W signal phase.
41st Street	EB	LT	0.27	15.3	C	LT	0.27	15.2	C	LT	0.27	15.2	C	
41st Street	WB	R	0.96	49.1	E	R	1.10	99.8	*F**	R	0.67	20.6	C	
Overall Intersection		-	**0.83**	**12.0**	**B**	-	**0.87**	**16.4**	**F***	-	**0.70**	**9.2**	**B**	
(46) THIRD AVENUE & 42nd STREET														
Third Avenue	NB	LT	1.05	43.4	E	LT	1.05	44.4	E	LT	1.05	44.3	E	-Provide a protected E/W signal phase.
		R	0.73	23.2	C	R	0.77	27.3	D	R	0.77	27.3	D	
42nd Street	EB	LT	0.81	19.4	C	LT	0.76	17.5	C	LT	0.76	17.5	C	
42nd Street	WB	T	0.76	23.8	C	T	0.75	23.7	C	T	0.75	23.7	C	
		R	1.09	120.0+	*F**	R	1.20+	120.0+	*F**	R	0.95	68.5	F	
Overall Intersection		-	**0.93**	**38.5**	**F***	-	**0.90**	**35.6**	**F***	-	**0.90**	**37.5**	**D**	
(47) THIRD AVENUE & 43rd STREET														
Third Avenue	NB	LT	0.85	9.2	B	LT	0.83	8.7	B	LT	0.83	8.7	B	-Daylight the north curb to provide an
43rd Street	WB	TR	1.13	113.8	*F**	TR	1.20+	120.0+	*F**	T	0.22	15.0	B	exclusive RT lane WB and provide a
										R	1.03	75.4	F	protected WB signal phase.
Overall Intersection		-	**0.96**	**19.6**	**F***	-	**1.02**	**109.4**	**F***	-	**0.91**	**13.5**	**B**	
(48) THIRD AVENUE & 44th STREET														
Third Avenue	NB	TR	0.94	12.2	B	TR	0.91	10.7	B					
44th Street	EB	LT	0.70	24.2	C	LT	0.70	24.2	C			n/a		
Overall Intersection		-	**0.84**	**12.8**	**B**	-	**0.83**	**11.4**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE
AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		No Build				Build				Mitigated Build				
		Mvt.	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(49) THIRD AVENUE & 45th STREET														
Third Avenue	NB	LT	0.89	10.0	B	LT	0.87	9.5	B	LT	0.87	9.5	B	-Daylight the north curb of the WB
45th Street	WB	T	0.66	20.4	C	T	0.67	20.6	C	T	0.67	20.6	C	approach to allow for a right-turn lane.
		R	0.97	65.2	F	R	1.05	94.3	F	R	0.92	52.3	E	
Overall Intersection		-	**0.92**	**13.4**	**B**	-	**0.94**	**14.2**	**B**	-	**0.89**	**12.4**	**B**	
(50) THIRD AVENUE & 46th STREET														
Third Avenue	NB	TR	0.82	8.6	B	TR	0.80	8.2	B	TR	0.80	8.2	B	-Daylight the north curb of the EB
46th Street	EB	LT	1.02	62.8	F	LT	1.12	101.8	*F**	L	0.94	59.6	E	approach to allow for a left-turn lane.
										T	0.51	17.7	C	
Overall Intersection		-	**0.90**	**14.6**	**B**	-	**0.92**	**19.0**	**F***	-	**0.85**	**11.1**	**B**	
(51) THIRD AVENUE & 47th STREET														
Third Avenue	NB	LT	0.82	8.6	B	LT	0.81	8.4	B					
47th Street	WB	TR	0.65	19.1	C	TR	0.63	18.8	C			n/a		
Overall Intersection		-	**0.75**	**10.3**	**B**	-	**0.74**	**10.1**	**B**					
(52) THIRD AVENUE & 48th STREET														
Third Avenue	NB	TR	0.78	8.0	B	TR	0.76	7.8	B	TR	0.76	7.8	B	-Daylight the north curb of the EB
48th Street	EB	LT	1.13	105.2	*F**	LT	1.20+	120.0+	*F**	L	0.96	59.1	E	approach to allow for a left-turn lane.
										T	0.61	19.2	C	
Overall Intersection		-	**0.92**	**20.3**	**F***	-	**0.97**	**38.6**	**F***	-	**0.84**	**11.6**	**B**	

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE
AM PEAK HOUR (8-9 AM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(53) SECOND AVENUE & 42nd STREET														
Second Avenue	SB	LTR	0.93	18.5	C	LTR	0.91	17.7	C					
42nd Street	EB	TR	0.78	20.7	C	TR	0.76	19.9	C			n/a		
42nd Street	WB	LT	1.14	104.8	*F**	LT	1.11	88.2	*F**					
Overall Intersection		**-**	**1.02**	**30.3**	**F***	**-**	**1.00**	**27.5**	**F***					
(54) FIRST AVENUE & 42nd STREET														
First Avenue	NB	LTR	0.29	11.3	B	LTR	0.29	11.2	B					
42nd Street	EB	L	1.13	113.3	*F**	L	1.08	87.6	*F**					
		T	0.77	20.3	C	T	0.75	19.7	C			n/a		
42nd Street	WB	TR	0.54	17.6	C	TR	0.53	17.4	C					
		R	1.07	83.2	*F**	R	1.05	73.8	F					
Overall Intersection		**-**	**0.70**	**41.1**	**F***	**-**	**0.68**	**35.6**	**F***					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE
AM PEAK HOUR (8-9 AM)

UNSIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS
(25) VANDERBILT AVENUE & 44th STREET													
44th Street	EB	L	7.8	1.1	B	L	7.9	1.1	B				
		R	3.5	0.4	A	R	3.6	0.6	A			n/a	
(26) VANDERBILT AVENUE & 43rd STREET													
Vanderbilt Avenue	NB	L	2.8	0.2	A	L	2.8	0.2	A				
43rd Street	WB	TR	7.4	1.7	B	TR	8.0	2.1	B			n/a	

GENERAL NOTES:

1. "MVT" refers to the specific intersection approach lane(s) and how the lane(s) operate and/or specific pavement striping. TR is a combined through-right turn lane(s), R or L refers to exclusive right- or left-turn movement lane(s), and LTR is a mixed lane(s) that allows for all movement types. DfL refers to a "defacto left-turn" lane that is formed due to a very heavy left-turn volume; in effect, only left turners use this lane. It is possible that lane uses change in different time periods. For example, a very heavy right-turn volume may exceed a single lane capacity, thus forcing drivers to use (or "share") an adjacent lane for additional travel capacity in the AM, but as flows decrease later in the day, a shared lane may not be needed.

2. "v/c" is the volume-to-capacity ratio for the MVT listed in the first column.

3. "Delay" is expressed in seconds per vehicle for the MVT listed in the first column.

4. "LOS" is based on average stopped delay per vehicle (sec/veh) for each signaled lane group, and on total average delay for unsignalized approaches as listed in the 1994 HCM, TRB SR 209.

5. " * " indicates that Delay and Level of Service are not meaningful when any v/c is greater than 1.2 or 1/PHF. Also, it is beyond the scope of HCM to assess delay for an approach which operates in oversaturated conditions.

6. 95% queue length is expressed in vehicles.

7. Significant Impact is defined as No Action LOS A,B,C, or D deteriorating to LOS E or F under the Build condition providing that the average vehicle delay increase is 10 seconds or more ; and No Action LOS E deteriorating to LOS F for the Build condition providing that the average vehicle delay increases by 10 seconds or more. Deterioration from the No Action condition to the Build condition within either LOS E or F with 10 seconds or more of additional delay is defined as a significant worsening of a pre-existing problem.

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(1) SEVENTH AVENUE & 42nd STREET														
Seventh Avenue	SB	LTR	0.68	12.1	B	LTR	0.66	11.9	B					
42nd Street	EB	TR	0.85	23.8	C	TR	0.82	22.4	C			n/a		
42nd Street	WB	LT	0.64	17.6	C	LT	0.62	17.4	C					
Overall Intersection		-	**0.75**	**16.2**	**C**	-	**0.73**	**15.7**	**C**					
(2) BROADWAY & 42nd STREET														
Broadway	SB	LTR	0.60	12.2	B	LTR	0.60	12.1	B					
42nd Street	EB	TR	0.67	17.2	C	TR	0.65	16.7	C			n/a		
42nd Street	WB	LT	1.17	120.0+	*F**	LT	1.14	104.0	*F**					
		-	-	-	-	-	-	-	-					
Overall Intersection		-	**0.86**	**43.5**	**F***	-	**0.84**	**38.5**	**F***					
(3) SIXTH AVENUE & 42nd STREET														
Sixth Avenue	NB	LT	0.87	16.7	C	LT	0.87	16.4	C					
		R	0.37	10.1	B	R	0.37	10.1	B					
42nd Street	EB	LT	0.79	20.7	C	LT	0.76	19.8	C			n/a		
42nd Street	WB	TR	0.71	18.2	C	TR	0.70	18.2	C					
		R	1.16	120.0+	*F**	R	1.16	120.0+	*F**					
Overall Intersection		-	**1.00**	**23.7**	**F***	-	**1.00**	**23.4**	**F***					
(4) FIFTH AVENUE & 48th STREET														
Fifth Avenue	SB	LT	0.85	14.8	B	LT	0.86	15.1	C					
48th Street	EB	TR	0.59	14.0	B	TR	0.61	14.3	B			n/a		
Overall Intersection		-	**0.72**	**14.6**	**B**	-	**0.74**	**14.9**	**B**					
(5) FIFTH AVENUE & 47th STREET														
Fifth Avenue	SB	TR	0.81	13.7	B	TR	0.79	13.4	B					
47th Street	WB	LT	0.63	14.7	B	LT	0.64	14.7	B			n/a		
Overall Intersection		-	**0.72**	**13.9**	**B**	-	**0.71**	**13.7**	**B**					
(6) FIFTH AVENUE & 46th STREET														
Fifth Avenue	SB	LT	0.86	15.1	C	LT	0.86	15.0	B					
46th Street	EB	TR	0.54	13.5	B	TR	0.55	13.6	B			n/a		
Overall Intersection		-	**0.70**	**14.8**	**B**	-	**0.71**	**14.8**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(7) FIFTH AVENUE & 45th STREET														
Fifth Avenue	SB	TR	0.86	15.1	C	TR	0.86	14.8	B					
45th Street	WB	LT	1.05	66.0	F	LT	1.06	70.5	*F**			n/a		
Overall Intersection		**-**	**0.96**	**23.2**	**C**	**-**	**0.95**	**23.7**	**F***					
(8) FIFTH AVENUE & 44th STREET														
Fifth Avenue	SB	LT	0.83	14.3	B	LT	0.82	14.1	B					
44th Street	EB	TR	0.50	13.0	B	TR	0.52	13.2	B			n/a		
Overall Intersection		**-**	**0.66**	**14.0**	**B**	**-**	**0.67**	**14.0**	**B**					
(9) FIFTH AVENUE & 43rd STREET														
Fifth Avenue	SB	TR	0.88	15.6	C	TR	0.86	15.1	C					
43rd Street	WB	LT	1.10	89.4	*F**	LT	1.12	96.1	*F**			n/a		
Overall Intersection		**-**	**0.99**	**28.5**	**F***	**-**	**0.99**	**29.3**	**F***					
(10) FIFTH AVENUE & 42nd STREET														
Fifth Avenue	SB	LTR	0.72	13.1	B	LTR	0.70	12.8	B					
42nd Street	EB	TR	0.88	25.5	D	TR	0.86	24.2	C			n/a		
42nd Street	WB	LT	1.05	55.4	E	LT	1.04	54.1	E					
Overall Intersection		**-**	**0.86**	**26.1**	**D**	**-**	**0.85**	**25.5**	**D**					
(11) FIFTH AVENUE & 41st STREET														
Fifth Avenue	SB	LT	0.67	6.0	B	LT	0.66	5.9	B			n/a		
Overall Intersection		**-**	**0.41**	**6.0**	**B**	**-**	**0.40**	**5.9**	**B**					
(12) FIFTH AVENUE & 40th STREET														
Fifth Avenue	SB	LT	0.68	9.2	B	LT	0.67	9.1	B					
40th Street	EB	TR	0.56	16.0	C	TR	0.56	16.0	C			n/a		
Overall Intersection		**-**	**0.63**	**10.7**	**B**	**-**	**0.62**	**10.6**	**B**					
(13) MADISON AVENUE & 40th STREET														
Madison Avenue	NB	TR	0.96	22.2	C	TR	0.96	22.7	C					
40th Street	EB	LT	0.48	12.8	B	LT	0.48	12.8	B			n/a		
Overall Intersection		**-**	**0.72**	**20.1**	**C**	**-**	**0.72**	**20.4**	**C**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(14) MADISON AVENUE & 41st STREET													
Madison Avenue	NB	TR	0.95	21.2	C	TR	0.96	21.6	C				
41st Street	EB	LT	0.59	15.3	C	LT	0.63	16.5	C		n/a		
Overall Intersection		**-**	**0.77**	**20.5**	**C**	**-**	**0.79**	**21.1**	**C**				
(15) MADISON AVENUE & 42nd STREET													
Madison Avenue	NB	LTR	0.95	25.9	D	LTR	0.95	25.6	D				
42nd Street	EB	LT	1.11	87.7	*F**	LT	1.08	75.5	*F**		n/a		
42nd Street	WB	T	0.79	18.0	C	T	0.79	18.0	C				
Overall Intersection		**-**	**0.87**	**38.6**	**F***	**-**	**0.87**	**35.3**	**F***				
(16) MADISON AVENUE & 43rd STREET													
Madison Avenue	NB	LT	0.66	11.8	B	LT	0.66	11.8	B				
43rd Street	WB	TR	0.41	12.2	B	TR	0.45	12.5	B		n/a		
Overall Intersection		**-**	**0.54**	**11.9**	**B**	**-**	**0.55**	**11.9**	**B**				
(17) MADISON AVENUE & 44th STREET													
Madison Avenue	NB	TR	0.59	11.1	B	TR	0.60	11.2	B				
44th Street	EB	LT	0.73	18.1	C	LT	0.70	17.2	C		n/a		
Overall Intersection		**-**	**0.66**	**12.5**	**B**	**-**	**0.65**	**12.4**	**B**				
(18) MADISON AVENUE & 45th STREET													
Madison Avenue	NB	LT	0.69	12.1	B	LT	0.69	12.1	B				
45th Street	WB	TR	1.00	50.4	E	TR	1.03	58.7	E		n/a		
Overall Intersection		**-**	**0.84**	**19.5**	**C**	**-**	**0.86**	**21.2**	**C**				
(19) MADISON AVENUE & 46th STREET													
Madison Avenue	NB	TR	0.69	12.1	B	TR	0.70	12.2	B				
46th Street	EB	LT	0.97	40.8	E	LT	0.97	42.5	E		n/a		
Overall Intersection		**-**	**0.83**	**18.3**	**C**	**-**	**0.84**	**18.7**	**C**				
(20) MADISON AVENUE & 47th STREET													
Madison Avenue	NB	LT	0.67	11.8	B	LT	0.68	12.0	B				
47th Street	WB	TR	0.58	13.9	B	TR	0.61	14.3	B		n/a		
Overall Intersection		**-**	**0.63**	**12.4**	**B**	**-**	**0.65**	**12.7**	**B**				

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

			No Build			Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(21) MADISON AVENUE & 48th STREET														
Madison Avenue	NB	TR	0.70	12.2	B	TR	0.75	12.9	B					
48th Street	EB	LT	0.57	13.8	B	LT	0.64	14.8	B			n/a		
Overall Intersection		-	**0.64**	**12.6**	**B**	-	**0.70**	**13.4**	**B**					
(22) VANDERBILT AVENUE & 47th STREET														
Vanderbilt Avenue	NB	L	0.12	12.5	B	L	0.12	12.5	B					
47th Street	WB	LT	0.77	15.2	C	LT	0.78	15.4	C			n/a		
Overall Intersection		-	**0.49**	**15.1**	**C**	-	**0.49**	**15.3**	**C**					
(23) VANDERBILT AVENUE & 46th STREET														
Vanderbilt Avenue	NB	TR	0.78	23.8	C	TR	0.82	26.8	D					
Vanderbilt Avenue	SB	LT	0.37	11.9	B	LT	0.37	11.9	B			n/a		
46th Street	EB	LTR	0.43	12.3	B	LTR	0.43	12.3	B					
Overall Intersection		-	**0.61**	**14.7**	**B**	-	**0.62**	**15.4**	**C**					
(24) VANDERBILT AVENUE & 45th STREET														
Vanderbilt Avenue	NB	LT	0.30	11.4	B	LT	0.31	11.4	B					
Vanderbilt Avenue	SB	TR	0.53	13.7	B	TR	0.53	13.7	B			n/a		
45th Street	WB	LTR	0.39	12.0	B	LTR	0.40	12.1	B					
Overall Intersection		-	**0.46**	**12.4**	**B**	-	**0.47**	**12.5**	**B**					
(27) VANDERBILT AVENUE & 42nd STREET														
42nd Street	EB	LT	0.82	19.2	C	LT	0.80	18.7	C					
42nd Street	WB	TR	0.88	22.1	C	TR	0.89	22.5	C			n/a		
Overall Intersection		-	**0.43**	**20.8**	**C**	-	**0.43**	**20.8**	**C**					
(28) PARK AVENUE & 40th STREET														
Park Avenue	NB	TR	0.52	9.0	B	TR	0.53	9.1	B					
Park Avenue	SB	T	0.30	7.4	B	T	0.30	7.4	B					
Park Avenue (tunnel)	NB	T	0.64	10.6	B	T	0.64	10.6	B					
Park Avenue (viaduct)	SB	T	0.56	9.3	B	T	0.55	9.2	B			n/a		
40th Street	EB	LTR	0.80	26.2	D	LTR	0.80	26.2	D					
		R	0.56	21.1	C	R	0.56	21.1	C					
Overall Intersection		-	**0.70**	**11.7**	**B**	-	**0.70**	**11.1**	**B**					

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2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(29) PARK AVENUE(SB) & 41st STREET													
Park Avenue	SB	LT	0.28	7.7	B	LT	0.28	7.7	B				
41st Street	EB	TR	0.59	19.7	C	TR	0.59	19.7	C		n/a		
Overall Intersection		**-**	**0.40**	**13.6**	**B**	**-**	**0.40**	**13.6**	**B**				
(30) PARK AVENUE(NB) & 41st STREET													
Park Avenue	NB	TR	0.29	7.7	B	TR	0.31	7.8	B				
41st Street	EB	LT	0.42	16.7	C	LT	0.42	16.7	C		n/a		
Overall Intersection		**-**	**0.34**	**10.4**	**B**	**-**	**0.35**	**10.5**	**B**				
(31) PARK AVENUE & 42nd STREET													
Park Avenue	NB	LR	0.37	15.8	C	LR	0.40	16.2	C	L	0.07	14.5	B	-Remove parking along the NB approach
		R	1.20+	120.0+	*F**	R	1.20+	120.0+	*F**	R	0.64	21.0	C	to provide two right-turn lanes and one
42nd Street	EB	T	0.55	15.3	C	T	0.53	15.1	C	T	0.51	13.9	B	left lane, adjust the signal timing to
		R	1.20+	120.0+	*F**	R	1.20+	120.0+	*F**	R	1.20+	120.0+	*F**	provide a protected NB phase, and shift
42nd Street	WB	LT	0.72	12.4	B	LT	0.74	12.9	B	LT	0.71	11.5	B	2 seconds of green time from the NB phase to the E/W phase.
Overall Intersection		**-**	**1.20+**	**54.4**	**F***	**-**	**1.20+**	**104.9**	**F***	**-**	**1.05**	**34.1**	**F***	
(32) PARK AVENUE & 46th STREET													
Park Avenue	NB	TR	0.99	35.3	D	TR	0.99	35.4	D				
Park Avenue	SB	L	1.19	120.0+	*F**	L	1.19	120.0+	*F**				
		T	0.90	23.3	C	T	0.89	22.2	C		n/a		
46th Street	EB	LTR	0.66	14.6	B	LTR	0.66	14.6	B				
Overall Intersection		**-**	**0.96**	**31.0**	**F***	**-**	**0.96**	**28.0**	**F***				
(33) PARK AVENUE & 47th STREET													
Park Avenue	NB	DFL	0.99	87.5	F	DFL	0.99	87.5	F				
		T	0.85	10.2	B	T	0.82	9.4	B				
Park Avenue	SB	TR	0.78	8.4	B	TR	0.79	8.5	B		n/a		
47th Street	WB	LTR	0.82	24.0	C	LTR	0.82	24.1	C				
Overall Intersection		**-**	**0.97**	**13.3**	**B**	**-**	**0.97**	**13.1**	**B**				

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(34) PARK AVENUE & 48th STREET														
Park Avenue	NB	TR	0.66	7.0	B	TR	0.65	6.9	B	TR	0.65	6.9	B	-Provide a protected N/S phase and
Park Avenue	SB	DFL	0.85	48.5	E	DFL	0.93	67.0	F	LT	0.64	6.8	B	daylight the south curb of the EB
		T	0.90	12.2	B	T	0.89	11.9	B	-	-	-	-	approach.
48th Street	EB	LTR	0.97	40.6	E	LTR	1.03	56.5	E	LTR	0.97	39.8	D	
Overall Intersection		**-**	**0.93**	**15.4**	**C**	**-**	**1.00**	**19.0**	**C**	**-**	**0.77**	**12.7**	**B**	
(35) LEXINGTON AVENUE & 48th STREET														
Lexington Avenue	SB	LT	0.92	18.1	C	LT	0.92	18.0	C					
48th Street	EB	TR	0.52	13.2	B	TR	0.56	13.7	B			n/a		
Overall Intersection		**-**	**0.72**	**16.9**	**C**	**-**	**0.74**	**16.9**	**C**					
(36) LEXINGTON AVENUE & 47th STREET														
Lexington Avenue	SB	TR	0.98	24.3	C	TR	0.98	24.4	C					
47th Street	WB	LT	0.99	41.4	E	LT	1.01	47.0	E			n/a		
Overall Intersection		**-**	**0.98**	**28.9**	**D**	**-**	**0.99**	**30.4**	**D**					
(37) LEXINGTON AVENUE & 46th STREET														
Lexington Avenue	SB	LT	0.89	16.5	C	LT	0.89	16.6	C					
46th Street	EB	TR	1.01	48.6	E	TR	1.03	54.0	E			n/a		
Overall Intersection		**-**	**0.95**	**25.0**	**C**	**-**	**0.96**	**26.6**	**D**					
(38) LEXINGTON AVENUE & 45th STREET														
Lexington Avenue	SB	TR	1.12	83.8	*F**	TR	1.12	82.3	*F**					
45th Street	WB	LT	0.95	38.9	D	LT	0.42	12.2	B			n/a		
Overall Intersection		**-**	**0.97**	**74.7**	**F***	**-**	**0.70**	**67.4**	**F***					
(39) LEXINGTON AVENUE & 44th STREET														
Lexington Avenue	SB	LT	1.12	81.3	*F**	LT	1.12	81.3	*F**			n/a		
Overall Intersection		**-**	**0.48**	**81.3**	**F***	**-**	**0.48**	**81.3**	**F***					
(40) LEXINGTON AVENUE & 43rd STREET														
Lexington Avenue	SB	T	0.74	10.6	B	T	0.74	10.6	B	T	0.74	10.6	B	-Provide a protected WB signal phase.
43rd Street	WB	L	0.92	48.0	E	L	1.20+	120.0+	*F**	L	0.56	18.6	C	
Overall Intersection		**-**	**0.77**	**15.0**	**B**	**-**	**1.02**	**74.8**	**F***	**-**	**0.62**	**11.5**	**B**	

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(41) LEXINGTON AVENUE & 42nd STREET														
Lexington Avenue	SB	LTR	1.00	33.6	D	LTR	1.01	34.5	D					
42nd Street	EB	TR	0.95	33.5	D	TR	0.92	29.2	D			n/a		
42nd Street	WB	LT	0.88	25.3	D	LT	0.88	24.7	C					
Overall Intersection		**-**	**0.98**	**31.5**	**D**	**-**	**0.97**	**30.8**	**D**					
(42) LEXINGTON AVENUE & 41st STREET														
Lexington Avenue	SB	LT	0.78	10.6	B	LT	0.77	10.5	B					
41st Street	EB	TR	0.75	23.4	C	TR	0.76	23.9	C			n/a		
Overall Intersection		**-**	**0.77**	**12.3**	**B**	**-**	**0.76**	**12.2**	**B**					
(43) LEXINGTON AVENUE & 40th STREET														
Lexington Avenue	SB	LT	0.73	7.8	B	LT	0.73	7.7	B					
40th Street	EB	TR	0.61	18.6	C	TR	0.61	18.6	C			n/a		
Overall Intersection		**-**	**0.68**	**10.2**	**B**	**-**	**0.68**	**10.1**	**B**					
(44) THIRD AVENUE & 40th STREET														
Third Avenue	NB	TR	0.72	7.4	B	TR	0.72	7.4	B					
40th Street	EB	LT	0.57	18.2	C	LT	0.57	18.3	C			n/a		
Overall Intersection		**-**	**0.66**	**8.7**	**B**	**-**	**0.66**	**8.7**	**B**					
(45) THIRD AVENUE & 41st STREET														
Third Avenue	NB	TR	0.74	7.6	B	TR	0.73	7.5	B					
41st Street	EB	LT	0.56	18.6	C	LT	0.56	18.6	C			n/a		
41st Street	WB	R	0.69	25.5	D	R	0.73	28.5	D					
Overall Intersection		**-**	**0.72**	**9.0**	**B**	**-**	**0.73**	**9.1**	**B**					
(46) THIRD AVENUE & 42nd STREET														
Third Avenue	NB	LT	0.95	23.3	C	LT	0.96	24.4	C	LT	1.01	34.1	D	-Provide a protected NB signal phase,
		R	1.14	120.0+	*F**	R	1.19	120.0+	*F**	R	0.96	51.9	E	shift 3 seconds of green time from the NB
42nd Street	EB	LT	0.87	22.5	C	LT	0.86	21.6	C	LT	0.80	17.4	C	phase to the E/W phase and daylight the
42nd Street	WB	T	0.59	20.6	C	T	0.59	20.6	C	T	0.53	18.4	C	west curb of the NB approach.
		R	1.06	101.7	*F**	R	1.16	120.0+	*F**	R	1.05	96.4	F	
Overall Intersection		**-**	**1.00**	**30.8**	**F***	**-**	**1.03**	**35.1**	**F***	**-**	**0.90**	**32.3**	**D**	

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(47) THIRD AVENUE & 43rd STREET														
Third Avenue	NB	LT	0.78	8.0	B	LT	0.77	7.9	B	LT	0.82	10.3	B	-Shift 3 seconds of green time from the NB
43rd Street	WB	TR	0.99	57.3	E	TR	1.05	77.9	F	TR	0.96	49.8	E	phase to the WB phase.
Overall Intersection		**-**	**0.86**	**12.5**	**B**	**-**	**0.88**	**14.4**	**B**	**-**	**0.88**	**13.9**	**B**	
(48) THIRD AVENUE & 44th STREET														
Third Avenue	NB	TR	0.83	8.7	B	TR	0.82	8.5	B					
44th Street	EB	LT	0.75	26.6	D	LT	0.76	26.7	D			n/a		
Overall Intersection		**-**	**0.80**	**9.8**	**B**	**-**	**0.79**	**9.7**	**B**					
(49) THIRD AVENUE & 45th STREET														
Third Avenue	NB	LT	0.80	8.2	B	LT	0.79	8.1	B					
45th Street	WB	TR	0.99	55.9	E	TR	1.01	60.4	F			n/a		
Overall Intersection		**-**	**0.87**	**13.4**	**B**	**-**	**0.88**	**13.9**	**B**					
(50) THIRD AVENUE & 46th STREET														
Third Avenue	NB	TR	0.90	15.7	C	TR	0.89	15.4	C					
46th Street	EB	LT	0.49	12.9	B	LT	0.50	13.0	B			n/a		
Overall Intersection		**-**	**0.69**	**15.2**	**C**	**-**	**0.70**	**15.0**	**B**					
(51) THIRD AVENUE & 47th STREET														
Third Avenue	NB	LT	0.90	15.5	C	LT	0.88	15.3	C					
47th Street	WB	TR	1.08	76.3	*F**	TR	1.08	77.6	*F**			n/a		
Overall Intersection		**-**	**0.98**	**24.7**	**F***	**-**	**0.98**	**24.8**	**F***					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(52) THIRD AVENUE & 48th STREET														
Third Avenue	NB	TR	0.86	14.8	B	TR	0.86	14.6	B	TR	0.86	14.6	B	-Daylight the north curb to provide a
48th Street	EB	LT	1.05	65.1	F	LT	1.12	96.1	*F**	L	0.93	45.4	E	left-turn lane eastbound.
										T	0.40	12.2	B	
Overall Intersection		-	**0.96**	**21.9**	**C**	-	**0.99**	**26.9**	**F***	-	**0.90**	**16.6**	**C**	
(53) SECOND AVENUE & 42nd STREET														
Second Avenue	SB	LTR	0.92	18.2	C	LTR	0.91	18.1	C					
42nd Street	EB	TR	0.79	20.7	C	TR	0.80	21.1	C			n/a		
42nd Street	WB	LT	0.86	26.0	D	LT	0.86	26.5	D					
Overall Intersection		-	**0.89**	**19.6**	**C**	-	**0.89**	**19.7**	**C**					
(54) FIRST AVENUE & 42nd STREET														
First Avenue	NB	LTR	0.24	10.9	B	LTR	0.24	10.9	B					
42nd Street	EB	L	0.96	46.2	E	L	0.96	46.2	E					
		T	0.81	22.0	C	T	0.81	22.0	C			n/a		
42nd Street	WB	T	0.31	15.5	C	T	0.31	15.5	C					
		R	0.86	32.6	D	R	0.88	34.5	D					
Overall Intersection			**0.61**	**24.6**	**C**		**0.61**	**24.9**	**C**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

MIDDAY PEAK HOUR (12-1 PM)

UNSIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS
(25) VANDERBILT AVENUE & 44th STREET													
44th Street	EB	L	6.5	0.5	B	L	6.6	0.5	B		n/a		
		R	3.3	0.2	A	R	3.3	0.3	A				
(26) VANDERBILT AVENUE & 43rd STREET													
Vanderbilt Avenue	NB	L	2.9	0.2	A	L	3.0	0.3	A		n/a		
43rd Street	WB	TR	5.7	0.7	B	TR	6.1	0.9	B				

GENERAL NOTES:

1. "MVT" refers to the specific intersection approach lane(s) and how the lane(s) operate and/or specific pavement striping. TR is a combined through-right turn lane(s), R or L refers to exclusive right- or left-turn movement lane(s), and LTR is a mixed lane(s) that allows for all movement types. DfL refers to a "defacto left-turn" lane that is formed due to a very heavy left-turn volume; in effect, only left turners use this lane. It is possible that lane uses change in different time periods. For example, a very heavy right-turn volume may exceed a single lane capacity, thus forcing drivers to use (or "share") an adjacent lane for additional travel capacity in the AM, but as flows decrease later in the day, a shared lane may not be needed.

2. "v/c" is the volume-to-capacity ratio for the MVT listed in the first column.

3. "Delay" is expressed in seconds per vehicle for the MVT listed in the first column.

4. "LOS" is based on average stopped delay per vehicle (sec/veh) for each signaled lane group, and on total average delay for unsignalized approaches as listed in the 1994 HCM, TRB SR 209.

5. " * " indicates that Delay and Level of Service are not meaningful when any v/c is greater than 1.2 or 1/PHF. Also, it is beyond the scope of HCM to assess delay for an approach which operates in oversaturated conditions.

6. 95% queue length is expressed in vehicles.

7. Significant Impact is defined as No Action LOS A,B,C, or D deteriorating to LOS E or F under the Build condition providing that the average vehicle delay increase is 10 seconds or more ; and No Action LOS E deteriorating to LOS F for the Build condition providing that the average vehicle delay increases by 10 seconds or more. Deterioration from the No Action condition to the Build condition within either LOS E or F with 10 seconds or more of additional delay is defined as a significant worsening of a pre-existing problem.

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(1) SEVENTH AVENUE & 42nd STREET														
Seventh Avenue	SB	LTR	0.81	14.5	B	LTR	0.77	13.6	B					
42nd Street	EB	TR	0.80	22.0	C	TR	0.72	19.5	C					
42nd Street	WB	LT	0.90	28.4	D	LT	0.87	25.4	D			n/a		
Overall Intersection		-	**0.85**	**18.7**	**C**	-	**0.81**	**17.1**	**C**					
(2) BROADWAY & 42nd STREET														
Broadway	SB	LTR	0.67	13.1	B	LTR	0.65	12.8	B					
42nd Street	EB	TR	0.56	15.5	C	TR	0.48	14.6	B			n/a		
42nd Street	WB	LT	1.20+	120.0+	*F**	LT	1.18	120.0+	*F**					
		-	-	-	-	-	-	-	-					
Overall Intersection		-	**0.94**	**66.4**	**F***	-	**0.89**	**49.2**	**F***					
(3) SIXTH AVENUE & 42nd STREET														
Sixth Avenue	NB	LTR	1.08	57.8	F*	LTR	1.03	35.9	D	LTR	1.05	43.5	E	-Shift 1 second of green time from
		R	0.47	11.3	B	R	0.66	16.5	C	R	0.68	17.6	C	the NB phase to the E/W phase.
42nd Street	EB	LT	0.79	20.9	C	LT	0.71	18.4	C	LT	0.69	17.6	C	
42nd Street	WB	TR	0.74	19.0	C	TR	0.73	18.8	C	TR	0.71	17.9	C	
		R	1.16	120.0+	*F**	R	1.19	120.0+	*F**	R	1.16	120.0+	*F**	
Overall Intersection		-	**1.12**	**48.6**	**F***	-	**1.10**	**35.5**	**F***	-	**1.10**	**39.1**	**F***	
(4) FIFTH AVENUE & 48th STREET														
Fifth Avenue	SB	LT	0.72	9.6	B	LT	0.75	10.0	B					
48th Street	EB	TR	0.82	21.7	C	TR	0.92	28.1	D			n/a		
Overall Intersection		-	**0.76**	**13.1**	**B**	-	**0.82**	**15.8**	**C**					
(5) FIFTH AVENUE & 47th STREET														
Fifth Avenue	SB	TR	0.69	9.3	B	TR	0.66	9.0	B					
47th Street	WB	LT	0.55	15.9	C	LT	0.58	16.2	C			n/a		
Overall Intersection		-	**0.63**	**10.7**	**B**	-	**0.63**	**10.6**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(6) FIFTH AVENUE & 46th STREET														
Fifth Avenue	SB	LT	0.72	9.6	B	LT	0.69	9.3	B					
46th Street	EB	TR	0.65	17.3	C	TR	0.67	17.6	C			n/a		
Overall Intersection		-	**0.69**	**11.4**	**B**	-	**0.68**	**11.3**	**B**					
(7) FIFTH AVENUE & 45th STREET														
Fifth Avenue	SB	TR	0.73	9.7	B	TR	0.70	9.4	B					
45th Street	WB	LT	0.55	15.8	C	LT	0.58	16.2	C			n/a		
Overall Intersection		-	**0.65**	**11.1**	**B**	-	**0.65**	**11.0**	**B**					
(8) FIFTH AVENUE & 44th STREET														
Fifth Avenue	SB	LT	0.72	9.7	B	LT	0.70	9.4	B					
44th Street	EB	TR	0.65	17.5	C	TR	0.69	18.3	C			n/a		
Overall Intersection		-	**0.69**	**11.3**	**B**	-	**0.69**	**11.4**	**B**					
(9) FIFTH AVENUE & 43rd STREET														
Fifth Avenue	SB	TR	0.77	10.3	B	TR	0.73	9.8	B					
43rd Street	WB	LT	0.49	15.2	C	LT	0.50	15.3	C			n/a		
Overall Intersection		-	**0.65**	**11.2**	**B**	-	**0.63**	**10.9**	**B**					
(10) FIFTH AVENUE & 42nd STREET														
Fifth Avenue	SB	LTR	0.68	12.5	B	LTR	0.64	12.1	B					
42nd Street	EB	TR	0.93	29.4	D	TR	0.84	23.1	C			n/a		
42nd Street	WB	LT	1.13	94.6	*F**	LT	1.09	75.2	*F**					
Overall Intersection		-	**0.88**	**37.4**	**F***	-	**0.84**	**31.5**	**F***					
(11) FIFTH AVENUE & 41st STREET														
Fifth Avenue	SB	LT	0.68	6.2	B	LT	0.66	6.0	B			n/a		
Overall Intersection		-	**0.42**	**6.2**	**B**	-	**0.40**	**6.0**	**B**					
(12) FIFTH AVENUE & 40th STREET														
Fifth Avenue	SB	LT	0.69	9.4	B	LT	0.66	9.0	B					
40th Street	EB	TR	0.74	19.3	C	TR	0.75	19.6	C			n/a		
Overall Intersection		-	**0.71**	**12.1**	**B**	-	**0.70**	**12.1**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(13) MADISON AVENUE & 40th STREET														
Madison Avenue	NB	TR	0.90	14.3	B	TR	0.90	14.1	B					
40th Street	EB	LT	0.58	16.2	C	LT	0.58	16.2	C			n/a		
Overall Intersection		-	**0.76**	**14.8**	**B**	-	**0.76**	**14.7**	**B**					
(14) MADISON AVENUE & 41st STREET														
Madison Avenue	NB	TR	0.86	12.7	B	TR	0.87	12.8	B					
41st Street	EB	LT	0.50	15.8	C	LT	0.52	16.1	C			n/a		
Overall Intersection		-	**0.70**	**13.0**	**B**	-	**0.71**	**13.2**	**B**					
(15) MADISON AVENUE & 42nd STREET														
Madison Avenue	NB	LTR	0.86	17.1	C	LTR	0.85	16.8	C					
42nd Street	EB	LT	1.03	51.1	E	LT	0.95	33.1	D					
42nd Street	WB	T	0.92	28.5	D	T	0.92	28.5	D			n/a		
Overall Intersection		-	**0.93**	**28.8**	**D**	-	**0.89**	**23.9**	**C**					
(16) MADISON AVENUE & 43rd STREET														
Madison Avenue	NB	LT	0.58	8.4	B	LT	0.57	8.3	B					
43rd Street	WB	TR	0.44	14.7	B	TR	0.56	16.0	C			n/a		
Overall Intersection		-	**0.52**	**9.7**	**B**	-	**0.56**	**10.1**	**B**					
(17) MADISON AVENUE & 44th STREET														
Madison Avenue	NB	TR	0.52	8.0	B	TR	0.53	8.0	B					
44th Street	EB	LT	0.62	17.0	C	LT	0.62	16.9	C			n/a		
Overall Intersection		-	**0.56**	**10.1**	**B**	-	**0.57**	**10.2**	**B**					
(18) MADISON AVENUE & 45th STREET														
Madison Avenue	NB	LT	0.64	8.9	B	LT	0.65	8.9	B					
45th Street	WB	TR	0.55	15.9	C	TR	0.57	16.1	C			n/a		
Overall Intersection		-	**0.60**	**10.6**	**B**	-	**0.61**	**10.7**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(19) MADISON AVENUE & 46th STREET													
Madison Avenue	NB	TR	0.63	8.8	B	TR	0.64	8.9	B				
46th Street	EB	LT	0.69	18.1	C	LT	0.69	18.1	C		n/a		
Overall Intersection		**-**	**0.66**	**11.5**	**B**	**-**	**0.66**	**11.5**	**B**				
(20) MADISON AVENUE & 47th STREET													
Madison Avenue	NB	LT	0.57	8.3	B	LT	0.58	8.4	B				
47th Street	WB	TR	0.57	16.0	C	TR	0.68	17.9	C		n/a		
Overall Intersection		**-**	**0.57**	**10.4**	**B**	**-**	**0.63**	**11.1**	**B**				
(21) MADISON AVENUE & 48th STREET													
Madison Avenue	NB	TR	0.58	8.3	B	TR	0.61	8.6	B				
48th Street	EB	LT	0.69	17.8	C	LT	0.84	22.6	C		n/a		
Overall Intersection		**-**	**0.62**	**11.2**	**B**	**-**	**0.71**	**13.3**	**B**				
(22) VANDERBILT AVENUE & 47th STREET													
Vanderbilt Avenue	NB	L	0.2	12.9	B	L	0.19	12.9	B				
47th Street	WB	LT	0.6	12.2	B	LT	0.65	12.6	B		n/a		
Overall Intersection		**-**	**0.43**	**12.3**	**B**	**-**	**0.45**	**12.7**	**B**				
(23) VANDERBILT AVENUE & 46th STREET													
Vanderbilt Avenue	NB	TR	0.44	12.6	B	TR	0.45	12.6	B				
Vanderbilt Avenue	SB	LT	0.32	11.5	B	LT	0.31	11.4	B		n/a		
46th Street	EB	LTR	0.54	13.4	B	LTR	0.54	13.4	B				
Overall Intersection		**-**	**0.49**	**12.8**	**B**	**-**	**0.50**	**12.9**	**B**				
(24) VANDERBILT AVENUE & 45th STREET													
Vanderbilt Avenue	NB	LT	0.37	11.9	B	LT	0.36	11.9	B				
Vanderbilt Avenue	SB	TR	0.37	12.0	B	TR	0.37	11.9	B		n/a		
45th Street	WB	LTR	0.94	33.9	D	LTR	0.96	38.4	D				
Overall Intersection		**-**	**0.66**	**23.6**	**C**	**-**	**0.66**	**26.3**	**D**				

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(27) VANDERBILT AVENUE & 42nd STREET													
42nd Street	EB	LT	0.91	25.3	D	LT	0.85	20.8	C				
42nd Street	WB	TR	0.90	23.5	C	TR	0.91	24.2	C		n/a		
Overall Intersection		**-**	**0.44**	**24.3**	**C**	**-**	**0.44**	**22.8**	**C**				
(28) PARK AVENUE & 40th STREET													
Park Avenue	NB	TR	0.60	10.2	B	TR	0.61	10.4	B				
Park Avenue	SB	T	0.26	7.6	B	T	0.27	7.6	B				
Park Avenue (tunnel)	NB	T	0.60	10.5	B	T	0.59	10.3	B				
Park Avenue (viaduct)	SB	T	0.69	11.4	B	T	0.67	11.1	B		n/a		
40th Street	EB	LTR	1.06	73.8	*F**	LTR	1.06	70.4	*F**				
		R	0.56	20.4	C	R	0.56	20.4	C				
Overall Intersection		**-**	**0.78**	**20.4**	**F***	**-**	**0.82**	**19.8**	**F***				
(29) PARK AVENUE(SB) & 41st STREET													
Park Avenue	SB	LT	0.25	7.5	B	LT	0.26	7.6	B				
41st Street	EB	TR	0.69	22.2	C	TR	0.68	21.8	C		n/a		
Overall Intersection		**-**	**0.42**	**16.0**	**C**	**-**	**0.43**	**15.6**	**C**				
(30) PARK AVENUE(NB) & 41st STREET													
Park Avenue	NB	TR	0.20	7.3	B	TR	0.22	7.3	B				
41st Street	EB	LT	0.65	20.7	C	LT	0.68	21.8	C		n/a		
Overall Intersection		**-**	**0.38**	**13.5**	**B**	**-**	**0.40**	**14.2**	**B**				
(31) PARK AVENUE & 42nd STREET													
Park Avenue	NB	LR	0.31	15.2	C	LR	0.33	15.3	C	L	0.16	15.1	C	-Remove parking along the NB approach
		R	0.98	80.2	F	R	1.20+	120.0+	*F**	R	0.49	18.1	C	to provide two right-turn lanes and one
42nd Street	EB	T	0.59	15.8	C	T	0.53	15.0	C	T	0.50	13.8	B	left lane, provide a protected NB phase,
		R	1.20+	120.0+	*F**	R	1.20+	120.0+	*F**	R	1.20+	120.0+	*F**	and shift 2 seconds of green time from the
42nd Street	WB	LT	0.70	12.1	B	LT	0.76	13.3	B	LT	0.73	11.8	B	NB phase to the E/W phase.
Overall Intersection		**-**	**1.16**	**35.5**	**F***	**-**	**1.20+**	**104.7**	**F***	**-**	**0.99**	**30.7**	**F***	

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(32) PARK AVENUE & 46th STREET														
Park Avenue	NB	TR	0.87	20.4	C	TR	0.85	19.7	C					
Park Avenue	SB	L	1.20+	120.0+	*F**	L	0.30	11.8	B					
		T	0.91	23.6	C	T	0.88	21.4	C		n/a			
46th Street	EB	LTR	0.60	13.5	B	LTR	0.60	13.5	B					
Overall Intersection		**-**	**1.12**	**64.1**	**F***	**-**	**0.74**	**18.2**	**C**					
(33) PARK AVENUE & 47th STREET														
Park Avenue	NB	DFL	0.85	48.5	E	DFL	0.99	87.5	F	LT	0.63	6.7	B	-Provide a protected N/S phase.
		T	0.90	12.1	B	T	0.88	11.2	B	-	-	-	-	
Park Avenue	SB	TR	0.80	8.7	B	TR	0.81	8.9	B	TR	0.80	8.6	B	
47th Street	WB	LTR	0.93	33.6	D	LTR	0.92	32.2	D	LTR	0.92	32.2	D	
Overall Intersection		**-**	**0.92**	**14.7**	**B**	**-**	**1.01**	**15.1**	**C**	**-**	**0.84**	**11.7**	**B**	
(34) PARK AVENUE & 48th STREET														
Park Avenue	NB	TR	0.76	8.1	B	TR	0.76	8.0	B	TR	0.75	7.9	B	-Daylight the south curb of the eastbound
Park Avenue	SB	DFL	0.85	48.5	E	DFL	0.93	67.0	F	-	-	-	-	approach and provide a protected N/S
		T	0.98	20.0	C	T	0.96	16.5	C	LT	0.68	7.2	B	phase.
48th Street	EB	LTR	0.79	23.1	C	LTR	0.97	38.6	D	LTR	0.91	29.8	D	
Overall Intersection		**-**	**0.91**	**15.6**	**C**	**-**	**0.98**	**17.6**	**C**	**-**	**0.81**	**11.4**	**B**	
(35) LEXINGTON AVENUE & 48th STREET														
Lexington Avenue	SB	LT	0.80	8.7	B	LT	0.78	8.5	B					
48th Street	EB	TR	0.72	20.5	C	TR	0.85	25.6	D		n/a			
Overall Intersection		**-**	**0.77**	**11.9**	**B**	**-**	**0.81**	**13.7**	**B**					
(36) LEXINGTON AVENUE & 47th STREET														
Lexington Avenue	SB	TR	0.89	11.3	B	TR	0.89	11.4	B					
47th Street	WB	LT	0.64	19.0	C	LT	0.67	19.5	C		n/a			
Overall Intersection		**-**	**0.79**	**13.2**	**B**	**-**	**0.80**	**13.4**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(37) LEXINGTON AVENUE & 46th STREET													
Lexington Avenue SB	LT	0.73	7.8	B	LT	0.74	7.8	B					
46th Street EB	TR	0.81	22.9	C	TR	0.80	22.6	C			n/a		
Overall Intersection	**-**	**0.76**	**12.8**	**B**	**-**	**0.76**	**12.6**	**B**					
(38) LEXINGTON AVENUE & 45th STREET													
Lexington Avenue SB	TR	0.99	25.3	D	TR	0.99	25.8	D					
45th Street WB	LT	0.69	20.3	C	LT	0.76	22.4	C			n/a		
Overall Intersection	**-**	**0.78**	**24.2**	**C**	**-**	**0.81**	**25.0**	**C**					
(39) LEXINGTON AVENUE & 44th STREET													
Lexington Avenue SB	LT	1.04	40.2	E	LT	1.04	39.3	D			n/a		
Overall Intersection	**-**	**0.49**	**40.2**	**E**	**-**	**0.49**	**39.3**	**D**					
(40) LEXINGTON AVENUE & 43rd STREET													
Lexington Avenue SB	T	0.84	15.5	C	T	0.84	15.6	C	T	0.84	15.6	C	-Provide a protected WB phase.
43rd Street WB	L	0.97	58.7	E	L	1.20+	120.0+	*F**	L	0.68	22.1	C	
Overall Intersection	**-**	**0.79**	**20.7**	**C**	**-**	**1.20+**	**120.0+**	**F***	**-**	**0.68**	**16.4**	**C**	
(41) LEXINGTON AVENUE & 42nd STREET													
Lexington Avenue SB	LTR	1.03	41.2	E	LTR	1.04	41.7	E					
42nd Street EB	TR	0.95	32.9	D	TR	0.82	21.9	C			n/a		
42nd Street WB	LT	0.92	28.4	D	LT	0.88	25.2	D					
Overall Intersection	**-**	**1.00**	**36.1**	D	**-**	**0.97**	**33.1**	**D**					
(42) LEXINGTON AVENUE & 41st STREET													
Lexington Avenue SB	LT	0.75	10.2	B	LT	0.72	9.8	B					
41st Street EB	TR	0.75	22.9	C	TR	0.76	23.3	C			n/a		
Overall Intersection	**-**	**0.75**	**12.1**	**B**	**-**	**0.74**	**11.9**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(43) LEXINGTON AVENUE & 40th STREET													
Lexington Avenue SB	LT	0.69	7.3	B	LT	0.67	7.1	B					
40th Street EB	TR	0.71	20.5	C	TR	0.70	20.1	C		n/a			
Overall Intersection	-	**0.70**	**11.0**	**B**	-	**0.68**	**10.8**	**B**					
(44) THIRD AVENUE & 40th STREET													
Third Avenue NB	TR	0.66	6.8	B	TR	0.65	6.8	B					
40th Street EB	LT	0.69	20.2	C	LT	0.68	20.0	C		n/a			
Overall Intersection	-	**0.67**	**9.1**	**B**	-	**0.66**	**9.0**	**B**					
(45) THIRD AVENUE & 41st STREET													
Third Avenue NB	TR	0.66	6.8	B	TR	0.64	6.8	B	TR	0.64	6.8	B	-Daylight the north curb of the westbound
41st Street EB	LT	0.57	18.7	C	LT	0.56	18.5	C	LT	0.56	18.5	C	approach.
41st Street WB	R	0.89	46.7	E	R	1.00	77.1	F	R	0.87	44.4	E	
Overall Intersection	-	**0.75**	**9.9**	**B**	-	**0.78**	**11.3**	**B**	-	**0.73**	**9.6**	**B**	
(46) THIRD AVENUE & 42nd STREET													
Third Avenue NB	LT	0.87	18.3	C	LT	0.87	18.6	C	LT	0.87	18.6	C	-Provide a protect phase for the E/W
	R	0.76	24.9	C	R	0.83	32.2	D	R	0.83	32.1	D	movements.
42nd Street EB	LT	0.97	34.4	D	LT	0.93	27.4	D	LT	0.93	27.4	D	
42nd Street WB	T	0.67	21.8	C	T	0.66	21.7	C	T	0.66	21.7	C	
	R	1.16	120.0+	*F**	R	1.20+	120.0+	*F**	R	0.97	69.1	F	
Overall Intersection	-	**0.92**	**27.0**	**F***	-	**0.90**	**82.0**	**F***	-	**0.90**	**23.0**	**C**	
(47) THIRD AVENUE & 43rd STREET													
Third Avenue NB	LT	0.75	7.7	B	LT	0.74	7.5	B	LT	0.82	11.3	B	-Shift 5 seconds of green time from the NB
43rd Street WB	TR	1.01	63.8	F	TR	1.15	120.0+	F*	TR	0.99	56.3	E	phase to the WB phase.
Overall Intersection	-	**0.85**	**13.2**	**B**	-	**0.90**	**18.8**	**F***	-	**0.90**	**15.8**	**C**	

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(48) THIRD AVENUE & 44th STREET														
Third Avenue	NB	TR	0.80	8.3	B	TR	0.78	8.0	B					
44th Street	EB	LT	0.57	19.1	C	LT	0.57	19.1	C			n/a		
Overall Intersection		-	**0.71**	**8.9**	**B**	-	**0.70**	**8.7**	**B**					
(49) THIRD AVENUE & 45th STREET														
Third Avenue	NB	LT	0.76	7.8	B	LT	0.75	7.7	B					
45th Street	WB	TR	0.97	47.4	E	TR	0.99	52.1	E			n/a		
Overall Intersection		-	**0.84**	**12.5**	**B**	-	**0.84**	**13.1**	**B**					
(50) THIRD AVENUE & 46th STREET														
Third Avenue	NB	TR	0.68	7.0	B	TR	0.66	6.9	B					
46th Street	EB	LT	0.76	21.3	C	LT	0.75	21.2	C			n/a		
Overall Intersection		-	**0.71**	**10.0**	**B**	-	**0.70**	**9.9**	**B**					
(51) THIRD AVENUE & 47th STREET														
Third Avenue	NB	LT	0.70	7.2	B	LT	0.69	7.1	B					
47th Street	WB	TR	1.12	105.7	*F**	TR	1.10	95.0	*F**			n/a		
Overall Intersection		-	**0.87**	**18.7**	**F***	-	**0.85**	**17.5**	**F***					
(52) THIRD AVENUE & 48th STREET														
Third Avenue	NB	TR	0.66	6.9	B	TR	0.65	6.8	B					
48th Street	EB	LT	0.71	20.5	C	LT	0.81	23.6	C			n/a		
Overall Intersection		-	**0.68**	**9.4**	**B**	-	**0.71**	**10.2**	**B**					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

SIGNALIZED INTERSECTIONS

		No Build				Build				Mitigated Build				
INTERSECTION & APPROACH		**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mvt.**	**v/c**	**Delay**	**LOS**	**Mitigation**
(53) SECOND AVENUE & 42nd STREET														
Second Avenue	SB	LTR	0.90	17.1	C	LTR	0.88	16.4	C					
42nd Street	EB	TR	0.82	21.7	C	TR	0.80	21.0	C			n/a		
42nd Street	WB	LT	0.94	35.0	D	LT	0.93	32.7	D					
Overall Intersection		-	**0.92**	**20.4**	**C**	-	**0.90**	**19.5**	**C**					
(54) FIRST AVENUE & 42nd STREET														
First Avenue	NB	LTR	0.23	10.9	B	LTR	0.23	10.9	B					
42nd Street	EB	L	1.06	75.3	*F**	L	1.02	67.0	F					
		T	0.88	28.4	D	T	0.86	26.4	D			n/a		
42nd Street	WB	T	0.40	16.2	C	T	0.40	16.2	C					
		R	1.11	96.6	*F**	R	1.12	102.6	*F**					
Overall Intersection		-	**0.67**	**43.2**	**F***	-	**0.66**	**42.5**	**F***					

Table M - 3

2010 BUILD / MITIGATED TRAFFIC LEVELS OF SERVICE

PM PEAK HOUR (5:15-6:15 PM)

UNSIGNALIZED INTERSECTIONS

INTERSECTION & APPROACH		Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS	Mvt.	Avg. Total Delay	95% Queue Length	LOS
(25) VANDERBILT AVENUE & 44th STREET													
44th Street	EB	L	6.6	0.9	B	L	6.6	0.9	B			n/a	
		R	3.3	0.4	A	R	3.4	0.6	A				
(26) VANDERBILT AVENUE & 43rd STREET													
Vanderbilt Avenue	NB	L	2.8	0.1	A	L	2.8	0.2	A			n/a	
43rd Street	WB	TR	6.4	0.9	B	TR	7.2	1.2	B				

GENERAL NOTES:

1. "MVT" refers to the specific intersection approach lane(s) and how the lane(s) operate and/or specific pavement striping. TR is a combined through-right turn lane(s), R or L refers to exclusive right- or left-turn movement lane(s), and LTR is a mixed lane(s) that allows for all movement types. DfL refers to a "defacto left-turn" lane that is formed due to a very heavy left-turn volume; in effect, only left turners use this lane. It is possible that lane uses change in different time periods. For example, a very heavy right-turn volume may exceed a single lane capacity, thus forcing drivers to use (or "share") an adjacent lane for additional travel capacity in the AM, but as flows decrease later in the day, a shared lane may not be needed.

2. "v/c" is the volume-to-capacity ratio for the MVT listed in the first column.

3. "Delay" is expressed in seconds per vehicle for the MVT listed in the first column.

4. "LOS" is based on average stopped delay per vehicle (sec/veh) for each signaled lane group, and on total average delay for unsignalized approaches as listed in the 1994 HCM, TRB SR 209.

5. " * " indicates that Delay and Level of Service are not meaningful when any v/c is greater than 1.2 or 1/PHF. Also, it is beyond the scope of HCM to assess delay for an approach which operates in oversaturated conditions.

6. 95% queue length is expressed in vehicles.

7. Significant Impact is defined as No Action LOS A,B,C, or D deteriorating to LOS E or F under the Build condition providing that the average vehicle delay increase is 10 seconds or more ; and No Action LOS E deteriorating to LOS F for the Build condition providing that the average vehicle delay increases by 10 seconds or more. Deterioration from the No Action condition to the Build condition within either LOS E or F with 10 seconds or more of additional delay is defined as a significant worsening of a pre-existing problem.

TABLE M-4

EXISTING
GCT EXTERNAL
PEDESTRIAN ANALYSES

Table M - 4
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
LEXINGTON AVENUE @ 42nd Street												
Northwest Corner	15.8	D			27.7	C			22.2	D		
North Crosswalk	30	C	13	E	41	B	19	D	27	C	12	E
West Crosswalk	30	C	14	E	33	C	16	D	30	C	15	E
LEXINGTON AVENUE between 43rd & 44th Street												
Crosswalk	22	D	11	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEXINGTON AVENUE @ 45th Street												
Southwest Corner	7.7	E			8.5	E			12.6	E		
South Crosswalk	45	B	26	C	38	C	17	D	45	B	25	C
West Crosswalk	32	C	14	E	32	C	14	E	32	C	13	E
MADISON AVENUE @ 43rd Street												
Northeast Corner	22.2	D			31.4	C			31.2	C		
North Crosswalk	41	B	21	D	96	B	45	B	45	B	22	D
East Crosswalk	52	B	15	D	36	C	11	E	60	B	18	D
Southeast Corner	22.1	D			29.1	C			33.6	C		
South Crosswalk	47	B	22	D	82	B	36	C	53	B	25	C
East Crosswalk	52	B	15	D	36	C	11	E	60	B	18	D
MADISON AVENUE @ 44th Street												
Northeast Corner	40.7	B			30.2	C			35.4	C		
North Crosswalk	58	B	33	C	87	B	45	B	55	B	30	C
East Crosswalk	67	B	21	D	31	C	10	E	55	B	17	D
Southeast Corner	26.6	C			17.5	D			28.7	C		
South Crosswalk	55	B	26	C	58	B	26	C	66	B	32	C
East Crosswalk	67	B	21	D	31	C	10	E	55	B	17	D
MADISON AVENUE @ 45th Street												
Northeast Corner	10.1	E			17.2	D			8.6	E		
North Crosswalk	32	C	17	D	52	B	25	C	39	C	20	D
East Crosswalk	47	B	15	D	47	B	16	D	36	C	12	E
Southeast Corner	18.9	D			27.0	C			20.5	D		
South Crosswalk	50	B	24	C	65	B	29	C	34	C	16	D
East Crosswalk	47	B	15	D	47	B	16	D	36	C	12	E
MADISON AVENUE @ 46th Street												
Northeast Corner	48	B			48.1	B			30.6	C		
North Crosswalk	103	B	53	B	148	A	71	B	98	B	51	B
East Crosswalk	47	B	14	E	39	C	12	E	30	C	9	E
Southeast Corner	20.9	D			32.8	C			28.3	C		
South Crosswalk	41	B	20	D	79	B	35	C	71	B	34	C
East Crosswalk	47	B	14	E	39	C	12	E	30	C	9	E
MADISON AVENUE @ 47th Street												
Northeast Corner	61.6	B			59.5	B			32.1	C		
North Crosswalk	93	B	48	B	169	A	83	B	79	B	42	B
East Crosswalk	75	B	20	D	48	B	13	E	36	C	9	E
Southeast Corner	33.4	C			27.7	C			24.3	C		
South Crosswalk	70	B	34	C	73	B	33	C	71	B	34	C
East Crosswalk	75	B	20	D	48	B	13	E	36	C	9	E
MADISON AVENUE @ 48th Street												
Northeast Corner	56.5	B			46.4	B			46.4	B		
North Crosswalk	54	B	27	C	81	B	40	C	83	B	43	B
East Crosswalk	83	B	27	C	45	B	16	D	53	B	16	D
Southeast Corner	114.8	B			78.6	B			82.8	B		
South Crosswalk	101	B	49	B	93	B	42	B	101	B	49	B
East Crosswalk	83	B	27	C	45	B	16	D	53	B	16	D

ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
VANDERBILT AVENUE @ 42nd Street												
Northeast Corner	19.6	D			33.5	C			21.9	D		
North Crosswalk	27	C	10	E	35	C	12	E	22	D	8	E
East Crosswalk	67	B	30	C	93	B	42	B	81	B	36	C
VANDERBILT AVENUE @ 44th Street												
Northwest Corner	53.3	B			52.6	B			49.7	B		
North Crosswalk	60	B	22	D	71	B	26	C	74	B	28	C
West Crosswalk	111	B	35	C	103	B	32	C	111	B	35	C
VANDERBILT AVENUE @ 45th Street												
Northwest Corner	31.5	C			17.2	D			24.0	C		
North Crosswalk	86	B	23	D	48	B	12	E	67	B	18	D
West Crosswalk	77	B	34	C	82	B	31	C	99	B	36	C
Southwest Corner	43.4	B			26.5	C			34.8	C		
South Crosswalk	98	B	25	C	44	B	11	E	57	B	15	E
West Crosswalk	77	B	34	C	82	B	31	C	99	B	36	C
Southeast Corner	49.1	B			25.9	C			31.6	C		
South Crosswalk	98	B	25	C	44	B	11	E	57	B	15	E
East Crosswalk	66	B	23	D	71	B	24	C	74	B	25	C
VANDERBILT AVENUE @ 46th Street												
Northeast Corner	54.5	B			32.1	C			41.6	B		
North Crosswalk	125	B	45	B	90	B	32	C	118	B	42	B
East Crosswalk	90	B	29	C	55	B	18	D	69	B	25	C
Southeast Corner	52.1	B			28.7	C			49.9	B		
South Crosswalk	147	A	56	B	66	B	24	D	118	B	42	B
East Crosswalk	90	B	29	C	55	B	18	D	69	B	25	C
Northwest Corner	54.4	B			41.7	B			45.3	B		
North Crosswalk	125	B	45	B	90	B	32	C	118	B	42	B
West Crosswalk	113	B	31	C	104	B	28	C	98	B	27	C
Southwest Corner	61.2	B			38.7	C			54.7	B		
South Crosswalk	147	A	56	B	66	B	24	D	118	B	42	B
West Crosswalk	113	B	31	C	104	B	28	C	98	B	27	C
VANDERBILT AVENUE @ 47th Street												
Southwest Corner	33.1	C			42.2	B			40.3	B		
South Crosswalk	80	B	32	C	84	B	33	C	82	B	31	C
West Crosswalk	83	B	25	C	116	B	35	C	104	B	31	C
PARK AVENUE @ 48th Street												
Northeast Corner	44.9	B			55.3	B			43.0	B		
North Crosswalk	82	B	78	B	58	B	56	B	63	B	59	B
East Crosswalk	35	C	12	E	73	B	22	D	43	B	14	E
Southwest Corner	76.4	B			81.1	B			107.5	B		
South Crosswalk	72	B	68	B	84	B	80	B	101	B	94	B
West Crosswalk	117	B	29	C	115	B	29	C	158	A	40	C
PARK AVENUE @ 42nd Street												
East Crosswalk	37	C	23	D	49	B	31	C	61	B	36	C
West Crosswalk	49	B	28	C	62	B	35	C	41	B	24	D

Table M - 4
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	AM Peak Period				Mid-Day Peak Period				PM Peak Period			
	Average		Platoon		Average		Platoon		Average		Platoon	
	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS
LEXINGTON AVENUE between 43rd & 44th Street												
Walkway	15.1	E	19.1	E	8.7	C	12.7	D	14.2	D	18.2	E
MADISON AVENUE between 43rd & 44th Street												
Walkway	3.7	B	7.7	C	3.4	B	7.4	C	4.6	B	8.6	C
MADISON AVENUE between 44rd & 45th Street												
Walkway	2.9	B	6.9	B	4.7	B	8.7	C	5.3	B	9.3	C
MADISON AVENUE between 45th & 46th Street												
Walkway	7.5	C	11.5	D	4.5	B	8.5	C	8.0	C	12.0	D
MADISON AVENUE between 46th & 47th Street												
Walkway	4.6	B	8.6	C	3.9	B	7.9	C	6.8	B	10.8	D
MADISON AVENUE between 47th & 48th Street												
Walkway	3.2	B	7.2	C	4.1	B	8.1	C	4.4	B	8.4	C
VANDERBILT AVENUE between 45th & 46th Street												
Walkway (East Side)	2.6	B	6.6	B	2.7	B	6.7	B	3.3	B	7.3	C
Walkway (West Side)	1.9	A	5.9	B	1.8	A	5.8	B	2.1	B	6.1	B
VANDERBILT AVENUE between 46th & 47th Street												
Walkway (East Side)	1.7	A	5.7	B	1.8	A	5.8	B	2.1	B	6.1	B
Walkway (West Side)	2.0	A	6.0	B	1.2	A	5.2	B	1.3	A	5.3	B
43rd STREET between Madison & Vanderbilt Avenue												
Walkway (North Side)	11.7	D	15.7	E	4.7	B	8.7	C	9.4	C	13.4	D
Walkway (South Side)	5.0	B	9.0	C	3.0	B	7.0	B	3.4	B	7.4	C
45th STREET between Madison & Vanderbilt Avenue												
Walkway (North side)	4.0	B	8.0	C	4.2	B	8.2	C	4.2	B	8.2	C
Walkway (South side)	9.9	C	13.9	D	7.0	C	11.0	D	15.1	E	19.1	E
46th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.1	A	5.1	B	1.2	A	5.2	B	1.0	A	5.0	B
Walkway (South Side)	1.3	A	5.3	B	1.6	A	5.6	B	1.5	A	5.5	B
47th STREET between Park & Lexington Avenue												
Walkway	0.7	A	4.7	B	0.8	A	4.8	B	0.7	A	4.7	B
47th STREET between Vanderbilt & Park Avenue												
Walkway (North Side)	1.6	A	5.6	B	1.7	A	5.7	B	1.9	A	5.9	B
Walkway (South Side)	1.0	A	5.0	B	1.3	A	5.3	B	1.3	A	5.3	B
47th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.0	A	5.0	B	0.8	A	4.8	B	1.2	A	5.2	B
Walkway (South Side)	1.7	A	5.7	B	2.0	B	6.0	B	1.8	A	5.8	B
48th STREET between Park & Lexington Avenue												
Walkway	1.6	A	5.6	B	1.3	A	5.3	B	1.4	A	5.4	B
48th STREET between Madison & Park Avenue												
Walkway	1.8	A	5.8	B	1.8	A	5.8	B	1.5	A	5.5	B

TABLE M-5

2010 NO BUILD
GCT EXTERNAL
PEDESTRIAN ANALYSES

Table M - 5
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
LEXINGTON AVENUE @ 42nd Street												
Northwest Corner	15.1	D			26.8	C			21.5	D		
North Crosswalk	29	C	13	E	40	B	18	D	27	C	12	E
West Crosswalk	29	C	14	E	32	C	16	D	29	C	14	E
LEXINGTON AVENUE between 43rd & 44th Street												
Crosswalk	22	D	11	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEXINGTON AVENUE @ 45th Street												
Southwest Corner	23.6	D			11.7	E			18.5	D		
South Crosswalk	62	B	37	C	40	C	19	D	61	B	34	C
West Crosswalk	63	B	27	C	42	B	19	D	54	B	23	D
MADISON AVENUE @ 43rd Street												
Northeast Corner	27.2	C			34.4	C			36.5	C		
North Crosswalk	46	B	23	D	131	A	61	B	58	B	29	C
East Crosswalk	51	B	15	E	35	C	11	E	59	B	17	D
Southeast Corner	21.2	D			28.3	C			32.6	C		
South Crosswalk	46	B	21	D	80	B	35	C	52	B	24	C
East Crosswalk	51	B	15	E	35	C	11	E	59	B	17	D
MADISON AVENUE @ 44th Street												
Northeast Corner	46.4	B			31.1	C			39.6	C		
North Crosswalk	57	B	33	C	86	B	44	B	53	B	29	C
East Crosswalk	96	B	30	C	33	C	11	E	68	B	21	D
Southeast Corner	33.6	C			18.1	D			32.0	C		
South Crosswalk	54	B	26	C	56	B	25	C	65	B	31	C
East Crosswalk	96	B	30	C	33	C	11	E	68	B	21	D
MADISON AVENUE @ 45th Street												
Northeast Corner	15.3	D			24.8	C			16.7	D		
North Crosswalk	32	C	17	D	62	B	30	C	38	C	20	D
East Crosswalk	111	B	36	C	62	B	21	D	55	B	18	D
Southeast Corner	62.0	B			37.4	C			30.1	C		
South Crosswalk	109	B	53	B	85	B	38	C	47	B	23	D
East Crosswalk	111	B	36	C	62	B	21	D	55	B	18	D
MADISON AVENUE @ 46th Street												
Northeast Corner	57.6	B			49.6	B			34.1	C		
North Crosswalk	98	B	52	B	148	A	71	B	95	B	49	B
East Crosswalk	84	B	25	C	48	B	15	E	39	C	12	E
Southeast Corner	35.8	C			38.8	C			36.0	C		
South Crosswalk	49	B	23	D	85	B	38	C	90	B	43	B
East Crosswalk	84	B	25	C	48	B	15	E	39	C	12	E
MADISON AVENUE @ 47th Street												
Northeast Corner	73.4	B			73.4	B			35.9	C		
North Crosswalk	90	B	47	B	169	A	83	B	77	B	41	B
East Crosswalk	127	B	33	C	54	B	15	E	42	B	11	E
Southeast Corner	49.7	B			30.3	C			27.5	C		
South Crosswalk	79	B	38	C	75	B	34	C	79	B	38	C
East Crosswalk	127	B	33	C	54	B	15	E	42	B	11	E
MADISON AVENUE @ 48th Street												
Northeast Corner	66.4	B			47.1	B			49.8	B		
North Crosswalk	51	B	27	C	78	B	38	C	80	B	41	B
East Crosswalk	105	B	34	C	47	B	16	D	58	B	17	D
Southeast Corner	137.5	A			80.5	B			89.0	B		
South Crosswalk	103	B	52	B	93	B	42	B	105	B	50	B
East Crosswalk	105	B	34	C	47	B	16	D	58	B	17	D

ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
VANDERBILT AVENUE @ 42nd Street												
Northeast Corner	18.8	D			32.1	C			21.1	D		
North Crosswalk	27	C	9	E	32	C	12	E	21	D	7	E
East Crosswalk	65	B	29	C	90	B	41	B	80	B	36	C
VANDERBILT AVENUE @ 44th Street												
Northwest Corner	51.5	B			51.0	B			47.9	B		
North Crosswalk	56	B	22	D	69	B	25	C	72	B	27	C
West Crosswalk	108	B	34	C	101	B	31	C	108	B	34	C
VANDERBILT AVENUE @ 45th Street												
Northwest Corner	31.5	C			16.8	D			23.5	D		
North Crosswalk	86	B	23	D	44	B	12	E	66	B	18	D
West Crosswalk	77	B	34	C	82	B	31	C	96	B	35	C
Southwest Corner	42.9	B			26.0	C			33.5	C		
South Crosswalk	95	B	24	C	41	B	11	E	55	B	14	E
West Crosswalk	77	B	34	C	82	B	31	C	96	B	35	C
Southeast Corner	47.7	B			25.1	C			30.8	C		
South Crosswalk	95	B	24	C	41	B	11	E	55	B	14	E
East Crosswalk	65	B	22	D	70	B	24	D	72	B	25	C
VANDERBILT AVENUE @ 46th Street												
Northeast Corner	53.8	B			31.0	C			40.3	B		
North Crosswalk	125	B	45	B	88	B	32	C	114	B	41	B
East Crosswalk	88	B	28	C	53	B	18	D	68	B	25	C
Southeast Corner	51.2	B			27.6	C			49.3	B		
South Crosswalk	147	A	56	B	64	B	23	D	118	B	42	B
East Crosswalk	88	B	28	C	53	B	18	D	68	B	25	C
Northwest Corner	80.9	B			63.1	B			68.7	B		
North Crosswalk	125	B	45	B	88	B	32	C	114	B	41	B
West Crosswalk	109	B	30	C	101	B	27	C	96	B	26	C
Southwest Corner	60.1	B			37.5	C			54.0	B		
South Crosswalk	147	A	56	B	64	B	23	D	118	B	42	B
West Crosswalk	109	B	30	C	101	B	27	C	96	B	26	C
VANDERBILT AVENUE @ 47th Street												
Southwest Corner	48.8	B			60.5	B			56.8	B		
South Crosswalk	77	B	31	C	79	B	32	C	79	B	30	C
West Crosswalk	77	B	24	C	116	B	35	C	100	B	30	C
PARK AVENUE @ 48th Street												
Northeast Corner	67.5	B			67.7	B			66.6	B		
North Crosswalk	80	B	76	B	55	B	54	B	61	B	58	B
East Crosswalk	65	B	21	D	116	B	35	C	80	B	25	C
Southwest Corner	73.6	B			78.0	B			104.1	B		
South Crosswalk	71	B	66	B	82	B	78	B	98	B	92	B
West Crosswalk	112	B	28	C	110	B	27	C	154	A	38	C
PARK AVENUE @ 42nd Street												
East Crosswalk	36	C	22	D	47	B	30	C	58	B	35	C
West Crosswalk	47	B	27	C	61	B	34	C	40	C	23	D

Table M - 5
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	AM Peak Period				Mid-Day Peak Period				PM Peak Period			
	Average		Platoon		Average		Platoon		Average		Platoon	
	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS
LEXINGTON AVENUE between 43rd & 44th Street												
Walkway	12.1	D	16.1	E	7.5	C	11.5	D	11.7	D	15.7	E
MADISON AVENUE between 43rd & 44th Street												
Walkway	3.0	B	7.0	B	3.1	B	7.1	C	3.8	B	7.8	C
MADISON AVENUE between 44rd & 45th Street												
Walkway	2.1	B	6.1	B	4.4	B	8.4	C	4.3	B	8.3	C
MADISON AVENUE between 45th & 46th Street												
Walkway	5.2	B	9.2	C	3.5	B	7.5	C	4.7	B	8.7	C
MADISON AVENUE between 46th & 47th Street												
Walkway	3.1	B	7.1	C	3.3	B	7.3	C	5.6	B	9.6	C
MADISON AVENUE between 47th & 48th Street												
Walkway	2.4	B	6.4	B	3.9	B	7.9	C	3.8	B	7.8	C
VANDERBILT AVENUE between 45th & 46th Street												
Walkway (East Side)	2.6	B	6.6	B	2.7	B	6.7	B	3.4	B	7.4	C
Walkway (West Side)	2.0	A	6.0	B	1.8	A	5.8	B	2.1	B	6.1	B
VANDERBILT AVENUE between 46th & 47th Street												
Walkway (East Side)	1.8	A	5.8	B	1.8	A	5.8	B	2.1	B	6.1	B
Walkway (West Side)	2.0	B	6.0	B	1.2	A	5.2	B	1.3	A	5.3	B
43rd STREET between Madison & Vanderbilt Avenue												
Walkway (North Side)	8.5	C	12.5	D	3.3	B	7.3	C	6.7	B	10.7	D
Walkway (South Side)	5.2	B	9.2	C	3.1	B	7.1	C	3.5	B	7.5	C
45th STREET between Madison & Vanderbilt Avenue												
Walkway (North side)	4.2	B	8.2	C	4.3	B	8.3	C	4.3	B	8.3	C
Walkway (South side)	3.3	B	7.3	C	4.3	B	8.3	C	9.7	C	13.7	D
46th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.1	A	5.1	B	1.2	A	5.2	B	1.1	A	5.1	B
Walkway (South Side)	1.3	A	5.3	B	1.6	A	5.6	B	1.5	A	5.5	B
47th STREET between Park & Lexington Avenue												
Walkway	0.8	A	4.8	B	0.9	A	4.9	B	0.7	A	4.7	B
47th STREET between Vanderbilt & Park Avenue												
Walkway (North Side)	1.6	A	5.6	B	1.7	A	5.7	B	2.0	A	6.0	B
Walkway (South Side)	1.1	A	5.1	B	1.3	A	5.3	B	1.3	A	5.3	B
47th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.1	A	5.1	B	0.8	A	4.8	B	1.2	A	5.2	B
Walkway (South Side)	1.7	A	5.7	B	2.1	B	6.1	B	1.8	A	5.8	B
48th STREET between Park & Lexington Avenue												
Walkway	1.6	A	5.6	B	1.3	A	5.3	B	1.5	A	5.5	B
48th STREET between Madison & Park Avenue												
Walkway	1.8	A	5.8	B	1.8	A	5.8	B	1.6	A	5.6	B

TABLE M-6

2010 BUILD
GCT EXTERNAL
PEDESTRIAN ANALYSES

Table M - 6
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
LEXINGTON AVENUE @ 42nd Street												
Northwest Corner	12.5	E			25.4	C			20.1	D		
North Crosswalk	28	C	12	E	39	C	18	D	26	C	12	E
West Crosswalk	26	C	12	E	30	C	15	D	26	C	13	E
LEXINGTON AVENUE between 43rd & 44th Street												
Crosswalk	21	D	11	E	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LEXINGTON AVENUE @ 45th Street												
Southwest Corner	18.9	D			11.1	E			16.1	D		
South Crosswalk	53	B	32	C	39	C	18	D	52	B	30	C
West Crosswalk	54	B	23	D	41	B	18	D	48	B	20	D
MADISON AVENUE @ 43rd Street												
Northeast Corner	14.9	E			27.0	C			24.9	C		
North Crosswalk	34	C	18	D	100	B	46	B	42	B	22	D
East Crosswalk	36	C	11	E	31	C	9	E	42	B	12	E
Southeast Corner	16.2	D			26.9	C			24.6	C		
South Crosswalk	41	B	19	D	86	B	37	C	46	B	22	D
East Crosswalk	36	C	11	E	31	C	9	E	42	B	12	E
MADISON AVENUE @ 44th Street												
Northeast Corner	30.4	C			26.2	C			29.0	C		
North Crosswalk	50	B	29	C	80	B	41	B	48	B	26	C
East Crosswalk	48	B	16	D	28	C	9	E	43	B	13	E
Southeast Corner	19.6	D			15.3	D			21.6	D		
South Crosswalk	46	B	22	D	53	B	24	D	55	B	26	C
East Crosswalk	48	B	16	D	28	C	9	E	43	B	13	E
MADISON AVENUE @ 45th Street												
Northeast Corner	10.8	E			20.1	D			12.0	E		
North Crosswalk	27	C	15	E	57	B	28	C	32	C	17	D
East Crosswalk	62	B	20	D	52	B	18	D	43	B	14	E
Southeast Corner	25.4	C			28.6	C			21.1	D		
South Crosswalk	64	B	31	C	71	B	32	C	37	C	18	D
East Crosswalk	62	B	20	D	52	B	18	D	41	B	13	E
MADISON AVENUE @ 46th Street												
Northeast Corner	41.0	B			43.0	B			26.8	C		
North Crosswalk	90	B	48	B	144	A	69	B	88	B	45	B
East Crosswalk	50	B	14	E	39	C	12	E	30	C	9	E
Southeast Corner	21.9	D			32.5	C			27.0	C		
South Crosswalk	40	C	19	D	76	B	34	C	68	B	33	C
East Crosswalk	50	B	14	E	39	C	12	E	30	C	9	E
MADISON AVENUE @ 47th Street												
Northeast Corner	28.1	C			49.3	B			25.3	C		
North Crosswalk	37	C	19	D	89	B	43	B	37	C	20	D
East Crosswalk	64	B	17	D	45	B	12	E	33	C	9	E
Southeast Corner	28.6	C			23.2	D			21.0	D		
South Crosswalk	60	B	29	C	69	B	31	C	63	B	30	C
East Crosswalk	64	B	17	D	45	B	12	E	33	C	9	E
MADISON AVENUE @ 48th Street												
Northeast Corner	19.0	D			24.9	C			15.2	D		
North Crosswalk	23	D	12	E	46	B	23	D	30	C	15	D
East Crosswalk	34	C	12	E	27	C	10	E	25	C	7	E
Southeast Corner	50.2	B			51.1	B			42.8	B		
South Crosswalk	64	B	31	C	77	B	34	C	67	B	32	C
East Crosswalk	34	C	12	E	27	C	10	E	25	C	7	E

Table M - 6
LIRR EAST SIDE ACCESS ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
VANDERBILT AVENUE @ 42nd Street												
Northeast Corner	25.9	C			45.9	B			29.8	C		
North Crosswalk	23	D	8	E	32	C	11	E	19	D	7	E
East Crosswalk	50	B	23	D	77	B	35	C	61	B	28	C
VANDERBILT AVENUE @ 44th Street												
Northwest Corner	51.5	B			51.0	B			47.9	B		
North Crosswalk	56	B	22	D	69	B	25	C	72	B	27	C
West Crosswalk	108	B	34	C	101	B	31	C	108	B	34	C
VANDERBILT AVENUE @ 45th Street												
Northwest Corner	31.5	C			16.8	D			23.5	D		
North Crosswalk	86	B	23	D	44	B	12	E	66	B	18	D
West Crosswalk	77	B	34	C	82	B	31	C	96	B	35	C
Southwest Corner	42.4	B			26.0	C			33.2	C		
South Crosswalk	93	B	24	D	41	B	11	E	54	B	14	E
West Crosswalk	77	B	34	C	82	B	31	C	96	B	35	C
Southeast Corner	43.9	B			24.8	C			29.7	C		
South Crosswalk	93	B	24	D	41	B	11	E	54	B	14	E
East Crosswalk	60	B	20	D	67	B	23	D	66	B	23	D
VANDERBILT AVENUE @ 46th Street												
Northeast Corner	53.2	B			31.0	C			40.3	B		
North Crosswalk	125	B	45	B	88	B	32	C	114	B	41	B
East Crosswalk	86	B	27	C	53	B	18	D	68	B	25	C
Southeast Corner	48.3	B			27.1	C			47.1	B		
South Crosswalk	147	A	56	B	64	B	23	D	114	B	41	B
East Crosswalk	86	B	27	C	53	B	18	D	68	B	25	C
Northwest Corner	80.9	B			63.1	B			68.7	B		
North Crosswalk	125	B	45	B	88	B	32	C	114	B	41	B
West Crosswalk	109	B	30	C	101	B	27	C	96	B	26	C
Southwest Corner	55.6	B			37.5	C			53.2	B		
South Crosswalk	147	A	56	B	64	B	23	D	114	B	41	B
West Crosswalk	109	B	30	C	101	B	27	C	96	B	26	C
VANDERBILT AVENUE @ 47th Street												
Southwest Corner	48.8	B			60.5	B			56.8	B		
South Crosswalk	77	B	31	C	79	B	32	C	79	B	30	C
West Crosswalk	81	B	24	C	116	B	35	C	100	B	30	C
PARK AVENUE @ 48th Street												
Northeast Corner	30.4	C			44.4	B			33.4	C		
North Crosswalk	77	B	76	B	55	B	54	B	61	B	58	B
East Crosswalk	50	B	17	D	101	B	31	C	64	B	20	D
Southwest Corner	51.6	B			67.4	B			74.8	B		
South Crosswalk	70	B	62	B	82	B	78	B	96	B	92	B
West Crosswalk	66	B	17	D	87	B	22	D	87	B	22	D
PARK AVENUE @ 42nd Street												
East Crosswalk	34	C	21	D	46	B	29	C	52	B	32	C
West Crosswalk	43	B	24	C	58	B	33	C	37	C	22	D

Table M - 6
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS EXTERIOR TO GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	AM Peak Period				Mid-Day Peak Period				PM Peak Period			
	Average		Platoon		Average		Platoon		Average		Platoon	
	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS
LEXINGTON AVENUE between 43rd & 44th Street												
Walkway	12.1	D	16.1	E	7.5	C	11.5	D	11.7	D	15.7	E
MADISON AVENUE between 43rd & 44th Street												
Walkway	4.5	B	8.5	C	3.7	B	7.7	C	4.3	B	9.4	C
MADISON AVENUE between 44rd & 45th Street												
Walkway	4.0	B	8.0	C	5.2	B	9.2	C	6.7	B	10.7	D
MADISON AVENUE between 45th & 46th Street												
Walkway	7.1	C	11.1	D	4.3	B	8.3	C	6.3	B	10.3	D
MADISON AVENUE between 46th & 47th Street												
Walkway	4.7	B	8.7	C	3.9	B	7.9	C	6.9	B	10.9	D
MADISON AVENUE between 47th & 48th Street												
Walkway	8.0	C	12.0	D	6.3	B	10.3	D	8.6	C	12.6	D
VANDERBILT AVENUE between 45th & 46th Street												
Walkway (East Side)	2.9	B	6.9	B	2.8	B	6.8	B	3.7	B	7.7	C
Walkway (West Side)	2.0	A	6.0	B	1.8	A	5.8	B	2.1	B	6.1	B
VANDERBILT AVENUE between 46th & 47th Street												
Walkway (East Side)	1.8	A	5.8	B	1.8	A	5.8	B	2.1	B	6.1	B
Walkway (West Side)	2.0	B	6.0	B	1.2	A	5.2	B	1.3	A	5.3	B
43rd STREET between Madison & Vanderbilt Avenue												
Walkway (North Side)	14.8	D	18.8	E	5.8	B	9.8	C	12.0	D	16.0	E
Walkway (South Side)	5.4	B	9.4	C	3.1	B	7.1	C	3.7	B	7.7	C
45th STREET between Madison & Vanderbilt Avenue												
Walkway (North side)	4.2	B	8.2	C	4.3	B	8.3	C	4.3	B	8.3	C
Walkway (South side)	8.7	C	12.7	D	6.4	B	10.4	D	14.2	D	18.2	E
46th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.1	A	5.1	B	1.2	A	5.2	B	1.1	A	5.1	B
Walkway (South Side)	1.3	A	5.3	B	1.6	A	5.6	B	1.5	A	5.5	B
47th STREET between Park & Lexington Avenue												
Walkway	2.3	B	6.3	B	1.5	A	5.5	B	1.9	A	5.9	B
47th STREET between Vanderbilt & Park Avenue												
Walkway (North Side)	1.6	A	5.6	B	1.7	A	5.7	B	2.0	A	6.0	B
Walkway (South Side)	1.1	A	5.1	B	1.3	A	5.3	B	1.3	A	5.3	B
47th STREET between Vanderbilt & Madison Avenue												
Walkway (North Side)	1.1	A	5.1	B	0.8	A	4.8	B	1.2	A	5.2	B
Walkway (South Side)	1.7	A	5.7	B	2.1	B	6.1	B	1.8	A	5.8	B
48th STREET between Park & Lexington Avenue												
Walkway	1.6	A	5.6	B	1.3	A	5.3	B	1.5	A	5.5	B
48th STREET between Madison & Park Avenue												
Walkway	3.8	B	7.8	C	2.6	B	6.6	B	3.3	B	7.3	C

TABLE M-7

2010 MITIGATED BUILD GCT EXTERNAL PEDESTRIAN ANALYSES

Table M - 7
ANALYSIS OF CORNERS EXTERIOR TO GRAND CENTRAL TERMINAL
(BUILD VS. MITIGATED) AM, MIDDAY, PM PEAK PERIODS

	BUILD CONDITIONS						MITIGATED BUILD CONDITIONS						
INTERSECTION and ELEMENT	8 - 9 AM Average		12 - 1 PM Average		5 - 6 PM Average		8 - 9 AM Average		12 - 1 PM Average		5 - 6 PM Average		COMMENTS
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	
LEXINGTON AVENUE @ 42nd Street													
Northwest Corner	12.5	E	25.4	C	20.1	D	19.4	D	34.4	C	26.9	C	Remove refuse cans & widen west crosswalk from 13 feet to 15 feet.
LEXINGTON AVENUE between 43rd & 44th Street													
Crosswalk	N/A	N/A	N/A	N/A	N/A	N/A							
LEXINGTON AVENUE @ 45th Street													
Southwest Corner	18.9	D	11.1	E	16.1	D							
MADISON AVENUE @ 43rd Street													
Northeast Corner	14.9	E	27.0	C	24.9	C							
Southeast Corner	16.2	D	26.9	C	24.6	C							
MADISON AVENUE @ 44th Street													
Northeast Corner	30.4	C	26.2	C	29.0	C							
Southeast Corner	19.6	D	15.3	D	21.6	D							
MADISON AVENUE @ 45th Street													
Northeast Corner	10.8	E	20.1	D	11.3	E	21.7	D	36.5	C	22.5	D	Widen East Crosswalk from 15.5 feet to 17 feet.
Southeast Corner	25.4	C	28.6	C	21.1	D							
MADISON AVENUE @ 46th Street													
Northeast Corner	41.0	B	43.0	B	26.8	C							
Southeast Corner	21.9	D	32.5	C	27.0	C							
MADISON AVENUE @ 47th Street													
Northeast Corner	28.1	C	49.3	B	25.3	C							
Southeast Corner	28.6	C	23.2	D	21.0	D							
MADISON AVENUE @ 48th Street													
Northeast Corner	19.0	D	24.9	C	15.2	D							
Southeast Corner	50.2	B	51.1	B	42.8	B							
VANDERBILT AVENUE @ 42nd Street													
Northeast Corner	25.9	C	45.9	B	29.8	C							
VANDERBILT AVENUE @ 44th Street													
Northwest Corner	51.5	B	51.0	B	47.9	B							
VANDERBILT AVENUE @ 45th Street													
Northwest Corner	31.5	C	16.8	D	23.5	D							
Southwest Corner	42.4	B	26.0	C	33.2	C							
Southeast Corner	43.9	B	24.8	C	29.7	C							
VANDERBILT AVENUE @ 46th Street													
Northeast Corner	53.2	B	31.0	C	40.3	B							
Southeast Corner	48.3	B	27.1	C	47.1	B							
Northwest Corner	80.9	B	63.1	B	68.7	B							
Southwest Corner	55.6	B	37.5	C	53.2	B							
VANDERBILT AVENUE @ 47th Street													
Southwest Corner	48.8	B	60.5	B	56.8	B							
PARK AVENUE @ 48th Street													
Northeast Corner	30.4	C	44.4	B	33.4	C							
Southwest Corner	51.6	B	67.4	B	74.8	B							

Table M - 7
ANALYSIS OF CROSSWALKS EXTERIOR TO GRAND CENTRAL TERMINAL
(BUILD VS. MITIGATED) AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	BUILD CONDITIONS						MITIGATED BUILD CONDITIONS						COMMENTS
	8 - 9 AM Max Surge		12 - 1 PM Max Surge		5 - 6 PM Max Surge		8 - 9 AM Max Surge		12 - 1 PM Max Surge		5 - 6 PM Max Surge		
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	
LEXINGTON AVENUE @ 42nd Street													
North Crosswalk	12	E	18	D	12	E	13	E	19	D	12	E	Widen north crosswalk from 17ft to 18ft.
West Crosswalk	12	E	15	D	13	E	14	E	17	D	15	E	Remove refuse cans & widen west crosswalk from 13 ft to 15 ft.
LEXINGTON AVENUE between 43rd & 44th Street													
Crosswalk	11	E	N/A	N/A	N/A	N/A							
LEXINGTON AVENUE @ 45th Street													
South Crosswalk	32	C	18	D	30	C							
West Crosswalk	23	D	18	D	20	D							
MADISON AVENUE @ 43rd Street													
North Crosswalk	18	D	46	B	22	D							
East Crosswalk	11	E	9	E	12	E	15	D	14	E	18	D	Widen east crosswalk from 14 ft to 20 ft.
South Crosswalk	19	D	37	C	22	D							
MADISON AVENUE @ 44th Street													
North Crosswalk	29	C	41	B	26	C							
East Crosswalk	16	D	9	E	13	E	18	D	11	E	15	E	Widen east crosswalk from 14 ft to 17 ft.
South Crosswalk	22	D	24	D	26	C							
MADISON AVENUE @ 45th Street													
North Crosswalk	15	E	28	C	17	D							
East Crosswalk	20	D	18	D	13	E	22	D	19	D	15	E	Widen east crosswalk from 15.5 ft to 17 ft.
South Crosswalk	31	C	32	C	18	D							
MADISON AVENUE @ 46th Street													
North Crosswalk	48	B	69	B	45	B							
East Crosswalk	14	E	12	E	9	E	19	D	16	D	12	E	Widen east crosswalk from 12.5 ft to 17 ft.
South Crosswalk	19	D	34	C	33	C							
MADISON AVENUE @ 47th Street													
North Crosswalk	19	D	43	B	20	D							
East Crosswalk	17	D	12	E	9	E	21	D	15	D	11	E	Widen east crosswalk from 12 ft to 15 ft.
South Crosswalk	29	C	31	C	30	C							
MADISON AVENUE @ 48th Street													
North Crosswalk	12	E	23	D	15	D	15	D	29	C	20	D	Widen north crosswalk from 14 ft to 18 ft.
East Crosswalk	12	E	10	E	7	E	17	D	14	E	11	E	Widen east crosswalk from 15 ft to 25 ft.
South Crosswalk	31	C	34	C	32	C							
VANDERBILT AVENUE @ 42nd Street													
North Crosswalk	8	E	11	E	7	E	9	E	12	E	7	E	Widen north crosswalk from 22 ft to 23 ft.
East Crosswalk	23	D	35	C	28	C							
VANDERBILT AVENUE @ 44th Street													
North Crosswalk	22	D	25	C	27	C							
West Crosswalk	34	C	31	C	34	C							
VANDERBILT AVENUE @ 45th Street													
North Crosswalk	23	D	12	E	18	D							
West Crosswalk	34	C	31	C	35	C							
South Crosswalk	24	D	11	E	14	E							
East Crosswalk	20	D	23	D	23	D							
VANDERBILT AVENUE @ 46th Street													
North Crosswalk	45	B	32	C	41	B							
East Crosswalk	27	C	18	D	25	C							
South Crosswalk	56	B	23	D	41	B							
West Crosswalk	30	C	27	C	26	C							
VANDERBILT AVENUE @ 47th Street													
South Crosswalk	31	C	32	C	30	C							
West Crosswalk	24	C	35	C	30	C							
PARK AVENUE @ 48th Street													
North Crosswalk	76	B	54	B	58	B							
East Crosswalk	17	D	31	C	20	D							
South Crosswalk	62	B	78	B	92	B							
West Crosswalk	17	D	22	D	22	D							
PARK AVENUE @ 42nd Street													
East Crosswalk	21	D	29	D	32	C							
West Crosswalk	24	C	33	C	22	D							

Table M - 7
ANALYSIS OF MID-BLOCK WALKWAYS EXTERIOR TO GRAND CENTRAL TERMINAL
(BUILD VS. MITIGATED) AM, MIDDAY, PM PEAK PERIODS

	BUILD CONDITIONS						MITIGATED BUILD CONDITIONS						
INTERSECTION and ELEMENT	8 - 9 AM Platoon		12 - 1 PM Platoon		5 - 6 PM Platoon		8 - 9 AM Platoon		12 - 1 PM Platoon		5 - 6 PM Platoon		COMMENTS
	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	
LEXINGTON AVENUE between 43rd & 44th Street													
Walkway	16.1	E	11.5	D	15.7	E							
MADISON AVENUE between 43rd & 44th Street													
Walkway	8.5	C	7.7	C	9.4	C							
MADISON AVENUE between 44rd & 45th Street													
Walkway	8.0	C	9.2	C	10.7	D							
MADISON AVENUE between 45th & 46th Street													
Walkway	11.1	D	8.3	C	10.3	D							
MADISON AVENUE between 46th & 47th Street													
Walkway	8.7	C	7.9	C	10.9	D							
MADISON AVENUE between 47th & 48th Street													
Walkway	12.0	D	10.3	D	12.6	D							
VANDERBILT AVENUE between 45th & 46th Street													
Walkway (East Side)	6.9	B	6.8	B	7.7	C							
Walkway (West Side)	6.0	B	5.8	B	6.1	B							
VANDERBILT AVENUE between 46th & 47th Street													
Walkway (East Side)	5.8	B	5.8	B	6.1	B							
Walkway (West Side)	6.0	B	5.2	B	5.3	B							
43rd STREET between Madison & Vanderbilt Avenue													
Walkway (North Side)	18.8	E	9.8	C	16.0	E	11.4	D	6.9	B	10.0	C	Remove planters & Refuse cans Effective width = 8 feet
Walkway (South Side)	9.4	C	7.1	C	7.7	C							
45th STREET between Madison & Vanderbilt Avenue													
Walkway (North side)	8.2	C	8.3	C	8.3	C							
Walkway (South side)	12.7	D	10.4	D	18.2	E	9.2	C	7.8	C	12.5	D	Remove phone booths & Newspaper seller Effective width = 8 feet
46th STREET between Vanderbilt & Madison Avenue													
Walkway (North Side)	5.1	B	5.2	B	5.1	B							
Walkway (South Side)	5.3	B	5.6	B	5.5	B							
47th STREET between Park & Lexington Avenue													
Walkway	6.3	B	5.5	B	5.9	B							
47th STREET between Vanderbilt & Park Avenue													
Walkway (North Side)	5.6	B	5.7	B	6.0	B							
Walkway (South Side)	5.1	B	5.3	B	5.3	B							
47th STREET between Vanderbilt & Madison Avenue													
Walkway (North Side)	5.1	B	4.8	B	5.2	B							
Walkway (South Side)	5.7	B	6.1	B	5.8	B							
48th STREET between Park & Lexington Avenue													
Walkway	5.6	B	5.3	B	5.5	B							
48th STREET between Madison & Park Avenue													
Walkway	7.8	C	6.6	B	7.3	C							

Table M - 7
ANALYSIS OF MID-BLOCK WALKWAYS EXTERIOR TO GRAND CENTRAL TERMINAL
(BUILD VS. MITIGATED) AM, MIDDAY, PM PEAK PERIODS

	BUILD CONDITIONS						MITIGATED BUILD CONDITIONS						
INTERSECTION and ELEMENT	8 - 9 AM Platoon		12 - 1 PM Platoon		5 - 6 PM Platoon		8 - 9 AM Platoon		12 - 1 PM Platoon		5 - 6 PM Platoon		COMMENTS
	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	Volume (ped/min/ft)	LOS	
LEXINGTON AVENUE between 43rd & 44th Street													
Walkway	16.1	E	11.5	D	15.7	E							
MADISON AVENUE between 43rd & 44th Street													
Walkway	8.5	C	7.7	C	9.4	C							
MADISON AVENUE between 44rd & 45th Street													
Walkway	8.0	C	9.2	C	10.7	D							
MADISON AVENUE between 45th & 46th Street													
Walkway	11.1	D	8.3	C	10.3	D							
MADISON AVENUE between 46th & 47th Street													
Walkway	8.7	C	7.9	C	10.9	D							
MADISON AVENUE between 47th & 48th Street													
Walkway	12.0	D	10.3	D	12.6	D							
VANDERBILT AVENUE between 45th & 46th Street													
Walkway (East Side)	6.9	B	6.8	B	7.7	C							
Walkway (West Side)	6.0	B	5.8	B	6.1	B							
VANDERBILT AVENUE between 46th & 47th Street													
Walkway (East Side)	5.8	B	5.8	B	6.1	B							
Walkway (West Side)	6.0	B	5.2	B	5.3	B							
43rd STREET between Madison & Vanderbilt Avenue													
Walkway (North Side)	18.8	E	9.8	C	16.0	E	11.4	D	6.9	B	10.0	C	Remove planters & Refuse cans Effective width = 8 feet
Walkway (South Side)	9.4	C	7.1	C	7.7	C							
45th STREET between Madison & Vanderbilt Avenue													
Walkway (North side)	8.2	C	8.3	C	8.3	C							
Walkway (South side)	12.7	D	10.4	D	18.2	E	9.2	C	7.8	C	12.5	D	Remove phone booths & Newspaper seller Effective width = 8 feet
46th STREET between Vanderbilt & Madison Avenue													
Walkway (North Side)	5.1	B	5.2	B	5.1	B							
Walkway (South Side)	5.3	B	5.6	B	5.5	B							
47th STREET between Park & Lexington Avenue													
Walkway	6.3	B	5.5	B	5.9	B							
47th STREET between Vanderbilt & Park Avenue													
Walkway (North Side)	5.6	B	5.7	B	6.0	B							
Walkway (South Side)	5.1	B	5.3	B	5.3	B							
47th STREET between Vanderbilt & Madison Avenue													
Walkway (North Side)	5.1	B	4.8	B	5.2	B							
Walkway (South Side)	5.7	B	6.1	B	5.8	B							
48th STREET between Park & Lexington Avenue													
Walkway	5.6	B	5.3	B	5.5	B							
48th STREET between Madison & Park Avenue													
Walkway	7.8	C	6.6	B	7.3	C							

Table M - 12
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	3,030	-	3,030	-	-	-	225	0.90	under capacity	
	1 Down Escalator	-	195	195	-	-	-	75	0.17	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	210	890	1,100	20.0	18.0	20	216	0.34	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	380	20	400	9.0	8.0	20	64	0.42	A	
	South Stairs from LL	55	85	140	9.0	8.0	10	72	0.13	A	
	Up Escalator (3)	100	-	100	-	-	-	60	0.11	under capacity	
	Down Escalator (3)	-	30	30	-	-	-	60	0.03	under capacity	
	North Corridor	1,025	855	1,880	26.0	24.0	10	324	0.39	A	
	South Corridor	1,485	1,690	3,175	21.0	19.0	10	257	0.83	C	
3A. 43rd STREET PASSAGEWAY	Corridor	285	690	975	22.0	20.0	20	240	0.27	A	
4. HYATT PASSAGEWAY	Corridor	575	1,025	1,600	19.0	17.0	10	230	0.46	B	
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,155	975	2,130	19.0	16.0	10	144	0.99	C	
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	905	850	1,755	9.0	8.0	10	72	1.63	E	*
	Up Escalator	1,035	-	1,035	-	-	-	75	0.92	under capacity	
	Down Escalator	-	1,170	1,170	-	-	-	75	**1.04**	**over capacity**	*
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,430	2,420	3,850	30.0	28.0	10	378	0.68	B	
8. LOWER CONCOURSE EAST RAMP	Ramp	60	995	1,055	17.0	15.0	20	180	0.39	A	
9. 42nd ST. MAIN ENTRANCE	Corridor	205	1,180	1,385	21.0	19.0	20	228	0.40	A	
10. SHUTTLE PASSAGEWAY	Corridor	530	1,415	1,945	19.0	17.0	20	204	0.64	B	
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	225	1,350	1,575	14.0	12.0	20	144	0.73	C	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	1,160	30	1,190	9.0	8.0	20	64	1.24	D	*
	South Stairs from LL	60	40	100	9.0	8.0	10	72	0.09	A	
	Up Escalator (4)	2,555	-	2,555	-	-	-	75	**2.27**	**over capacity**	*
	Down Escalator (4)	-	45	45	-	-	-	75	0.04	under capacity	
	North Corridor	1,950	240	2,190	26.0	24.0	20	288	0.51	B	
	South Corridor	945	830	1,775	21.0	19.0	10	257	0.46	B	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	25	910	935	9.0	8.0	20	64	0.97	C	
14. ROOSEVELT PASSAGEWAY	Corridor	20	725	745	11.0	9.0	20	108	0.46	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions. Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 12
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	185	-	185	-	-	-	75	0.49	under capacity	
	3 Down Escalators	-	685	685	-	-	-	225	0.61	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	275	120	395	20.0	18.0	20	216	0.37	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	10	115	125	9.0	8.0	20	64	0.39	A	
	South Stairs from LL	20	35	55	9.0	8.0	10	72	0.15	A	
	Up Escalator (3)	5	-	5	-	-	-	60	0.02	under capacity	
	Down Escalator (3)	-	85	85	-	-	-	60	0.28	under capacity	
	North Corridor	355	460	815	26.0	24.0	10	324	0.50	B	
	South Corridor	570	540	1,110	21.0	19.0	10	257	0.87	C	
3A. 43rd STREET PASSAGEWAY	Corridor	200	65	265	22.0	20.0	20	240	0.22	A	
4. HYATT PASSAGEWAY	Corridor	335	130	465	19.0	17.0	20	204	0.46	B	
5. EASTERN IRT SUBWAY STAIRS	Stairs	330	430	760	19.0	16.0	10	144	1.06	D	
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	245	415	660	9.0	8.0	10	72	**1.83**	**F**	
	Up Escalator	325	-	325	-	-	-	75	0.87	under capacity	
	Down Escalator	-	325	325	-	-	-	75	0.87	under capacity	
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	650	645	1,295	30.0	28.0	10	378	0.69	B	
8. LOWER CONCOURSE EAST RAMP	Ramp	410	30	440	17.0	15.0	20	180	0.49	B	
9. 42nd ST. MAIN ENTRANCE	Corridor	435	110	545	21.0	19.0	20	228	0.48	B	
10. SHUTTLE PASSAGEWAY	Corridor	435	335	770	19.0	17.0	10	230	0.67	B	
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	520	85	605	14.0	12.0	20	144	0.84	C	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	15	375	390	9.0	8.0	20	64	1.22	D	*
	South Stairs from LL	5	30	35	9.0	8.0	20	64	0.11	A	
	Up Escalator (4)	5	-	5	-	-	-	75	0.01	under capacity	
	Down Escalator (4)	-	780	780	-	-	-	75	**2.08**	**over capacity**	*
	North Corridor	140	735	875	26.0	24.0	20	288	0.61	B	
	South Corridor	360	295	655	21.0	19.0	10	257	0.51	B	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	245	30	275	9.0	8.0	20	64	0.86	C	
14. ROOSEVELT PASSAGEWAY	Corridor	220	10	230	11.0	9.0	20	108	0.43	A	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 12
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	490	-	490	-	-	-	75	0.44	under capacity	
	3 Down Escalators	-	2,010	2,010	-	-	-	225	0.60	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	970	415	1,385	20.0	18.0	20	216	0.43	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	55	85	140	9.0	8.0	10	72	0.13	A	
	South Stairs from LL	30	290	320	9.0	8.0	20	64	0.33	A	
	Up Escalator (3)	50	-	50	-	-	-	60	0.06	under capacity	
	Down Escalator (3)	-	215	215	-	-	-	60	0.24	under capacity	
	North Corridor	950	1,095	2,045	26.0	24.0	10	324	0.42	A	
	South Corridor	1,545	1,510	3,055	21.0	19.0	10	257	0.79	C	
3A. 43rd STREET PASSAGEWAY	Corridor	580	185	765	22.0	20.0	20	240	0.21	A	
4. HYATT PASSAGEWAY	Corridor	945	360	1,305	19.0	17.0	20	204	0.43	A	
5. EASTERN IRT SUBWAY STAIRS	Stairs	785	1,120	1,905	19.0	16.0	10	144	0.88	C	
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	635	1,025	1,660	9.0	8.0	10	72	1.54	E	*
	Up Escalator	920	-	920	-	-	-	75	0.82	under capacity	
	Down Escalator	-	945	945	-	-	-	75	0.84	under capacity	
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,710	1,685	3,395	30.0	28.0	10	378	0.60	B	
8. LOWER CONCOURSE EAST RAMP	Ramp	860	75	935	17.0	15.0	20	180	0.35	A	
9. 42nd ST. MAIN ENTRANCE	Corridor	1,235	270	1,505	21.0	19.0	20	228	0.44	A	
10. SHUTTLE PASSAGEWAY	Corridor	1,125	815	1,940	19.0	17.0	10	230	0.56	B	
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	1,495	215	1,710	14.0	12.0	20	144	0.79	C	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	30	995	1,025	9.0	8.0	20	64	1.07	D	*
	South Stairs from LL	15	75	90	9.0	8.0	20	64	0.09	A	
	Up Escalator (4)	20	-	20	-	-	-	75	0.02	under capacity	
	Down Escalator (4)	-	2,070	2,070	-	-	-	75	**1.84**	**over capacity**	*
	North Corridor	340	2,000	2,340	26.0	24.0	20	288	0.54	B	
	South Corridor	890	995	1,885	21.0	19.0	10	257	0.49	B	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	715	55	770	9.0	8.0	20	64	0.80	C	
14. ROOSEVELT PASSAGEWAY	Corridor	635	30	665	11.0	9.0	20	108	0.41	A	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions. Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

TABLE M-13

2010 MITIGATED BUILD
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 13
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)		MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)				
5. EASTERN IRT SUBWAY STAIRS	Stairs	425	330	755	19.0	16.0	10	144	1.05	D		Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	390	215	605	9.0	8.0	10	72	**1.68**	**F**	*	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	375	45	420	9.0	8.0	20	64	1.31	D	*	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	20	10	30	9.0	8.0	20	64	0.09	A		
	Up Escalators (4)	840	-	840	-	-	-	150	**1.12**	**over capacity**	*	Direct both escalators up in AM (reassign down flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A, < 0.70 signifies LOS B; < 1.00 signifies LOS C, < 1.33 signifies LOS D, < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes unmitigated significant pedestrian impact per NYCDCP CEQR Technical Manual.

TABLE M-8

EXISTING
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 8
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS (without NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	1,210	-	1,210	-	-	-	225	**1.08**	**over capacity**
	1 Down Escalator	-	80	80	-	-	-	75	0.21	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	80	425	505	20.0	18.0	20	216	0.47	B
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	120	5	125	9.0	8.0	20	64	0.39	A
	South Stairs from LL	20	25	45	9.0	8.0	10	72	0.13	A
	Up Escalator (3)	25	-	25	-	-	-	60	0.08	under capacity
	Down Escalator (3)	-	10	10	-	-	-	60	0.03	under capacity
	North Corridor	410	280	690	26.0	24.0	10	324	0.43	A
	South Corridor	480	445	925	21.0	19.0	10	257	0.72	C
4. HYATT PASSAGEWAY	Corridor	240	385	625	19.0	17.0	10	230	0.54	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	405	290	695	19.0	16.0	10	144	0.97	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	360	215	575	9.0	8.0	10	72	1.60	E
	Up Escalator	435	-	435	-	-	-	75	**1.16**	**over capacity**
	Down Escalator	-	295	295	-	-	-	75	0.79	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	510	610	1,120	30.0	28.0	10	378	0.59	B
8. LOWER CONCOURSE EAST RAMP	Ramp	20	200	220	17.0	15.0	20	180	0.24	A
9. 42nd ST. MAIN ENTRANCE	Corridor	80	250	330	21.0	19.0	20	228	0.29	A
10. SHUTTLE PASSAGEWAY	Corridor	275	260	535	19.0	17.0	10	230	0.47	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	75	260	335	14.0	12.0	20	144	0.47	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	180	15	195	9.0	8.0	20	64	0.61	B
	South Stairs from LL	10	10	20	9.0	8.0	10	72	0.06	A
	Up Escalator (4)	215	-	215	-	-	-	75	0.57	under capacity
	Down Escalator (4)	-	20	20	-	-	-	75	0.05	under capacity
	North Corridor	485	195	680	26.0	24.0	20	288	0.47	B
	South Corridor	375	240	615	21.0	19.0	10	257	0.48	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	235	245	9.0	8.0	20	64	0.77	C
14. ROOSEVELT PASSAGEWAY	Corridor	10	520	530	11.0	9.0	20	108	0.98	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 8
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS (without NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	3,355	-	3,355	-	-	-	225	0.99	under capacity
	1 Down Escalator	-	210	210	-	-	-	75	0.19	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	235	1,235	1,470	20.0	18.0	20	216	0.45	B
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	280	15	295	9.0	8.0	20	64	0.31	A
	South Stairs from LL	40	70	110	9.0	8.0	10	72	0.10	A
	Up Escalator (3)	60	-	60	-	-	-	60	0.07	under capacity
	Down Escalator (3)	-	25	25	-	-	-	60	0.03	under capacity
	North Corridor	870	825	1,695	26.0	24.0	10	324	0.35	A
	South Corridor	1,350	1,250	2,600	21.0	19.0	10	257	0.68	B
4. HYATT PASSAGEWAY	Corridor	695	1,015	1,710	19.0	17.0	10	230	0.50	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,050	725	1,775	19.0	16.0	10	144	0.82	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	770	600	1,370	9.0	8.0	10	72	1.27	D
	Up Escalator	890	-	890	-	-	-	75	0.79	under capacity
	Down Escalator	-	830	830	-	-	-	75	0.74	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,295	1,705	3,000	30.0	28.0	10	378	0.53	B
8. LOWER CONCOURSE EAST RAMP	Ramp	50	440	490	17.0	15.0	20	180	0.18	A
9. 42nd ST. MAIN ENTRANCE	Corridor	220	675	895	21.0	19.0	20	228	0.26	A
10. SHUTTLE PASSAGEWAY	Corridor	500	665	1,165	19.0	17.0	10	230	0.34	A
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	190	625	815	14.0	12.0	20	144	0.38	A
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	465	25	490	9.0	8.0	20	64	0.51	B
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.05	A
	Up Escalator (4)	420	-	420	-	-	-	75	0.37	under capacity
	Down Escalator (4)	-	35	35	-	-	-	75	0.03	under capacity
	North Corridor	1,075	460	1,535	26.0	24.0	20	288	0.36	A
	South Corridor	880	580	1,460	21.0	19.0	10	257	0.38	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	20	620	640	9.0	8.0	20	64	0.67	B
14. ROOSEVELT PASSAGEWAY	Corridor	15	1,335	1,350	11.0	9.0	20	108	0.83	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions. Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios ≤ 0.45 signifies LOS A; ≤ 0.70 signifies LOS B; ≤ 1.00 signifies LOS C; ≤ 1.33 signifies LOS D; ≤ 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 8
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS (without NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	180	-	180	-	-	-	75	0.48	under capacity
	3 Down Escalators	-	920	920	-	-	-	225	0.82	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	400	135	535	20.0	18.0	20	216	0.50	B
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	10	90	100	9.0	8.0	20	64	0.31	A
	South Stairs from LL	15	25	40	9.0	8.0	10	72	0.11	A
	Up Escalator (3)	5	-	5	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	60	60	-	-	-	60	0.20	under capacity
	North Corridor	305	390	695	26.0	24.0	10	324	0.43	A
	South Corridor	400	490	890	21.0	19.0	10	257	0.69	B
4. HYATT PASSAGEWAY	Corridor	340	155	495	19.0	17.0	20	204	0.49	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	250	390	640	19.0	16.0	10	144	0.89	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	180	380	560	9.0	8.0	20	64	**1.75**	**F**
	Up Escalator	235	-	235	-	-	-	75	0.63	under capacity
	Down Escalator	-	295	295	-	-	-	75	0.79	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	465	585	1,050	30.0	28.0	10	378	0.56	B
8. LOWER CONCOURSE EAST RAMP	Ramp	155	25	180	17.0	15.0	20	180	0.20	A
9. 42nd ST. MAIN ENTRANCE	Corridor	275	110	385	21.0	19.0	20	228	0.34	A
10. SHUTTLE PASSAGEWAY	Corridor	205	310	515	19.0	17.0	10	230	0.45	A
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	285	70	355	14.0	12.0	20	144	0.49	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	10	195	205	9.0	8.0	20	64	0.64	B
	South Stairs from LL	5	10	15	9.0	8.0	20	64	0.05	A
	Up Escalator (4)	5	-	5	-	-	-	75	0.01	under capacity
	Down Escalator (4)	-	160	160	-	-	-	75	0.43	under capacity
	North Corridor	340	460	800	26.0	24.0	10	324	0.49	B
	South Corridor	280	285	565	21.0	19.0	10	257	0.44	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	25	155	180	9.0	8.0	20	64	0.56	B
14. ROOSEVELT PASSAGEWAY	Corridor	390	10	400	11.0	9.0	20	108	0.74	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 8
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS (without NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	480	-	480	-	-	-	75	0.43	under capacity
	3 Down Escalators	-	2,700	2,700	-	-	-	225	0.80	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	1,110	350	1,460	20.0	18.0	20	216	0.45	B
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	25	220	245	9.0	8.0	20	64	0.26	A
	South Stairs from LL	45	65	110	9.0	8.0	10	72	0.10	A
	Up Escalator (3)	15	-	15	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	150	150	-	-	-	60	0.17	under capacity
	North Corridor	895	930	1,825	26.0	24.0	10	324	0.38	A
	South Corridor	1,155	1,375	2,530	21.0	19.0	10	257	0.66	B
4. HYATT PASSAGEWAY	Corridor	950	435	1,385	19.0	17.0	20	204	0.45	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	580	1,020	1,600	19.0	16.0	10	144	0.74	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	445	930	1,375	9.0	8.0	20	64	1.43	E
	Up Escalator	635	-	635	-	-	-	75	0.56	under capacity
	Down Escalator	-	860	860	-	-	-	75	0.76	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,160	1,525	2,685	30.0	28.0	10	378	0.47	B
8. LOWER CONCOURSE EAST RAMP	Ramp	380	60	440	17.0	15.0	20	180	0.16	A
9. 42nd ST. MAIN ENTRANCE	Corridor	775	275	1,050	21.0	19.0	20	228	0.31	A
10. SHUTTLE PASSAGEWAY	Corridor	510	755	1,265	19.0	17.0	10	230	0.37	A
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	810	180	990	14.0	12.0	20	144	0.46	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	25	455	480	9.0	8.0	20	64	0.50	B
	South Stairs from LL	10	35	45	9.0	8.0	20	64	0.05	A
	Up Escalator (4)	15	-	15	-	-	-	75	0.01	under capacity
	Down Escalator (4)	-	370	370	-	-	-	75	0.33	under capacity
	North Corridor	485	1,215	1,700	26.0	24.0	20	288	0.39	A
	South Corridor	710	750	1,460	21.0	19.0	10	257	0.38	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	45	455	500	9.0	8.0	20	64	0.52	B
14. ROOSEVELT PASSAGEWAY	Corridor	1,120	25	1,145	11.0	9.0	20	108	0.71	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

TABLE M-9

2010 NO BUILD
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 9
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 FUTURE NO BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	900	-	900	-	-	-	225	0.80	under capacity
	1 Down Escalator	-	75	75	-	-	-	75	0.20	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	70	205	275	20.0	18.0	20	216	0.25	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	125	5	130	9.0	8.0	20	64	0.41	A
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.14	A
	Up Escalator (3)	25	-	25	-	-	-	60	0.08	under capacity
	Down Escalator (3)	-	10	10	-	-	-	60	0.03	under capacity
	North Corridor	445	180	625	26.0	24.0	20	288	0.43	A
	South Corridor	505	435	940	21.0	19.0	10	257	0.73	C
3A. 43rd STREET PASSAGEWAY	Corridor	90	180	270	22.0	20.0	20	240	0.23	A
4. HYATT PASSAGEWAY	Corridor	190	335	525	19.0	17.0	10	230	0.46	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	425	325	750	19.0	16.0	10	144	1.04	D
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	390	185	575	9.0	8.0	20	64	**1.80**	**F**
	Up Escalator	435	-	435	-	-	-	75	**1.16**	**over capacity**
	Down Escalator	-	250	250	-	-	-	75	0.67	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	535	550	1,085	30.0	28.0	10	378	0.57	B
8. LOWER CONCOURSE EAST RAMP	Ramp	25	90	115	17.0	15.0	20	180	0.13	A
9. 42nd ST. MAIN ENTRANCE	Corridor	75	270	345	21.0	19.0	20	228	0.30	A
10. SHUTTLE PASSAGEWAY	Corridor	285	425	710	19.0	17.0	10	230	0.62	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	80	290	370	14.0	12.0	20	144	0.51	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	190	20	210	9.0	8.0	20	64	0.66	B
	South Stairs from LL	10	10	20	9.0	8.0	10	72	0.06	A
	Up Escalator (4)	110	-	110	-	-	-	75	0.29	under capacity
	Down Escalator (4)	-	25	25	-	-	-	75	0.07	under capacity
	North Corridor	485	60	545	26.0	24.0	20	288	0.38	A
	South Corridor	335	280	615	21.0	19.0	10	257	0.48	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	175	185	9.0	8.0	20	64	0.58	B
14. ROOSEVELT PASSAGEWAY	Corridor	10	120	130	11.0	9.0	20	108	0.24	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 9
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 FUTURE NO BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	2,500	-	2,500	-	-	-	225	0.74	under capacity
	1 Down Escalator	-	195	195	-	-	-	75	0.17	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	190	590	780	20.0	18.0	20	216	0.24	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	280	15	295	9.0	8.0	20	64	0.31	A
	South Stairs from LL	40	80	120	9.0	8.0	20	64	0.13	A
	Up Escalator (3)	55	-	55	-	-	-	60	0.06	under capacity
	Down Escalator (3)	-	30	30	-	-	-	60	0.03	under capacity
	North Corridor	950	540	1,490	26.0	24.0	10	324	0.31	A
	South Corridor	1,420	1,235	2,655	21.0	19.0	10	257	0.69	B
3A. 43rd STREET PASSAGEWAY	Corridor	245	485	730	22.0	20.0	10	270	0.18	A
4. HYATT PASSAGEWAY	Corridor	550	635	1,185	19.0	17.0	10	230	0.34	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,105	810	1,915	19.0	16.0	10	144	0.89	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	925	550	1,475	9.0	8.0	10	72	1.37	E
	Up Escalator	935	-	935	-	-	-	75	0.83	under capacity
	Down Escalator	-	760	760	-	-	-	75	0.68	under capacity
7 EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,365	1,535	2,900	30.0	28.0	10	378	0.51	B
8. LOWER CONCOURSE EAST RAMP	Ramp	55	200	255	17.0	15.0	20	180	0.09	A
9. 42nd ST. MAIN ENTRANCE	Corridor	205	735	940	21.0	19.0	20	228	0.27	A
10. SHUTTLE PASSAGEWAY	Corridor	505	1,040	1,545	19.0	17.0	20	204	0.50	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	210	700	910	14.0	12.0	20	144	0.42	A
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	500	25	525	9.0	8.0	20	64	0.55	B
	South Stairs from LL	25	35	60	9.0	8.0	10	72	0.06	A
	Up Escalator (4)	155	-	155	-	-	-	75	0.14	under capacity
	Down Escalator (4)	-	40	40	-	-	-	75	0.04	under capacity
	North Corridor	1,050	145	1,195	26.0	24.0	20	288	0.28	A
	South Corridor	760	685	1,445	21.0	19.0	10	257	0.38	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	20	460	480	9.0	8.0	20	64	0.50	B
14. ROOSEVELT PASSAGEWAY	Corridor	15	280	295	11.0	9.0	20	108	0.18	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 9
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 FUTURE NO BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	180	-	180	-	-	-	75	0.48	under capacity
	3 Down Escalators	-	545	545	-	-	-	225	0.48	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	185	110	295	20.0	18.0	10	243	0.24	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	10	95	105	9.0	8.0	20	64	0.33	A
	South Stairs from LL	20	25	45	9.0	8.0	10	72	0.13	A
	Up Escalator (3)	5	-	5	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	70	70	-	-	-	60	0.23	under capacity
	North Corridor	220	425	645	26.0	24.0	10	324	0.40	A
	South Corridor	390	515	905	21.0	19.0	10	257	0.71	C
3A. 43rd STREET PASSAGEWAY	Corridor	145	65	210	22.0	20.0	20	240	0.18	A
4. HYATT PASSAGEWAY	Corridor	220	125	345	19.0	17.0	10	230	0.30	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	280	410	690	19.0	16.0	10	144	0.96	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	160	400	560	9.0	8.0	20	64	1.75	F
	Up Escalator	210	-	210	-	-	-	75	0.56	under capacity
	Down Escalator	-	310	310	-	-	-	75	0.83	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	425	615	1,040	30.0	28.0	10	378	0.55	B
8. LOWER CONCOURSE EAST RAMP	Ramp	80	30	110	17.0	15.0	20	180	0.12	A
9. 42nd ST. MAIN ENTRANCE	Corridor	300	110	410	21.0	19.0	20	228	0.36	A
10. SHUTTLE PASSAGEWAY	Corridor	325	320	645	19.0	17.0	10	230	0.56	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	320	75	395	14.0	12.0	20	144	0.55	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	15	190	205	9.0	8.0	20	64	0.64	B
	South Stairs from LL	5	15	20	9.0	8.0	20	64	0.06	A
	Up Escalator (4)	5	-	5	-	-	-	75	0.01	under capacity
	Down Escalator (4)	-	120	120	-	-	-	75	0.32	under capacity
	North Corridor	105	470	575	26.0	24.0	20	288	0.40	A
	South Corridor	315	240	555	21.0	19.0	10	257	0.43	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	120	25	145	9.0	8.0	20	64	0.45	B
14. ROOSEVELT PASSAGEWAY	Corridor	90	10	100	11.0	9.0	20	108	0.19	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual. Also adjusted for pedestrian flow in opposing directions. Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively. Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows. V/C ratios $\leq$ 0.45 signifies LOS A, $\leq$ 0.70 signifies LOS B, $\leq$ 1.00 signifies LOS C, $\leq$ 1.33 signifies LOS D, $\leq$ 1.67 signifies LOS E, $>$ 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 9
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 FUTURE NO BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	480	-	480	-	-	-	75	0.43	under capacity
	3 Down Escalators	-	1,600	1,600	-	-	-	225	0.47	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	560	285	845	20.0	18.0	10	243	0.23	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	75	55	130	9.0	8.0	10	72	0.12	A
	South Stairs from LL	10	245	255	9.0	8.0	20	64	0.27	A
	Up Escalator (3)	20	-	20	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	180	180	-	-	-	60	0.20	under capacity
	North Corridor	710	1,015	1,725	26.0	24.0	10	324	0.35	A
	South Corridor	1,150	1,445	2,595	21.0	19.0	10	257	0.67	B
3A. 43rd STREET PASSAGEWAY	Corridor	395	175	570	22.0	20.0	20	240	0.16	A
4. HYATT PASSAGEWAY	Corridor	600	345	945	19.0	17.0	10	230	0.27	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	700	1,070	1,770	19.0	16.0	10	144	0.82	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	400	1,000	1,400	9.0	8.0	20	64	1.46	E
	Up Escalator	570	-	570	-	-	-	75	0.51	under capacity
	Down Escalator	-	900	900	-	-	-	75	0.80	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,055	1,610	2,665	30.0	28.0	10	378	0.47	B
8. LOWER CONCOURSE EAST RAMP	Ramp	200	70	270	17.0	15.0	20	180	0.10	A
9. 42nd ST. MAIN ENTRANCE	Corridor	845	265	1,110	21.0	19.0	20	228	0.32	A
10. SHUTTLE PASSAGEWAY	Corridor	880	780	1,660	19.0	17.0	10	230	0.48	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	980	195	1,175	14.0	12.0	20	144	0.54	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	35	505	540	9.0	8.0	20	64	0.56	B
	South Stairs from LL	5	35	40	9.0	8.0	20	64	0.04	A
	Up Escalator (4)	20	-	20	-	-	-	75	0.02	under capacity
	Down Escalator (4)	-	135	135	-	-	-	75	0.12	under capacity
	North Corridor	265	1,320	1,585	26.0	24.0	20	288	0.37	A
	South Corridor	760	825	1,585	21.0	19.0	10	257	0.41	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	365	50	415	9.0	8.0	20	64	0.43	A
14. ROOSEVELT PASSAGEWAY	Corridor	275	30	305	11.0	9.0	20	108	0.19	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A, < 0.70 signifies LOS B; < 1.00 signifies LOS C, < 1.33 signifies LOS D, < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

TABLE M-10

2020 NO BUILD
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 10
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 FUTURE NO BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	975	-	975	-	-	-	225	0.87	under capacity
	1 Down Escalator	-	80	80	-	-	-	75	0.21	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	70	230	300	20.0	18.0	20	216	0.28	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	140	5	145	9.0	8.0	20	64	0.45	B
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.14	A
	Up Escalator (3)	25	-	25	-	-	-	60	0.08	under capacity
	Down Escalator (3)	-	10	10	-	-	-	60	0.03	under capacity
	North Corridor	485	200	685	26.0	24.0	20	288	0.48	B
	South Corridor	525	485	1,010	21.0	19.0	10	257	0.79	C
3A. 43rd STREET PASSAGEWAY	Corridor	95	200	295	22.0	20.0	20	240	0.25	A
4. HYATT PASSAGEWAY	Corridor	200	280	480	19.0	17.0	10	230	0.42	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	445	360	805	19.0	16.0	10	144	1.12	D
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	420	205	625	9.0	8.0	20	64	**1.95**	**F**
	Up Escalator	435	-	435	-	-	-	75	**1.16**	**over capacity**
	Down Escalator	-	280	280	-	-	-	75	0.75	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	565	605	1,170	30.0	28.0	10	378	0.62	B
8. LOWER CONCOURSE EAST RAMP	Ramp	25	100	125	17.0	15.0	20	180	0.14	A
9. 42nd ST. MAIN ENTRANCE	Corridor	80	295	375	21.0	19.0	20	228	0.33	A
10. SHUTTLE PASSAGEWAY	Corridor	295	470	765	19.0	17.0	10	230	0.67	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	90	325	415	14.0	12.0	20	144	0.58	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	215	20	235	9.0	8.0	20	64	0.73	C
	South Stairs from LL	10	10	20	9.0	8.0	10	72	0.06	A
	Up Escalator (4)	125	-	125	-	-	-	75	0.33	under capacity
	Down Escalator (4)	-	25	25	-	-	-	75	0.07	under capacity
	North Corridor	540	70	610	26.0	24.0	20	288	0.42	A
	South Corridor	365	305	670	21.0	19.0	10	257	0.52	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	195	205	9.0	8.0	20	64	0.64	B
14. ROOSEVELT PASSAGEWAY	Corridor	10	130	140	11.0	9.0	20	108	0.26	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M-10
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 FUTURE NO BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	2,705	-	2,705	-	-	-	225	1.00	under capacity
	1 Down Escalator	-	195	195	-	-	-	75	0.17	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	210	655	865	20.0	18.0	20	216	0.27	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	310	20	330	9.0	8.0	20	64	0.34	A
	South Stairs from LL	45	85	130	9.0	8.0	10	72	0.12	A
	Up Escalator (3)	60	-	60	-	-	-	60	0.07	under capacity
	Down Escalator (3)	-	30	30	-	-	-	60	0.03	under capacity
	North Corridor	1,025	600	1,625	26.0	24.0	10	324	0.33	A
	South Corridor	1,485	1,370	2,855	21.0	19.0	10	257	0.74	C
3A. 43rd STREET PASSAGEWAY	Corridor	285	540	825	22.0	20.0	10	270	0.20	A
4. HYATT PASSAGEWAY	Corridor	575	705	1,280	19.0	17.0	10	230	0.37	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,155	900	2,055	19.0	16.0	10	144	0.95	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	965	640	1,605	9.0	8.0	10	72	1.49	E
	Up Escalator	975	-	975	-	-	-	75	0.87	under capacity
	Down Escalator	-	815	815	-	-	-	75	0.72	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,430	1,780	3,210	30.0	28.0	10	378	0.57	B
8. LOWER CONCOURSE EAST RAMP	Ramp	60	225	285	17.0	15.0	20	180	0.11	A
9. 42nd ST. MAIN ENTRANCE	Corridor	205	800	1,005	21.0	19.0	20	228	0.29	A
10. SHUTTLE PASSAGEWAY	Corridor	530	1,150	1,680	19.0	17.0	20	204	0.55	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	225	775	1,000	14.0	12.0	20	144	0.46	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	555	30	585	9.0	8.0	20	64	0.61	B
	South Stairs from LL	30	40	70	9.0	8.0	10	72	0.06	A
	Up Escalator (4)	175	-	175	-	-	-	75	0.16	under capacity
	Down Escalator (4)	-	45	45	-	-	-	75	0.04	under capacity
	North Corridor	1,165	160	1,325	26.0	24.0	20	288	0.31	A
	South Corridor	825	750	1,575	21.0	19.0	10	257	0.41	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	25	510	535	9.0	8.0	20	64	0.56	B
14. ROOSEVELT PASSAGEWAY	Corridor	20	310	330	11.0	9.0	20	108	0.20	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 10
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 FUTURE NO BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	185	-	185	-	-	-	75	0.49	under capacity
	3 Down Escalators	-	590	590	-	-	-	225	0.52	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	210	120	330	20.0	18.0	10	243	0.27	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	10	100	110	9.0	8.0	20	64	0.34	A
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.14	A
	Up Escalator (3)	5	-	5	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	75	75	-	-	-	60	0.25	under capacity
	North Corridor	245	460	705	26.0	24.0	10	324	0.44	A
	South Corridor	435	540	975	21.0	19.0	10	257	0.76	C
3A. 43rd STREET PASSAGEWAY	Corridor	155	65	220	22.0	20.0	20	240	0.18	A
4. HYATT PASSAGEWAY	Corridor	245	130	375	19.0	17.0	10	230	0.33	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	310	430	740	19.0	16.0	10	144	1.03	D
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	175	415	590	9.0	8.0	20	64	**1.84**	**F**
	Up Escalator	235	-	235	-	-	-	75	0.63	under capacity
	Down Escalator	-	325	325	-	-	-	75	0.87	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	470	645	1,115	30.0	28.0	10	378	0.59	B
8. LOWER CONCOURSE EAST RAMP	Ramp	85	30	115	17.0	15.0	20	180	0.13	A
9. 42nd ST. MAIN ENTRANCE	Corridor	325	110	435	21.0	19.0	20	228	0.38	A
10. SHUTTLE PASSAGEWAY	Corridor	360	335	695	19.0	17.0	10	230	0.61	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	355	85	440	14.0	12.0	20	144	0.61	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	15	215	230	9.0	8.0	20	64	0.72	C
	South Stairs from LL	5	15	20	9.0	8.0	20	64	0.06	A
	Up Escalator (4)	5	-	5	-	-	-	75	0.01	under capacity
	Down Escalator (4)	-	130	130	-	-	-	75	0.35	under capacity
	North Corridor	120	520	640	26.0	24.0	20	288	0.44	A
	South Corridor	340	265	605	21.0	19.0	10	257	0.47	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	130	30	160	9.0	8.0	20	64	0.50	B
14. ROOSEVELT PASSAGEWAY	Corridor	100	10	110	11.0	9.0	20	108	0.20	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

Table M - 10
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 FUTURE NO BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	490	-	490	-	-	-	75	0.44	under capacity
	3 Down Escalators	-	1,730	1,730	-	-	-	225	0.51	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	770	415	1,185	20.0	18.0	10	243	0.33	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	55	70	125	9.0	8.0	10	72	0.12	A
	South Stairs from LL	30	240	270	9.0	8.0	20	64	0.28	A
	Up Escalator (3)	20	-	20	-	-	-	60	0.02	under capacity
	Down Escalator (3)	-	185	185	-	-	-	60	0.21	under capacity
	North Corridor	730	1,095	1,825	26.0	24.0	10	324	0.38	A
	South Corridor	1,275	1,510	2,785	21.0	19.0	10	257	0.72	C
3A. 43rd STREET PASSAGEWAY	Corridor	450	185	635	22.0	20.0	20	240	0.18	A
4. HYATT PASSAGEWAY	Corridor	670	360	1,030	19.0	17.0	10	230	0.30	A
5. EASTERN IRT SUBWAY STAIRS	Stairs	720	1,120	1,840	19.0	16.0	10	144	0.85	C
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	440	1,025	1,465	9.0	8.0	20	64	1.53	E
	Up Escalator	635	-	635	-	-	-	75	0.56	under capacity
	Down Escalator	-	945	945	-	-	-	75	0.84	under capacity
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,165	1,685	2,850	30.0	28.0	10	378	0.50	B
8. LOWER CONCOURSE EAST RAMP	Ramp	205	75	280	17.0	15.0	20	180	0.10	A
9. 42nd ST. MAIN ENTRANCE	Corridor	915	270	1,185	21.0	19.0	20	228	0.35	A
10. SHUTTLE PASSAGEWAY	Corridor	900	815	1,715	19.0	17.0	10	230	0.50	B
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	1010	215	1,225	14.0	12.0	20	144	0.57	B
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	30	515	545	9.0	8.0	20	64	0.57	B
	South Stairs from LL	15	40	55	9.0	8.0	20	64	0.06	A
	Up Escalator (4)	20	-	20	-	-	-	75	0.02	under capacity
	Down Escalator (4)	-	135	135	-	-	-	75	0.12	under capacity
	North Corridor	275	1,355	1,630	26.0	24.0	20	288	0.38	A
	South Corridor	825	900	1,725	21.0	19.0	10	257	0.45	A
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	375	55	430	9.0	8.0	20	64	0.45	A
14. ROOSEVELT PASSAGEWAY	Corridor	280	30	310	11.0	9.0	20	108	0.19	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

TABLE M-11

2010 BUILD
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 11
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	1,005	-	1,005	-	-	-	225	0.89	under capacity	
	1 Down Escalator	-	75	75	-	-	-	75	0.20	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	70	280	350	20.0	18.0	20	216	0.32	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	150	5	155	9.0	8.0	20	64	0.48	B	
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.14	A	
	Up Escalator (3)	35	-	35	-	-	-	60	0.12	under capacity	
	Down Escalator (3)	-	10	10	-	-	-	60	0.03	under capacity	
	North Corridor	445	260	705	26.0	24.0	10	324	0.44	A	
	South Corridor	505	535	1,040	21.0	19.0	10	257	0.81	C	
3A. 43rd STREET PASSAGEWAY	Corridor	90	230	320	22.0	20.0	20	240	0.27	A	
4. HYATT PASSAGEWAY	Corridor	190	355	545	19.0	17.0	10	230	0.47	B	
5. EASTERN IRT SUBWAY STAIRS	Stairs	425	350	775	19.0	16.0	10	144	1.08	D	*
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	390	260	650	9.0	8.0	10	72	**1.81**	**F**	
	Up Escalator	435	-	435	-	-	-	75	**1.16**	**over capacity**	
	Down Escalator	-	360	360	-	-	-	75	0.96	under capacity	
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	535	755	1,290	30.0	28.0	10	378	0.68	B	
8. LOWER CONCOURSE EAST RAMP	Ramp	25	335	360	17.0	15.0	20	180	0.40	A	
9. 42nd ST. MAIN ENTRANCE	Corridor	75	390	465	21.0	19.0	20	228	0.41	A	
10. SHUTTLE PASSAGEWAY	Corridor	285	510	795	19.0	17.0	10	230	0.69	B	
11. RAMP TO VANDERBILT AVE / 42nd ST NE CORNER	Ramp	80	475	555	14.0	12.0	20	144	0.77	C	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	375	20	395	9.0	8.0	20	64	1.23	D	*
	South Stairs from LL	20	10	30	9.0	8.0	20	64	0.09	A	
	Up Escalator (4)	840	-	840	-	-	-	75	**2.24**	**over capacity**	*
	Down Escalator (4)	-	25	25	-	-	-	75	0.07	under capacity	
	North Corridor	725	85	810	26.0	24.0	20	288	0.56	B	
	South Corridor	370	305	675	21.0	19.0	10	257	0.53	B	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	305	315	9.0	8.0	20	64	0.98	C	
14. ROOSEVELT PASSAGEWAY	Corridor	10	255	265	11.0	9.0	20	108	0.49	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M-11
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	2,810	-	2,810	-	-	-	225	0.83	under capacity	
	1 Down Escalator	-	195	195	-	-	-	75	0.17	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	190	810	1,000	20.0	18.0	20	216	0.31	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	345	15	360	9.0	8.0	20	64	0.38	A	
	South Stairs from LL	45	80	125	9.0	8.0	10	72	0.12	A	
	Up Escalator (3)	90	-	90	-	-	-	60	0.10	under capacity	
	Down Escalator (3)	-	30	30	-	-	-	60	0.03	under capacity	
	North Corridor	950	785	1,735	26.0	24.0	10	324	0.36	A	
	South Corridor	1,420	1,540	2,960	21.0	19.0	10	257	0.77	C	
3A. 43rd STREET PASSAGEWAY	Corridor	245	630	875	22.0	20.0	20	240	0.24	A	
4. HYATT PASSAGEWAY	Corridor	550	940	1,490	19.0	17.0	10	230	0.43	A	
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,105	880	1,985	19.0	16.0	10	144	0.92	C	
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	875	775	1,650	9.0	8.0	10	72	1.53	E	*
	Up Escalator	985	-	985	-	-	-	75	0.88	under capacity	
	Down Escalator	-	1,075	1,075	-	-	-	75	0.96	under capacity	
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,365	2,145	3,510	30.0	28.0	10	378	0.62	B	
8. LOWER CONCOURSE EAST RAMP	Ramp	55	935	990	17.0	15.0	20	180	0.37	A	
9. 42nd ST. MAIN ENTRANCE	Corridor	205	1,095	1,300	21.0	19.0	20	228	0.38	A	
10. SHUTTLE PASSAGEWAY	Corridor	505	1,290	1,795	19.0	17.0	20	204	0.59	B	
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	210	1,245	1,455	14.0	12.0	20	144	0.67	B	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	1,045	25	1,070	9.0	8.0	20	64	1.11	D	*
	South Stairs from LL	55	35	90	9.0	8.0	10	72	0.08	A	
	Up Escalator (4)	2,310	-	2,310	-	-	-	75	**2.05**	**over capacity**	*
	Down Escalator (4)	-	40	40	-	-	-	75	0.04	under capacity	
	North Corridor	1,770	215	1,985	26.0	24.0	20	288	0.46	B	
	South Corridor	870	755	1,625	21.0	19.0	10	257	0.42	A	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	20	840	860	9.0	8.0	20	64	0.90	C	
14. ROOSEVELT PASSAGEWAY	Corridor	15	675	690	11.0	9.0	20	108	0.43	A	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

"*" Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 11
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	180	-	180	-	-	-	75	0.48	under capacity	
	3 Down Escalators	-	635	635	-	-	-	225	0.56	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	245	110	355	20.0	18.0	20	216	0.33	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	10	110	120	9.0	8.0	20	64	0.38	A	
	South Stairs from LL	20	30	50	9.0	8.0	10	72	0.14	A	
	Up Escalator (3)	5	-	5	-	-	-	60	0.02	under capacity	
	Down Escalator (3)	-	80	80	-	-	-	60	0.27	under capacity	
	North Corridor	290	425	715	26.0	24.0	10	324	0.44	A	
	South Corridor	475	515	990	21.0	19.0	10	257	0.77	C	
3A. 43rd STREET PASSAGEWAY	Corridor	185	65	250	22.0	20.0	20	240	0.21	A	
4. HYATT PASSAGEWAY	Corridor	310	125	435	19.0	17.0	20	204	0.43	A	
5. EASTERN IRT SUBWAY STAIRS	Stairs	300	410	710	19.0	16.0	10	144	0.99	C	
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	225	400	625	9.0	8.0	10	72	**1.74**	**F**	
	Up Escalator	300	-	300	-	-	-	75	0.80	under capacity	
	Down Escalator	-	310	310	-	-	-	75	0.83	under capacity	
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	600	615	1,215	30.0	28.0	10	378	0.64	B	
8. LOWER CONCOURSE EAST RAMP	Ramp	290	30	320	17.0	15.0	20	180	0.36	A	
9. 42nd ST. MAIN ENTRANCE	Corridor	405	110	515	21.0	19.0	20	228	0.45	B	
10. SHUTTLE PASSAGEWAY	Corridor	400	320	720	19.0	17.0	10	230	0.63	B	
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	475	75	550	14.0	12.0	20	144	0.76	C	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	15	345	360	9.0	8.0	20	64	1.13	D	*
	South Stairs from LL	5	25	30	9.0	8.0	20	64	0.09	A	
	Up Escalator (4)	5	-	5	-	-	-	75	0.01	under capacity	
	Down Escalator (4)	-	740	740	-	-	-	75	**1.97**	**over capacity**	
	North Corridor	125	675	800	26.0	24.0	20	288	0.56	B	
	South Corridor	335	270	605	21.0	19.0	10	257	0.47	B	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	230	25	255	9.0	8.0	20	64	0.80	C	
14. ROOSEVELT PASSAGEWAY	Corridor	205	10	215	11.0	9.0	20	108	0.40	A	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 11
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1. MET LIFE BUILDING ESCALATORS	1 Up Escalator	480	-	480	-	-	-	75	0.43	under capacity	
	3 Down Escalators	-	1,865	1,865	-	-	-	225	0.55	under capacity	
2. GRAYBAR PASSAGEWAY	Corridor	750	285	1,035	20.0	18.0	20	216	0.32	A	
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	75	65	140	9.0	8.0	10	72	0.13	A	
	South Stairs from LL	10	295	305	9.0	8.0	20	64	0.32	A	
	Up Escalator (3)	20	-	20	-	-	-	60	0.02	under capacity	
	Down Escalator (3)	-	210	210	-	-	-	60	0.23	under capacity	
	North Corridor	920	1,015	1,935	26.0	24.0	10	324	0.40	A	
	South Corridor	1,410	1,445	2,855	21.0	19.0	10	257	0.74	C	
3A. 43rd STREET PASSAGEWAY	Corridor	515	175	690	22.0	20.0	20	240	0.19	A	
4. HYATT PASSAGEWAY	Corridor	860	345	1,205	19.0	17.0	20	204	0.39	A	
5. EASTERN IRT SUBWAY STAIRS	Stairs	760	1,070	1,830	19.0	16.0	10	144	0.85	C	
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	585	990	1,575	9.0	8.0	10	72	1.46	E	
	Up Escalator	845	-	845	-	-	-	75	0.75	under capacity	
	Down Escalator	-	910	910	-	-	-	75	0.81	under capacity	
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	1,575	1,610	3,185	30.0	28.0	10	378	0.56	B	
8. LOWER CONCOURSE EAST RAMP	Ramp	825	70	895	17.0	15.0	20	180	0.33	A	
9. 42nd ST. MAIN ENTRANCE	Corridor	1,150	265	1,415	21.0	19.0	20	228	0.41	A	
10. SHUTTLE PASSAGEWAY	Corridor	1,095	780	1,875	19.0	17.0	10	230	0.54	B	
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	1,440	195	1,635	14.0	12.0	20	144	0.76	C	
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	35	970	1,005	9.0	8.0	20	64	1.05	D	*
	South Stairs from LL	5	60	65	9.0	8.0	20	64	0.07	A	
	Up Escalator (4)	20	-	20	-	-	-	75	0.02	under capacity	
	Down Escalator (4)	-	1,975	1,975	-	-	-	75	**1.76**	**over capacity**	*
	North Corridor	325	1,930	2,255	26.0	24.0	20	288	0.52	B	
	South Corridor	820	915	1,735	21.0	19.0	10	257	0.45	B	
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	690	50	740	9.0	8.0	20	64	0.77	C	
14. ROOSEVELT PASSAGEWAY	Corridor	610	30	640	11.0	9.0	20	108	0.40	A	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

TABLE M-12

2020 BUILD

GCT INTERNAL

PEDESTRIAN ANALYSES

Table M - 12
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1. MET LIFE BUILDING ESCALATORS	3 Up Escalators	1,085	-	1,085	-	-	-	225	0.96	under capacity
	1 Down Escalator	-	80	80	-	-	-	75	0.21	under capacity
2. GRAYBAR PASSAGEWAY	Corridor	70	310	380	20.0	18.0	20	216	0.35	A
3. LEXINGTON AVE. STAIRS / ESCALATORS	North Stairs from LL	160	5	165	9.0	8.0	20	64	0.52	B
	South Stairs from LL	25	30	55	9.0	8.0	10	72	0.15	A
	Up Escalator (3)	40	-	40	-	-	-	60	0.13	under capacity
	Down Escalator (3)	-	10	10	-	-	-	60	0.03	under capacity
	North Corridor	485	285	770	26.0	24.0	10	324	0.48	B
	South Corridor	525	595	1,120	21.0	19.0	10	257	0.87	C
3A. 43rd STREET PASSAGEWAY	Corridor	95	250	345	22.0	20.0	20	240	0.29	A
4. HYATT PASSAGEWAY	Corridor	200	390	590	19.0	17.0	10	230	0.51	B
5. EASTERN IRT SUBWAY STAIRS	Stairs	445	385	830	19.0	16.0	10	144	1.15	D
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	420	285	705	9.0	8.0	10	72	**1.96**	**F** *
	Up Escalator	435	-	435	-	-	-	75	**1.16**	**over capacity**
	Down Escalator	-	390	390	-	-	-	75	**1.04**	**over capacity** *
7. EAST PASSAGEWAY TO 42nd ST. (PARK - LEX)	Corridor	565	820	1,385	30.0	28.0	10	378	0.73	C
8. LOWER CONCOURSE EAST RAMP	Ramp	25	360	385	17.0	15.0	20	180	0.43	A
9. 42nd ST. MAIN ENTRANCE	Corridor	80	425	505	21.0	19.0	20	228	0.44	A
10. SHUTTLE PASSAGEWAY	Corridor	295	560	855	19.0	17.0	10	230	0.75	C
11. RAMP TO VANDERBILT AVE / 42nd ST. NE CORNER	Ramp	90	520	610	14.0	12.0	20	144	0.85	C
12. VANDERBILT AVE. STAIRS / ESCALATORS	North Stairs from LL	410	20	430	9.0	8.0	20	64	1.34	E *
	South Stairs from LL	20	10	30	9.0	8.0	20	64	0.09	A
	Up Escalator (4)	895	-	895	-	-	-	75	**2.39**	**over capacity** *
	Down Escalator (4)	-	25	25	-	-	-	75	0.07	under capacity
	North Corridor	785	95	880	26.0	24.0	20	288	0.61	B
	South Corridor	400	330	730	21.0	19.0	10	257	0.57	B
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	330	340	9.0	8.0	20	64	1.06	D *
14. ROOSEVELT PASSAGEWAY	Corridor	10	270	280	11.0	9.0	20	108	0.52	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 13
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,105	820	1,925	19.0	16.0	10	144	0.89	C	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	925	635	1,560	9.0	8.0	10	72	1.44	E *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	1,045	65	1,110	9.0	8.0	20	64	1.16	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	55	35	90	9.0	8.0	10	72	0.08	A	
	Up Escalators (4)	2,310	-	2,310	-	-	-	150	**1.03**	**over capacity** *	Direct both escalators up in AM (reassign down flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes unmitigated significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 13
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	285	410	695	19.0	16.0	10	144	0.97	C	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	185	400	585	9.0	8.0	20	64	**1.83**	**F** *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	20	345	365	9.0	8.0	20	64	1.14	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	5	25	30	9.0	8.0	20	64	0.09	A	
	Down Escalators (4)	-	740	740	-	-	-	150	0.99	under capacity	Direct both escalators down in PM (reassign up flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
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(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

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Table M - 13
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	710	1,070	1,780	19.0	16.0	10	144	0.82	C	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	470	1,000	1,470	9.0	8.0	20	64	1.53	E *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	55	970	1,025	9.0	8.0	20	64	1.07	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	5	60	65	9.0	8.0	20	64	0.07	A	
	Down Escalators (4)	-	1,975	1,975	-	-	-	150	0.88	under capacity	Direct both escalators down in PM (reassign up flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions. Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A, < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes unmitigated significant pedestrian impact per NYCDCP CEQR Technical Manual.

TABLE M-14

2020 MITIGATED BUILD
GCT INTERNAL
PEDESTRIAN ANALYSES

Table M - 14
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	445	365	810	19.0	16.0	10	144	1.13	D	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	420	235	655	9.0	8.0	10	72	**1.82**	**F** *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	410	45	455	9.0	8.0	20	64	1.42	E *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	20	10	30	9.0	8.0	20	64	0.09	A	
	Up Escalators (4)	895	-	895	-	-	-	150	**1.19**	**over capacity** *	Direct both escalators up in AM (reassign down flow to nearest stair).
13. 43rd ST. STAIRS IN BILTMORE ROOM	Stairs	10	330	340	9.0	8.0	20	64	1.06	D *	

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes unmitigated significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 14
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS (NEA) PEAK AM 15-MINUTE PERIOD (8:35-8:50)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	1,155	910	2,065	19.0	16.0	10	144	0.96	C	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWAY STAIRS / ESCALATORS	Stairs	965	735	1,700	9.0	8.0	10	72	1.57	E *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	1,160	75	1,235	9.0	8.0	20	64	1.29	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	60	40	100	9.0	8.0	10	72	0.09	A	
	Up Escalators (4)	2,555	-	2,555	-	-	-	150	**1.14**	**over capacity** *	Direct both escalators up in AM (reassign down flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes unmitigated significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 14
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS (NEA) PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	315	430	745	19.0	16.0	10	144	1.03	D	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWA STAIRS / ESCALATORS	Stairs	200	415	615	9.0	8.0	20	64	**1.92**	**F** *	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	20	375	395	9.0	8.0	20	64	1.23	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	5	30	35	9.0	8.0	20	64	0.11	A	
	Down Escalators (4)	-	780	780	-	-	-	150	**1.04**	**over capacity** *	Direct both escalators down in PM (reassign up flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes unmitigated significant pedestrian impact per NYCDCP CEQR Technical Manual.

Table M - 14
ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS WITHIN GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS (NEA) PEAK PM 15-MINUTE PERIOD (5:10-5:25)

PEDESTRIAN CIRCULATION ELEMENT		PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	MITIGATION MEASURE
LOCATION	SECTION	UP / IN	DOWN / OUT	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
5. EASTERN IRT SUBWAY STAIRS	Stairs	730	1,120	1,850	19.0	16.0	10	144	0.86	C	Reassigned pedestrian flows into "free" shuttle passageway.
6. WESTERN IRT SUBWA STAIRS / ESCALATORS	Stairs	515	1,025	1,540	9.0	8.0	10	72	1.43	E	
12. VANDERBILT AVENUE STAIRS / ESCALATORS	North Stairs from LL	50	995	1,045	9.0	8.0	20	64	1.09	D *	Although significant impact noted, a more balanced flow and acceptable LOS between north and south stairs will likely result.
	South Stairs from LL	15	75	90	9.0	8.0	20	64	0.09	A	
	Down Escalators (4)	-	2,070	2,070	-	-	-	150	0.92	under capacity	Direct both escalators down in PM (reassign up flow to nearest stair).

NOTES:

(1) Based on an average unit (effective) width flow rate of 15 pax/ft/min for walkways and 10 pax/ft/min for stairwells, signifying LOS C/D per NYCDCP CEQR Technical Manual.
Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.
Escalator capacity ranges between 60 and 130 persons per minute, based on speed and width. The listed maximum processing rates for escalators represent values observed under heavy-demand conditions.
The CEQR Technical Manual and NYCT Station Planning and Design Guidelines do not list escalator levels of service since these type of elements operate either under or over capacity.

(2) Per NYCDCP CEQR Technical Manual, stairway and passageway level-of-service thresholds are as follows: V/C ratios < 0.45 signifies LOS A; < 0.70 signifies LOS B; < 1.00 signifies LOS C; < 1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

(3) Elements just east of Hudson News

(4) Elements facing NYCT Museum Store

" * " Denotes unmitigated significant pedestrian impact per NYCDCP CEQR Technical Manual.

TABLE M-15

SUBWAY MEZZANINE "B" PEDESTRIAN ANALYSES

Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS -- 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped) (7)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped) (7)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
AM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	631	1.0	7.0	4,414	575	40	224	0.18	102.7	16.0	1,643	6,057	**166%**	**fails**
2	380	5.0	1,900	315	1.0	7.0	2,207	685	35	224	0.16	107.0	16.0	1,713	3,920	**206%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	631	1.0	3.0	1,892	575	40	198	0.20	116.2	11.0	1,278	3,169	87%	OK
2	380	5.0	1,900	315	1.0	3.0	946	685	35	198	0.18	121.1	11.0	1,332	2,278	**120%**	**fails**
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	631	1.0	2.0	1,261	575	40	150	0.27	153.3	6.0	920	2,181	60%	OK
2	380	5.0	1,900	315	1.0	2.0	631	685	35	150	0.23	159.8	6.0	959	1,590	84%	OK
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	7.0	9,931	1,475	40	224	0.18	263.4	16.0	4,215	14,146	**129%**	**fails**
2	380	15.0	5,700	631	1.0	7.0	4,414	1,725	35	224	0.16	269.6	16.0	4,313	8,727	**153%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	3.0	4,256	1,475	40	198	0.20	298.0	11.0	3,278	7,534	69%	OK
2	380	15.0	5,700	631	1.0	3.0	1,892	1,725	35	198	0.18	304.9	11.0	3,354	5,246	92%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	2.0	2,837	1,475	40	150	0.27	393.3	6.0	2,360	5,197	47%	OK
2	380	15.0	5,700	631	1.0	2.0	1,261	1,725	35	150	0.23	402.5	6.0	2,415	3,676	64%	OK
PM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	168	1.0	7.0	1,177	560	40	224	0.18	100.0	16.0	1,600	2,777	76%	OK
2	380	5.0	1,900	84	1.0	7.0	589	520	35	224	0.16	81.3	16.0	1,300	1,889	99%	OK
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	168	1.0	3.0	504	560	40	198	0.20	113.1	11.0	1,244	1,749	48%	OK
2	380	5.0	1,900	84	1.0	3.0	252	520	35	198	0.18	91.9	11.0	1,011	1,263	66%	OK
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	168	1.0	2.0	336	560	40	150	0.27	149.3	6.0	896	1,232	34%	OK
2	380	5.0	1,900	84	1.0	2.0	168	520	35	150	0.23	121.3	6.0	728	896	47%	OK
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	378	1.0	7.0	2,649	1,400	40	224	0.18	250.0	16.0	4,000	6,649	61%	OK
2	380	15.0	5,700	168	1.0	7.0	1,177	1,470	35	224	0.16	229.7	16.0	3,675	4,852	85%	OK
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	378	1.0	3.0	1,135	1,400	40	198	0.20	282.8	11.0	3,111	4,246	39%	OK
2	380	15.0	5,700	168	1.0	3.0	504	1,470	35	198	0.18	259.8	11.0	2,858	3,363	59%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	378	1.0	2.0	757	1,400	40	150	0.27	373.3	6.0	2,240	2,997	27%	OK
2	380	15.0	5,700	168	1.0	2.0	336	1,470	35	150	0.23	343.0	6.0	2,058	2,394	42%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.
(2) Based on observations.
(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.
(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.
(7) In AM, uses "TA" growth factor since people queuing at stair/esc in Mezz B are coming from IRT subway; (for 2010, 1.0509; in 2020, 1.0993)
in PM, uses "MN" growth factor since people queuing at stair/esc in Mezz B are destined to MNR trains. (for 2010, 1.1211; in 2020, 1.244)

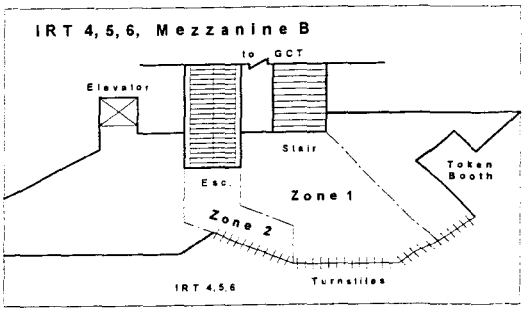

Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS -- 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped) (7)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
AM Peak Period Analysis																	
					Analysis Duration: 5 min.												
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	660	1.0	7.0	4,617	625	40	224	0.18	111.6	16.0	1,786	6,403	**175%**	**fails**
2	380	5.0	1,900	330	1.0	7.0	2,309	715	35	224	0.16	111.7	16.0	1,788	4,096	**216%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	660	1.0	3.0	1,979	625	40	198	0.20	126.3	11.0	1,389	3,368	92%	OK
2	380	5.0	1,900	330	1.0	3.0	989	715	35	198	0.18	126.4	11.0	1,390	2,380	**125%**	**fails**
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	660	1.0	2.0	1,319	625	40	150	0.27	166.7	6.0	1,000	2,319	64%	OK
2	380	5.0	1,900	330	1.0	2.0	660	715	35	150	0.23	166.8	6.0	1,001	1,661	87%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	7.0	10,388	1,605	40	224	0.18	286.6	16.0	4,586	14,975	**137%**	**fails**
2	380	15.0	5,700	660	1.0	7.0	4,617	1,790	35	224	0.16	279.7	16.0	4,475	9,092	**160%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	3.0	4,452	1,605	40	198	0.20	324.2	11.0	3,567	8,019	73%	OK
2	380	15.0	5,700	660	1.0	3.0	1,979	1,790	35	198	0.18	316.4	11.0	3,481	5,459	96%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	2.0	2,968	1,605	40	150	0.27	428.0	6.0	2,568	5,536	51%	OK
2	380	15.0	5,700	660	1.0	2.0	1,319	1,790	35	150	0.23	417.7	6.0	2,506	3,825	67%	OK
PM Peak Period Analysis																	
					Analysis Duration: 5 min.												
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	187	1.0	7.0	1,306	590	40	224	0.18	105.4	16.0	1,686	2,992	82%	OK
2	380	5.0	1,900	93	1.0	7.0	653	560	35	224	0.16	87.5	16.0	1,400	2,053	**108%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	187	1.0	3.0	560	590	40	198	0.20	119.2	11.0	1,311	1,871	51%	OK
2	380	5.0	1,900	93	1.0	3.0	280	560	35	198	0.18	99.0	11.0	1,089	1,369	72%	OK
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	187	1.0	2.0	373	590	40	150	0.27	157.3	6.0	944	1,317	36%	OK
2	380	5.0	1,900	93	1.0	2.0	187	560	35	150	0.23	130.7	6.0	784	971	51%	OK
					Analysis Duration: 15 min.												
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	420	1.0	7.0	2,939	1,465	40	224	0.18	261.6	16.0	4,186	7,125	65%	OK
2	380	15.0	5,700	187	1.0	7.0	1,306	1,580	35	224	0.16	246.9	16.0	3,950	5,257	92%	OK
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	420	1.0	3.0	1,260	1,465	40	198	0.20	296.0	11.0	3,256	4,515	41%	OK
2	380	15.0	5,700	187	1.0	3.0	560	1,580	35	198	0.18	279.3	11.0	3,072	3,632	64%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	420	1.0	2.0	840	1,465	40	150	0.27	390.7	6.0	2,344	3,184	29%	OK
2	380	15.0	5,700	187	1.0	2.0	373	1,580	35	150	0.23	368.7	6.0	2,212	2,585	45%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.
(2) Based on observations.
(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.
(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.
(7) In AM, uses "TA" growth factor since people queuing at stair/esc in Mezz B are coming from IRT subway; (for 2010, 1.0509; in 2020, 1.0993)
in PM, uses "MN" growth factor since people queuing at stair/esc in Mezz B are destined to MNR trains. (for 2010, 1.1211; in 2020, 1.244)

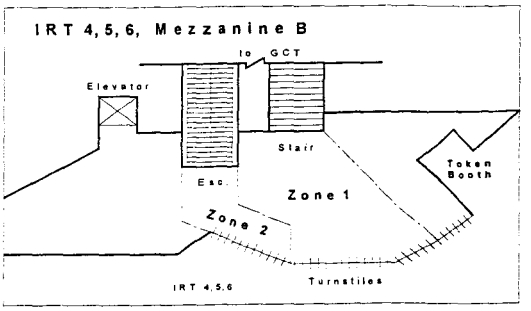

Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS -- 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped) (7)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
AM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	631	1.0	7.0	4,414	575	40	224	0.18	102.7	16.0	1,643	6,057	**166%**	fails
2	380	5.0	1,900	315	1.0	7.0	2,207	730	35	224	0.16	114.1	16.0	1,825	4,032	**212%**	fails
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	631	1.0	3.0	1,892	575	40	198	0.20	116.2	11.0	1,278	3,169	87%	OK
2	380	5.0	1,900	315	1.0	3.0	946	730	35	198	0.18	129.0	11.0	1,419	2,365	**124%**	fails
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	631	1.0	2.0	1,261	575	40	150	0.27	153.3	6.0	920	2,181	60%	OK
2	380	5.0	1,900	315	1.0	2.0	631	730	35	*90*	0.39	283.9	*4.5*	1,278	1,908	100%	OK
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	7.0	9,931	1,370	40	224	0.18	244.7	16.0	3,915	13,846	**126%**	fails
2	380	15.0	5,700	631	1.0	7.0	4,414	1,720	35	224	0.16	268.8	16.0	4,300	8,714	**153%**	fails
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	3.0	4,256	1,370	40	198	0.20	276.8	11.0	3,044	7,301	67%	OK
2	380	15.0	5,700	631	1.0	3.0	1,892	1,720	35	198	0.18	304.0	11.0	3,344	5,236	92%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	1,419	1.0	2.0	2,837	1,370	40	150	0.27	365.3	6.0	2,192	5,029	46%	OK
2	380	15.0	5,700	631	1.0	2.0	1,261	1,720	35	150	0.23	401.3	6.0	2,408	3,669	64%	OK
PM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	168	1.0	7.0	1,177	560	40	224	0.18	100.0	16.0	1,600	2,777	76%	OK
2	380	5.0	1,900	84	1.0	7.0	589	530	35	224	0.16	82.8	16.0	1,325	1,914	101%	fails
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	168	1.0	3.0	504	560	40	198	0.20	113.1	11.0	1,244	1,749	48%	OK
2	380	5.0	1,900	84	1.0	3.0	252	530	35	198	0.18	93.7	11.0	1,031	1,283	68%	OK
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	168	1.0	2.0	336	560	40	150	0.27	149.3	6.0	896	1,232	34%	OK
2	380	5.0	1,900	84	1.0	2.0	168	530	35	150	0.23	123.7	6.0	742	910	48%	OK
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	355	1.0	7.0	2,483	1,375	40	224	0.18	245.6	16.0	3,929	6,412	59%	OK
2	380	15.0	5,700	158	1.0	7.0	1,103	1,495	35	224	0.16	233.6	16.0	3,738	4,841	85%	OK
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	355	1.0	3.0	1,064	1,375	40	198	0.20	277.8	11.0	3,056	4,120	38%	OK
2	380	15.0	5,700	158	1.0	3.0	473	1,495	35	198	0.18	264.3	11.0	2,907	3,380	59%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	355	1.0	2.0	709	1,375	40	150	0.27	366.7	6.0	2,200	2,909	27%	OK
2	380	15.0	5,700	158	1.0	2.0	315	1,495	35	150	0.23	348.8	6.0	2,093	2,408	42%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.
(2) Based on observations.
(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.
(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.
(7) Uses No Build volumes and adds Build increment.

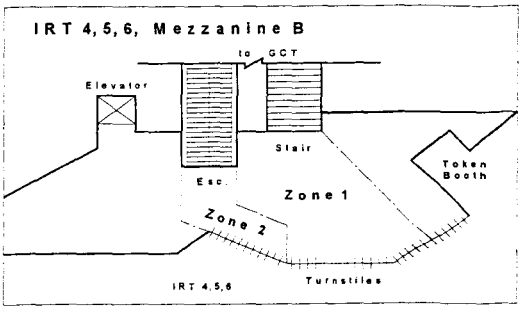

Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS -- 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped) (7)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
AM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	660	1.0	7.0	4,617	575	40	224	0.18	102.7	16.0	1,643	6,260	**172%**	**fails**
2	380	5.0	1,900	330	1.0	7.0	2,309	730	35	224	0.16	114.1	16.0	1,825	4,134	**218%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	660	1.0	3.0	1,979	575	40	198	0.20	116.2	11.0	1,278	3,257	89%	OK
2	380	5.0	1,900	330	1.0	3.0	989	730	35	198	0.18	129.0	11.0	1,419	2,409	**127%**	**fails**
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	660	1.0	2.0	1,319	575	40	150	0.27	153.3	6.0	920	2,239	61%	OK
2	380	5.0	1,900	330	1.0	2.0	660	730	35	*90*	0.39	283.9	*4.5*	1,278	1,937	102%	**fails**
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	7.0	10,388	1,370	40	224	0.18	244.7	16.0	3,915	14,303	**131%**	**fails**
2	380	15.0	5,700	660	1.0	7.0	4,617	1,720	35	224	0.16	268.8	16.0	4,300	8,917	**156%**	**fails**
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	3.0	4,452	1,370	40	198	0.20	276.8	11.0	3,044	7,497	68%	OK
2	380	15.0	5,700	660	1.0	3.0	1,979	1,720	35	198	0.18	304.0	11.0	3,344	5,323	93%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	1,484	1.0	2.0	2,968	1,370	40	150	0.27	365.3	6.0	2,192	5,160	47%	OK
2	380	15.0	5,700	660	1.0	2.0	1,319	1,720	35	150	0.23	401.3	6.0	2,408	3,727	65%	OK
PM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	730	5.0	3,650	187	1.0	7.0	1,306	560	40	224	0.18	100.0	16.0	1,600	2,906	80%	OK
2	380	5.0	1,900	93	1.0	7.0	653	530	35	224	0.16	82.8	16.0	1,325	1,978	104%	**fails**
Using LOS D/E Analysis Criteria																	
1	730	5.0	3,650	187	1.0	3.0	560	560	40	198	0.20	113.1	11.0	1,244	1,804	49%	OK
2	380	5.0	1,900	93	1.0	3.0	280	530	35	198	0.18	93.7	11.0	1,031	1,310	69%	OK
Using LOS E/F Analysis Criteria																	
1	730	5.0	3,650	187	1.0	2.0	373	560	40	150	0.27	149.3	6.0	896	1,269	35%	OK
2	380	5.0	1,900	93	1.0	2.0	187	530	35	150	0.23	123.7	6.0	742	929	49%	OK
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	730	15.0	10,950	420	1.0	7.0	2,939	1,375	40	224	0.18	245.6	16.0	3,929	6,868	63%	OK
2	380	15.0	5,700	187	1.0	7.0	1,306	1,495	35	224	0.16	233.6	16.0	3,738	5,044	88%	OK
Using LOS D/E Analysis Criteria																	
1	730	15.0	10,950	420	1.0	3.0	1,260	1,375	40	198	0.20	277.8	11.0	3,056	4,315	39%	OK
2	380	15.0	5,700	187	1.0	3.0	560	1,495	35	198	0.18	264.3	11.0	2,907	3,467	61%	OK
Using LOS E/F Analysis Criteria																	
1	730	15.0	10,950	420	1.0	2.0	840	1,375	40	150	0.27	366.7	6.0	2,200	3,040	28%	OK
2	380	15.0	5,700	187	1.0	2.0	373	1,495	35	150	0.23	348.8	6.0	2,093	2,466	43%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.
(2) Based on observations.
(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.
(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.
(7) Uses No Build volumes and adds Build increment.

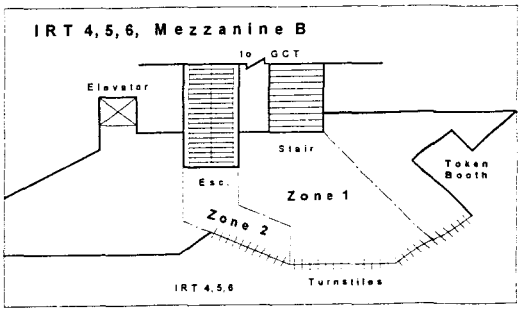

Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS -- 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped) (7)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
AM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	1,500	5.0	7,500	631	1.0	7.0	4,414	675	40	224	0.18	120.5	16.0	1,929	6,343	85%	OK
2	500	5.0	2,500	315	1.0	7.0	2,207	830	35	224	0.16	129.7	16.0	2,075	4,282	**171%**	**fails**
Using LOS D/E Analysis Criteria																	
1	1,500	5.0	7,500	631	1.0	3.0	1,892	675	40	198	0.20	136.4	11.0	1,500	3,392	45%	OK
2	500	5.0	2,500	315	1.0	3.0	946	830	35	198	0.18	146.7	11.0	1,614	2,560	**102%**	**fails**
Using LOS E/F Analysis Criteria																	
1	1,500	5.0	7,500	631	1.0	2.0	1,261	675	40	150	0.27	180.0	6.0	1,080	2,341	31%	OK
2	500	5.0	2,500	315	1.0	2.0	631	830	35	150	0.23	193.7	6.0	1,162	1,793	72%	OK
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	1,500	15.0	22,500	1,419	1.0	7.0	9,931	1,680	40	224	0.18	300.0	16.0	4,800	14,731	65%	OK
2	500	15.0	7,500	631	1.0	7.0	4,414	2,055	35	224	0.16	321.1	16.0	5,138	9,552	**127%**	**fails**
Using LOS D/E Analysis Criteria																	
1	1,500	15.0	22,500	1,419	1.0	3.0	4,256	1,680	40	198	0.20	339.4	11.0	3,733	7,989	36%	OK
2	500	15.0	7,500	631	1.0	3.0	1,892	2,055	35	198	0.18	363.3	11.0	3,996	5,887	78%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	15.0	22,500	1,419	1.0	2.0	2,837	1,680	40	150	0.27	448.0	6.0	2,688	5,525	25%	OK
2	500	15.0	7,500	631	1.0	2.0	1,261	2,055	35	150	0.23	479.5	6.0	2,877	4,138	55%	OK
PM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	1,500	5.0	7,500	168	1.0	7.0	1,177	655	40	224	0.18	117.0	16.0	1,872	3,049	41%	OK
2	500	5.0	2,500	84	1.0	7.0	589	640	35	224	0.16	100.0	16.0	1,600	2,189	88%	OK
Using LOS D/E Analysis Criteria																	
1	1,500	5.0	7,500	168	1.0	3.0	504	655	40	198	0.20	132.3	11.0	1,456	1,960	26%	OK
2	500	5.0	2,500	84	1.0	3.0	252	640	35	198	0.18	113.1	11.0	1,244	1,497	60%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	5.0	7,500	168	1.0	2.0	336	655	40	150	0.27	174.7	6.0	1,048	1,384	18%	OK
2	500	5.0	2,500	84	1.0	2.0	168	640	35	150	0.23	149.3	6.0	896	1,064	43%	OK
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	1,500	15.0	22,500	378	1.0	7.0	2,649	1,660	40	224	0.18	296.5	16.0	4,743	7,392	33%	OK
2	500	15.0	7,500	168	1.0	7.0	1,177	1,845	35	224	0.16	288.3	16.0	4,613	5,790	77%	OK
Using LOS D/E Analysis Criteria																	
1	1,500	15.0	22,500	378	1.0	3.0	1,135	1,660	40	198	0.20	335.4	11.0	3,689	4,824	21%	OK
2	500	15.0	7,500	168	1.0	3.0	504	1,845	35	198	0.18	326.1	11.0	3,588	4,092	55%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	15.0	22,500	378	1.0	2.0	757	1,660	40	150	0.27	442.7	6.0	2,656	3,413	15%	OK
2	500	15.0	7,500	168	1.0	2.0	336	1,845	35	150	0.23	430.5	6.0	2,583	2,919	39%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.
(2) Based on observations.
(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.
(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.
(7) Uses No Build volumes and adds Build increment.

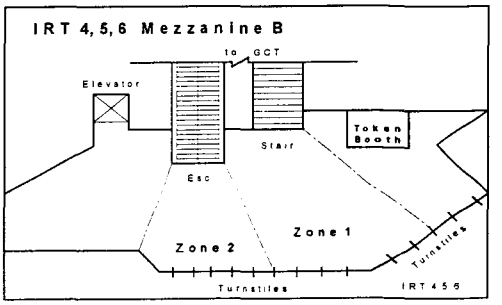

Table M - 15
TIME-SPACE ANALYSES OF IRT MEZZANINE 'B' @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS -- 5/15 MINUTES DURING AM/PM PEAK PERIODS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped) (7)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
AM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	1,500	5.0	7,500	660	1.0	7.0	4,617	740	40	224	0.18	132.2	16.0	2,114	6,732	90%	OK
2	500	5.0	2,500	330	1.0	7.0	2,309	860	35	224	0.16	134.4	16.0	2,150	4,459	**178%**	**fails**
Using LOS D/E Analysis Criteria																	
1	1,500	5.0	7,500	660	1.0	3.0	1,979	740	40	198	0.20	149.5	11.0	1,644	3,623	48%	OK
2	500	5.0	2,500	330	1.0	3.0	989	860	35	198	0.18	152.0	11.0	1,672	2,662	**106%**	**fails**
Using LOS E/F Analysis Criteria																	
1	1,500	5.0	7,500	660	1.0	2.0	1,319	740	40	150	0.27	197.3	6.0	1,184	2,503	33%	OK
2	500	5.0	2,500	330	1.0	2.0	660	860	35	150	0.23	200.7	6.0	1,204	1,864	75%	OK
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	1,500	15.0	22,500	1,484	1.0	7.0	10,388	1,790	40	224	0.18	319.7	16.0	5,115	15,503	69%	OK
2	500	15.0	7,500	660	1.0	7.0	4,617	2,265	35	224	0.16	353.9	16.0	5,663	10,280	**137%**	**fails**
Using LOS D/E Analysis Criteria																	
1	1,500	15.0	22,500	1,484	1.0	3.0	4,452	1,790	40	198	0.20	361.6	11.0	3,978	8,430	37%	OK
2	500	15.0	7,500	660	1.0	3.0	1,979	2,265	35	198	0.18	400.4	11.0	4,404	6,383	85%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	15.0	22,500	1,484	1.0	2.0	2,968	1,790	40	150	0.27	477.3	6.0	2,864	5,832	26%	OK
2	500	15.0	7,500	660	1.0	2.0	1,319	2,265	35	150	0.23	528.5	6.0	3,171	4,490	60%	OK
PM Peak Period Analysis																	
				Analysis Duration: 5 min.													
Using LOS C/D Analysis Criteria																	
1	1,500	5.0	7,500	187	1.0	7.0	1,306	690	40	224	0.18	123.2	16.0	1,972	3,278	44%	OK
2	500	5.0	2,500	93	1.0	7.0	653	680	35	224	0.16	106.3	16.0	1,700	2,353	94%	OK
Using LOS D/E Analysis Criteria																	
1	1,500	5.0	7,500	187	1.0	3.0	560	690	40	198	0.20	139.4	11.0	1,533	2,093	28%	OK
2	500	5.0	2,500	93	1.0	3.0	280	680	35	198	0.18	120.2	11.0	1,322	1,602	64%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	5.0	7,500	187	1.0	2.0	373	690	40	150	0.27	184.0	6.0	1,104	1,477	20%	OK
2	500	5.0	2,500	93	1.0	2.0	187	680	35	150	0.23	158.7	6.0	952	1,139	46%	OK
				Analysis Duration: 15 min.													
Using LOS C/D Analysis Criteria																	
1	1,500	15.0	22,500	420	1.0	7.0	2,939	1,745	40	224	0.18	311.6	16.0	4,986	7,925	35%	OK
2	500	15.0	7,500	187	1.0	7.0	1,306	1,960	35	224	0.16	306.3	16.0	4,900	6,207	83%	OK
Using LOS D/E Analysis Criteria																	
1	1,500	15.0	22,500	420	1.0	3.0	1,260	1,745	40	198	0.20	352.5	11.0	3,878	5,137	23%	OK
2	500	15.0	7,500	187	1.0	3.0	560	1,960	35	198	0.18	346.5	11.0	3,811	4,371	58%	OK
Using LOS E/F Analysis Criteria																	
1	1,500	15.0	22,500	420	1.0	2.0	840	1,745	40	150	0.27	465.3	6.0	2,792	3,632	16%	OK
2	500	15.0	7,500	187	1.0	2.0	373	1,960	35	150	0.23	457.3	6.0	2,744	3,117	42%	OK

NOTES:

(1) Analysis period is the 5-minute period just before train doors open during peak PM period.
(2) Based on observations.
(3) Average queue space of 7, 3, and 2 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 198, and 150 feet per minute signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure based on field measurement of walk speeds.
(6) Average walk space of 16, 11, and 6 square feet per pedestrian signify LOS C/D, D/E, and E/F conditions, respectively. Italicized figure corresponds to LOS F conditions.
(7) Uses No Build volumes and adds Build increment.

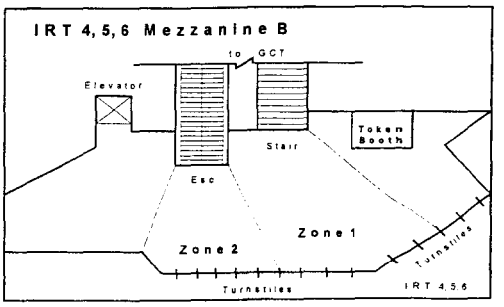

TABLE M-16

EXISTING
SUBWAY STAIRS
ANALYSES

Table M - 16
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	325	230	555	11.0	10.0	10	90	1.23	D
2 (P14)	170	445	615	11.0	10.0	20	80	1.54	E
3 (P18)	290	270	560	11.0	10.0	10	90	1.24	D
4 (P20)	245	195	440	11.0	10.0	10	90	0.98	C
5 (P22)	235	135	370	6.5	5.5	10	50	1.49	E
6 (P23)	360	45	405	6.5	5.5	20	44	1.84	F
7 (P21)	280	25	305	11.0	10.0	20	80	0.76	C
8 (P19)	200	120	320	11.0	10.0	10	90	0.71	C
9 (P17)	110	130	240	11.0	10.0	10	90	0.53	B
10 (P15)	70	100	170	11.0	10.0	10	90	0.38	A
11 (P13)	165	35	200	11.0	10.0	20	80	0.50	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

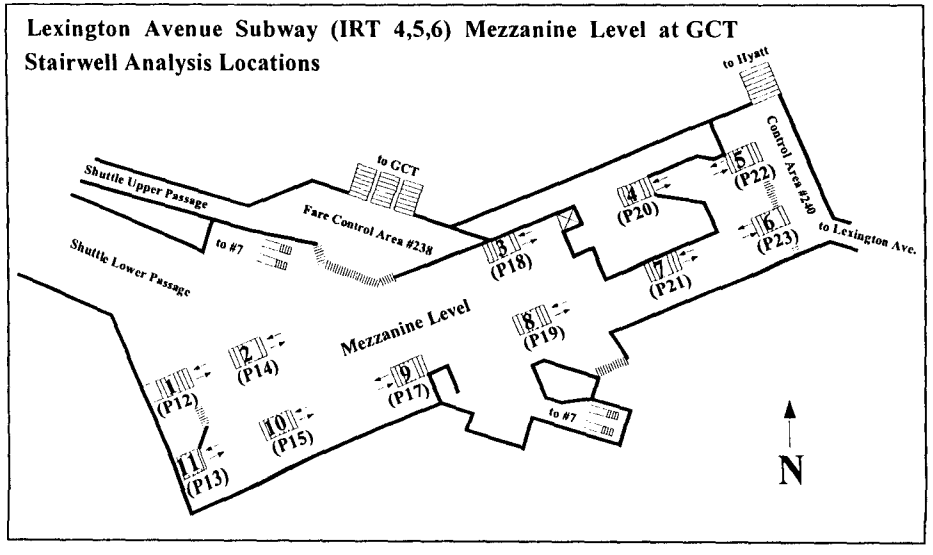

Table M - 16
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	815	605	1,420	11.0	10.0	10	90	1.05	D
2 (P14)	430	1,145	1,575	11.0	10.0	20	80	1.31	D
3 (P18)	665	645	1,310	11.0	10.0	10	90	0.97	C
4 (P20)	675	570	1,245	11.0	10.0	10	90	0.92	C
5 (P22)	565	340	905	6.5	5.5	10	50	1.22	D
6 (P23)	915	125	1,040	6.5	5.5	20	44	1.58	E
7 (P21)	690	70	760	11.0	10.0	20	80	0.63	B
8 (P19)	565	290	855	11.0	10.0	10	90	0.63	B
9 (P17)	300	350	650	11.0	10.0	10	90	0.48	B
10 (P15)	185	260	445	11.0	10.0	10	90	0.33	A
11 (P13)	455	65	520	11.0	10.0	20	80	0.43	A

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

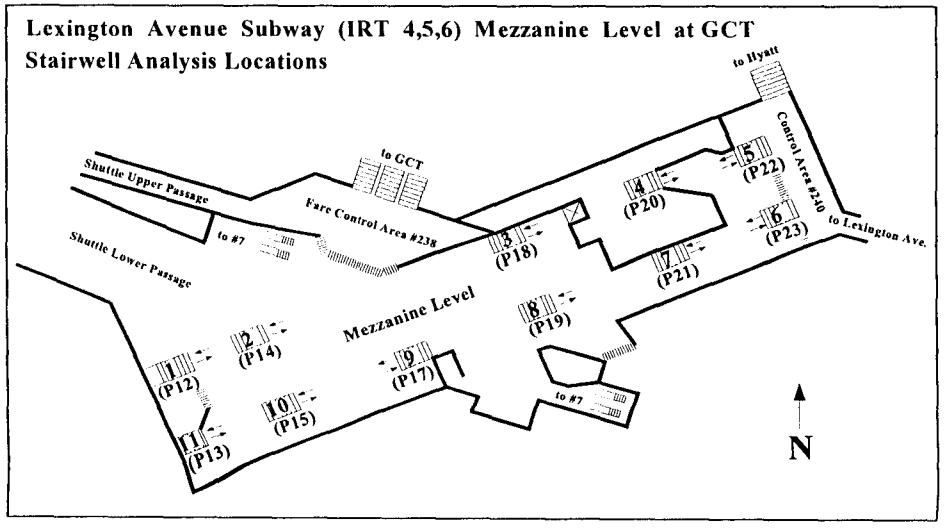

Table M - 16
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	65	115	180	11.0	10.0	10	90	0.40	A
2 (P14)	60	310	370	11.0	10.0	20	80	0.93	C
3 (P18)	110	105	215	11.0	10.0	10	90	0.48	B
4 (P20)	50	165	215	11.0	10.0	20	80	0.54	B
5 (P22)	35	245	280	6.5	5.5	20	44	1.27	D
6 (P23)	210	210	420	6.5	5.5	10	50	1.70	F
7 (P21)	210	115	325	11.0	10.0	10	90	0.72	C
8 (P19)	110	130	240	11.0	10.0	10	90	0.53	B
9 (P17)	170	185	355	11.0	10.0	10	90	0.79	C
10 (P15)	140	170	310	11.0	10.0	10	90	0.69	B
11 (P13)	170	200	370	11.0	10.0	10	90	0.82	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

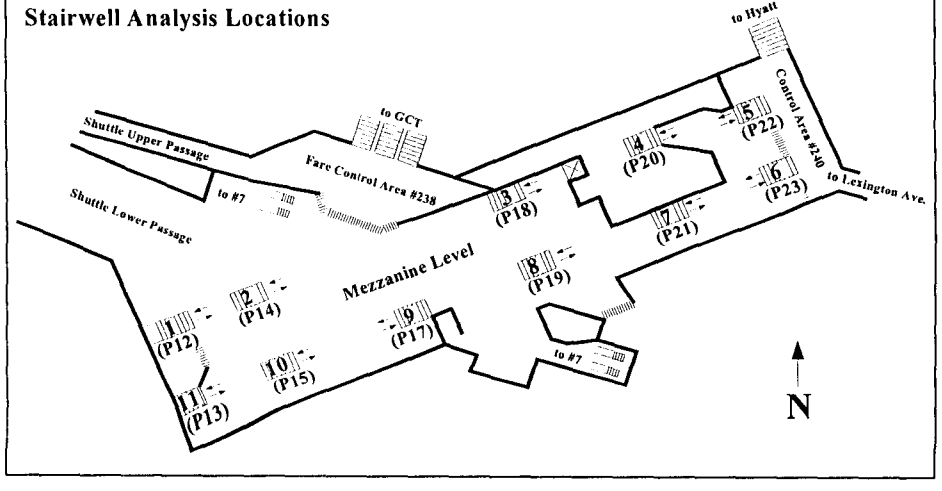

Table M - 16
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	165	285	450	11.0	10.0	10	90	0.33	A
2 (P14)	165	870	1,035	11.0	10.0	20	80	0.86	C
3 (P18)	280	295	575	11.0	10.0	10	90	0.43	A
4 (P20)	120	420	540	11.0	10.0	20	80	0.45	B
5 (P22)	70	680	750	6.5	5.5	20	44	1.14	D
6 (P23)	520	350	870	6.5	5.5	10	50	1.17	D
7 (P21)	540	275	815	11.0	10.0	10	90	0.60	B
8 (P19)	250	365	615	11.0	10.0	10	90	0.46	B
9 (P17)	410	520	930	11.0	10.0	10	90	0.69	B
10 (P15)	320	455	775	11.0	10.0	10	90	0.57	B
11 (P13)	365	470	835	11.0	10.0	10	90	0.62	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

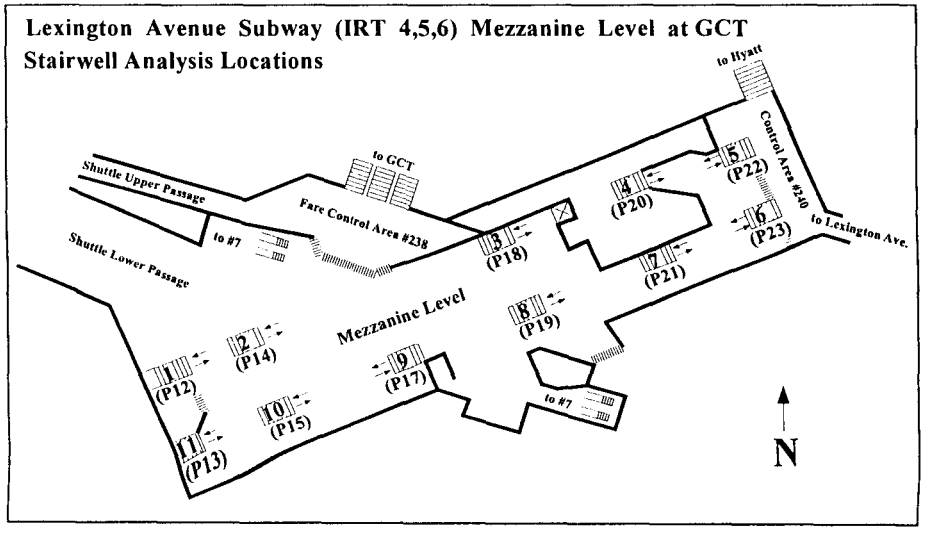

TABLE M-17

2010 NO BUILD SUBWAY STAIRS ANALYSES

Table M - 17
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	340	255	595	11.0	10.0	10	90	1.32	D
2 (P14)	180	500	680	11.0	10.0	20	80	1.70	F
3 (P18)	305	305	610	11.0	10.0	10	90	1.36	E
4 (P20)	255	220	475	11.0	10.0	10	90	1.06	D
5 (P22)	245	150	395	6.5	5.5	10	50	1.60	E
6 (P23)	380	50	430	6.5	5.5	20	44	1.95	F
7 (P21)	295	30	325	11.0	10.0	20	80	0.81	C
8 (P19)	210	135	345	11.0	10.0	10	90	0.77	C
9 (P17)	115	145	260	11.0	10.0	10	90	0.58	B
10 (P15)	75	110	185	11.0	10.0	10	90	0.41	A
11 (P13)	175	40	215	11.0	10.0	20	80	0.54	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

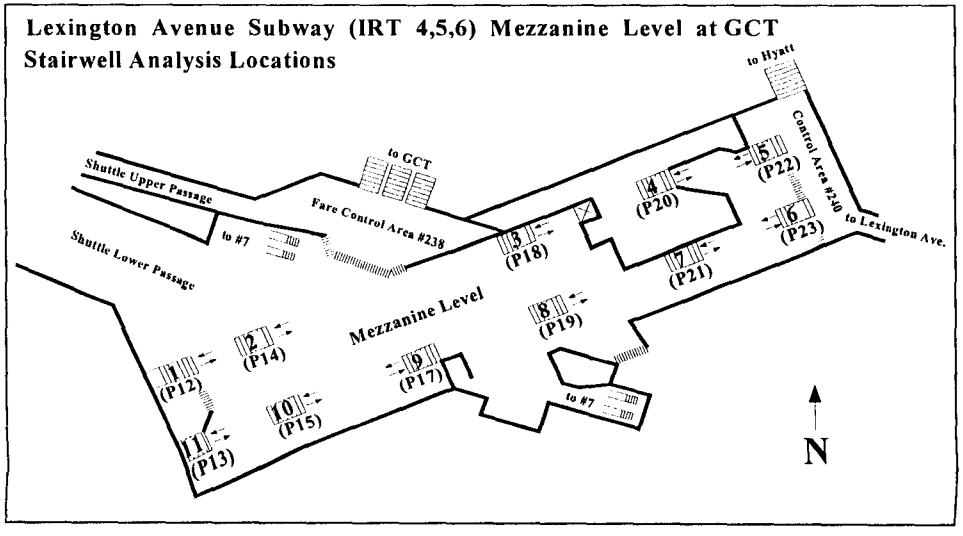

Table M -17
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	855	680	1,535	11.0	10.0	10	90	1.14	D
2 (P14)	450	1,285	1,735	11.0	10.0	20	80	1.45	E
3 (P18)	700	725	1,425	11.0	10.0	10	90	1.06	D
4 (P20)	710	640	1,350	11.0	10.0	10	90	1.00	D
5 (P22)	595	380	975	6.5	5.5	10	50	1.31	D
6 (P23)	960	140	1,100	6.5	5.5	20	44	1.67	E
7 (P21)	725	80	805	11.0	10.0	20	80	0.67	B
8 (P19)	590	325	915	11.0	10.0	10	90	0.68	B
9 (P17)	315	400	715	11.0	10.0	10	90	0.53	B
10 (P15)	195	290	485	11.0	10.0	10	90	0.36	A
11 (P13)	475	70	545	11.0	10.0	20	80	0.45	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

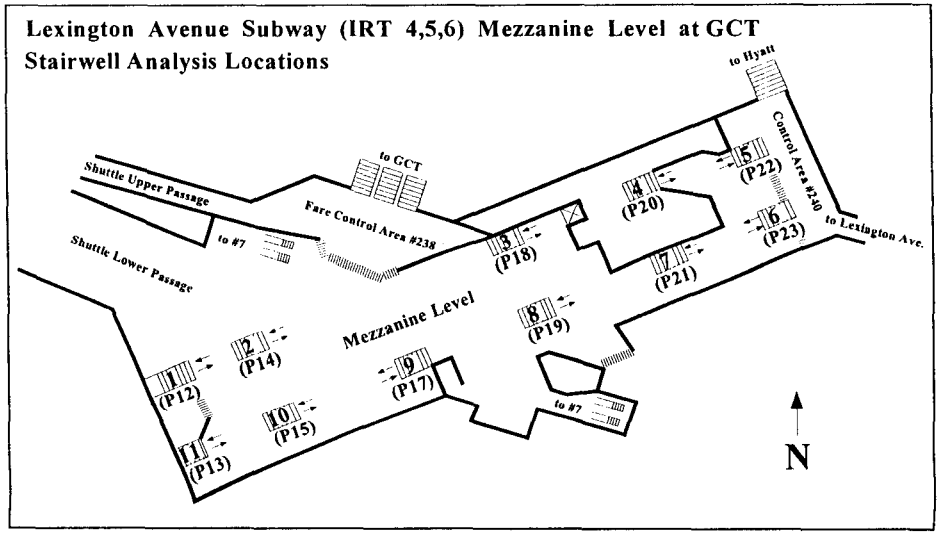

Table M - 17
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	70	120	190	11.0	10.0	10	90	0.42	A
2 (P14)	65	330	395	11.0	10.0	20	80	0.99	C
3 (P18)	120	110	230	11.0	10.0	10	90	0.51	B
4 (P20)	55	170	225	11.0	10.0	20	80	0.56	B
5 (P22)	40	260	300	6.5	5.5	20	44	1.36	E
6 (P23)	235	220	455	6.5	5.5	10	50	1.84	F
7 (P21)	235	120	355	11.0	10.0	10	90	0.79	C
8 (P19)	125	135	260	11.0	10.0	10	90	0.58	B
9 (P17)	195	195	390	11.0	10.0	10	90	0.87	C
10 (P15)	155	175	330	11.0	10.0	10	90	0.73	C
11 (P13)	190	210	400	11.0	10.0	10	90	0.89	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

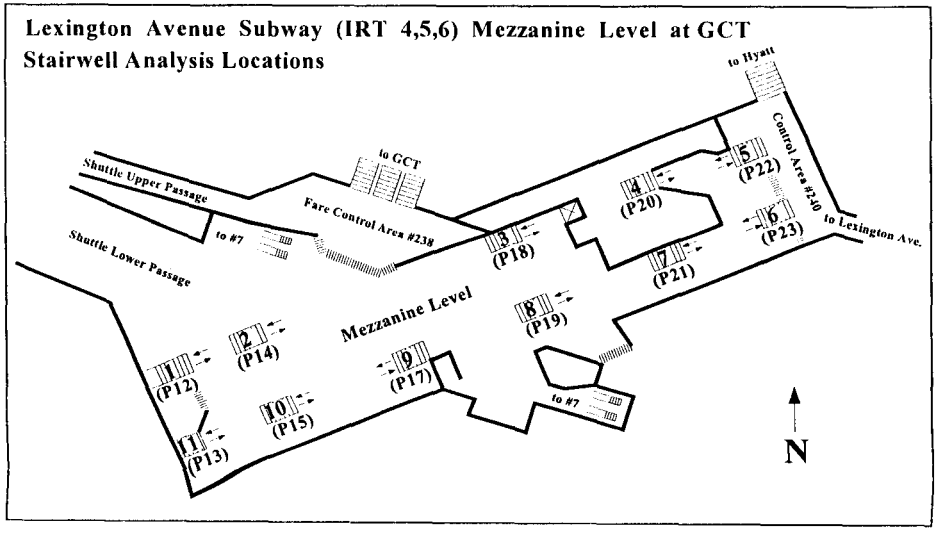

Table M - 17
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	185	300	485	11.0	10.0	10	90	0.36	A
2 (P14)	185	915	1,100	11.0	10.0	20	80	0.92	C
3 (P18)	315	310	625	11.0	10.0	10	90	0.46	B
4 (P20)	135	440	575	11.0	10.0	20	80	0.48	B
5 (P22)	80	715	795	6.5	5.5	20	44	1.20	D
6 (P23)	585	365	950	6.5	5.5	10	50	1.28	D
7 (P21)	610	285	895	11.0	10.0	20	80	0.75	C
8 (P19)	285	380	665	11.0	10.0	10	90	0.49	B
9 (P17)	460	550	1,010	11.0	10.0	10	90	0.75	C
10 (P15)	360	480	840	11.0	10.0	10	90	0.62	B
11 (P13)	410	495	905	11.0	10.0	10	90	0.67	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

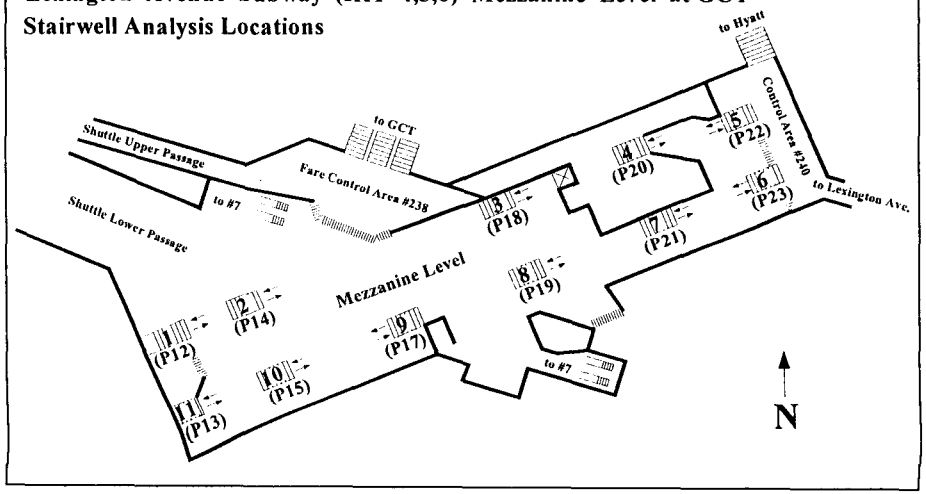

TABLE M-18

2020 NO BUILD
SUBWAY STAIRS
ANALYSES

Table M - 18
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	365	285	650	11.0	10.0	10	90	1.44	E
2 (P14)	185	550	735	11.0	10.0	20	80	1.84	F
3 (P18)	320	335	655	11.0	10.0	10	90	1.46	E
4 (P20)	270	245	515	11.0	10.0	10	90	1.14	D
5 (P22)	260	170	430	6.5	5.5	10	50	1.74	F
6 (P23)	395	55	450	6.5	5.5	20	44	2.05	F
7 (P21)	305	30	335	11.0	10.0	20	80	0.84	C
8 (P19)	220	150	370	11.0	10.0	10	90	0.82	C
9 (P17)	120	160	280	11.0	10.0	10	90	0.62	B
10 (P15)	70	125	195	11.0	10.0	10	90	0.43	A
11 (P13)	170	40	210	11.0	10.0	20	80	0.53	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

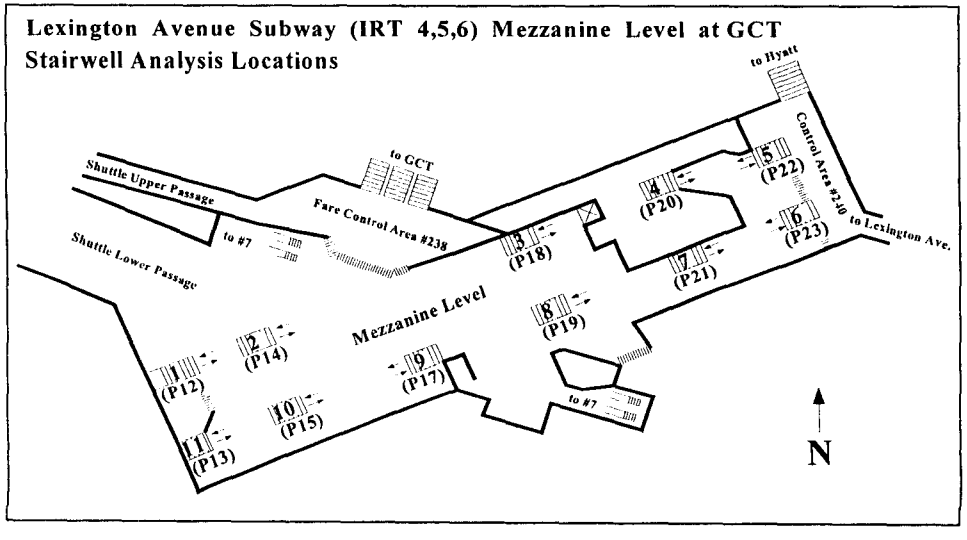

Table M - 18
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	895	750	1,645	11.0	10.0	10	90	1.22	D
2 (P14)	470	1,425	1,895	11.0	10.0	20	80	1.58	E
3 (P18)	730	805	1,535	11.0	10.0	10	90	1.14	D
4 (P20)	740	710	1,450	11.0	10.0	10	90	1.07	D
5 (P22)	620	425	1,045	6.5	5.5	10	50	1.41	E
6 (P23)	1,005	155	1,160	6.5	5.5	20	44	1.76	F
7 (P21)	760	85	845	11.0	10.0	20	80	0.70	C
8 (P19)	625	360	985	11.0	10.0	10	90	0.73	C
9 (P17)	330	450	780	11.0	10.0	10	90	0.58	B
10 (P15)	200	325	525	11.0	10.0	10	90	0.39	A
11 (P13)	500	80	580	11.0	10.0	20	80	0.48	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

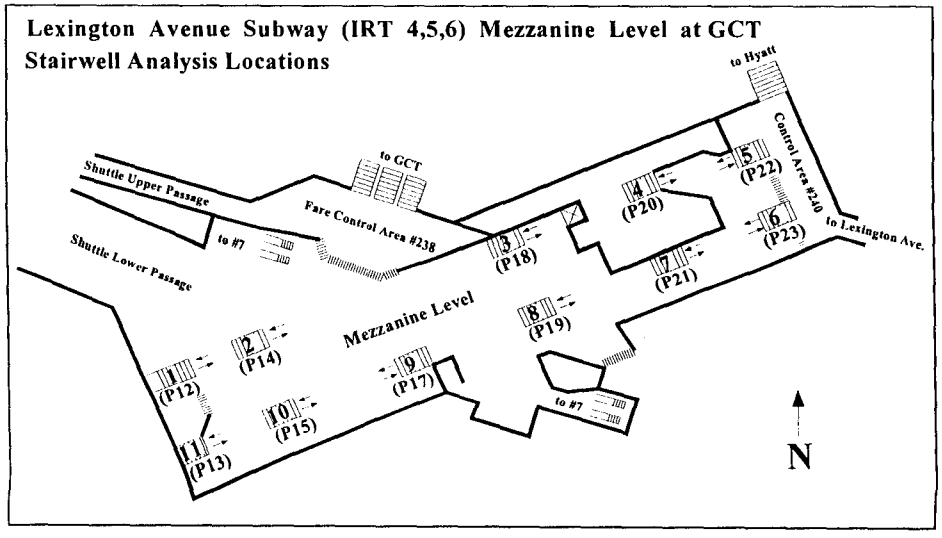

Table M - 18
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	80	125	205	11.0	10.0	10	90	0.46	B
2 (P14)	70	340	410	11.0	10.0	20	80	1.03	D
3 (P18)	135	115	250	11.0	10.0	10	90	0.56	B
4 (P20)	60	180	240	11.0	10.0	20	80	0.60	B
5 (P22)	40	270	310	6.5	5.5	20	44	1.41	E
6 (P23)	265	230	495	6.5	5.5	10	50	2.00	F
7 (P21)	265	125	390	11.0	10.0	20	80	0.98	C
8 (P19)	140	145	285	11.0	10.0	10	90	0.63	B
9 (P17)	210	200	410	11.0	10.0	10	90	0.91	C
10 (P15)	175	185	360	11.0	10.0	10	90	0.80	C
11 (P13)	210	220	430	11.0	10.0	10	90	0.96	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

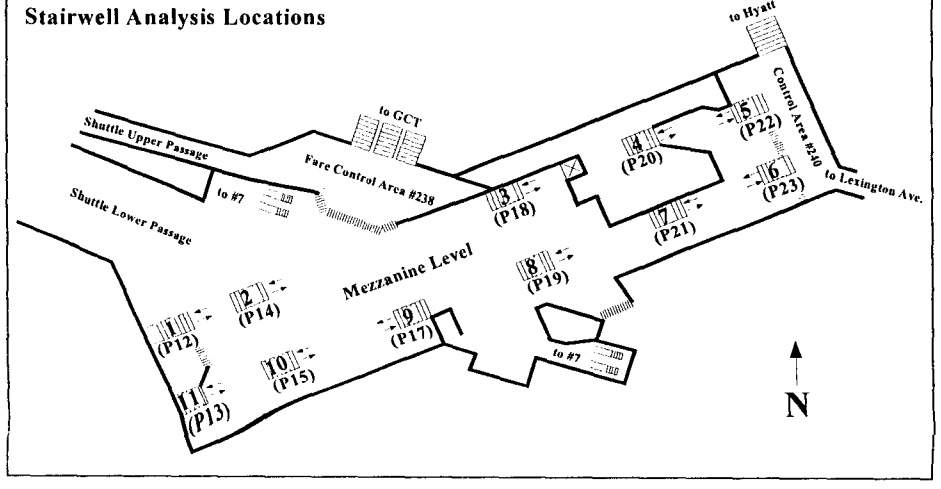

Table M - 18
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	205	310	515	11.0	10.0	10	90	0.38	A
2 (P14)	205	955	1,160	11.0	10.0	20	80	0.97	C
3 (P18)	345	325	670	11.0	10.0	10	90	0.50	B
4 (P20)	150	465	615	11.0	10.0	20	80	0.51	B
5 (P22)	85	750	835	6.5	5.5	20	44	1.27	D
6 (P23)	650	385	1,035	6.5	5.5	10	50	1.39	E
7 (P21)	670	305	975	11.0	10.0	20	80	0.81	C
8 (P19)	310	400	710	11.0	10.0	10	90	0.53	B
9 (P17)	510	570	1,080	11.0	10.0	10	90	0.80	C
10 (P15)	395	500	895	11.0	10.0	10	90	0.66	B
11 (P13)	450	515	965	11.0	10.0	10	90	0.71	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

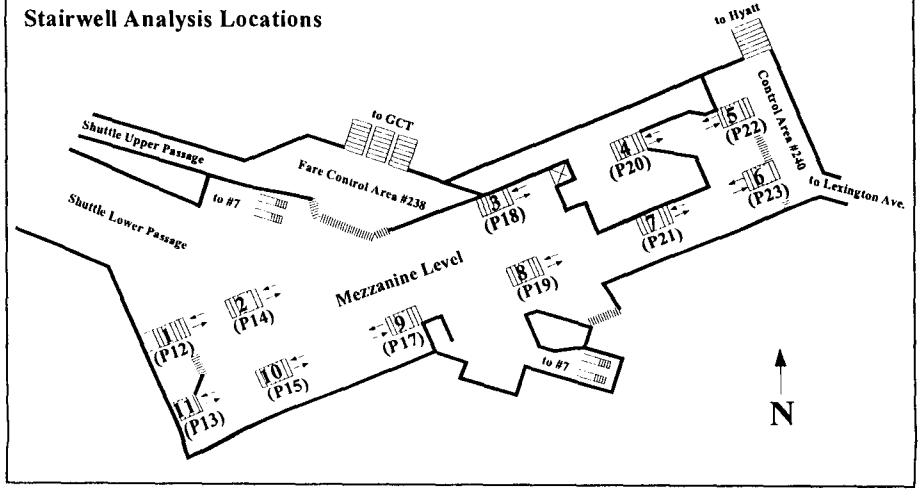

TABLE M-19

2010 BUILD
SUBWAY STAIRS
ANALYSES

Table M - 19
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	340	305	645	11.0	10.0	10	90	1.43	E *
2 (P14)	180	590	770	11.0	10.0	20	80	1.93	F *
3 (P18)	305	365	670	11.0	10.0	10	90	1.49	E *
4 (P20)	255	230	485	11.0	10.0	10	90	1.08	D
5 (P22)	245	160	405	6.5	5.5	10	50	1.64	E
6 (P23)	380	55	435	6.5	5.5	20	44	1.98	F
7 (P21)	295	35	330	11.0	10.0	20	80	0.83	C
8 (P19)	210	160	370	11.0	10.0	10	90	0.82	C
9 (P17)	115	175	290	11.0	10.0	10	90	0.64	B
10 (P15)	75	130	205	11.0	10.0	10	90	0.46	B
11 (P13)	175	50	225	11.0	10.0	20	80	0.56	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

" * " Significant Impact

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

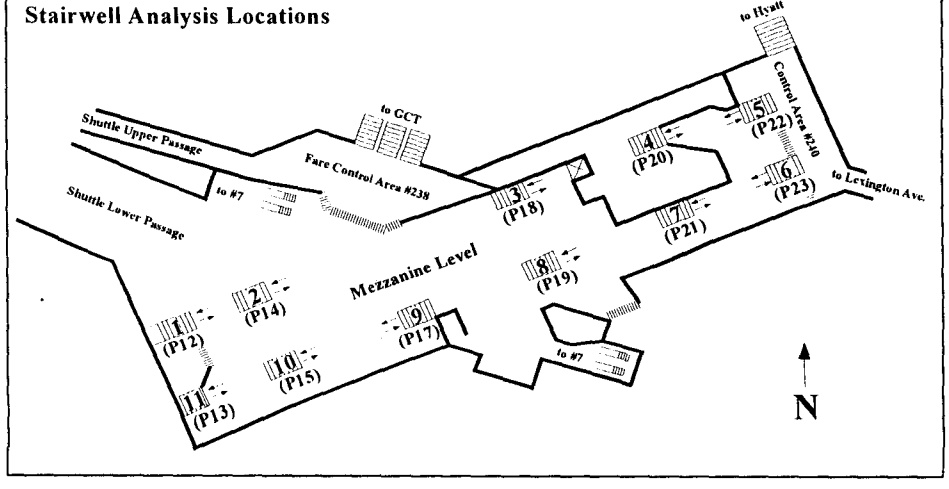

Table M - 19
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1 (P12)	855	825	1,680	11.0	10.0	10	90	1.24	D	*
2 (P14)	450	1,560	2,010	11.0	10.0	20	80	1.68	F	*
3 (P18)	700	880	1,580	11.0	10.0	10	90	1.17	D	*
4 (P20)	710	675	1,385	11.0	10.0	10	90	1.03	D	
5 (P22)	595	400	995	6.5	5.5	10	50	1.34	E	
6 (P23)	960	155	1,115	6.5	5.5	20	44	1.69	F	
7 (P21)	725	90	815	11.0	10.0	20	80	0.68	B	
8 (P19)	590	395	985	11.0	10.0	10	90	0.73	C	
9 (P17)	315	485	800	11.0	10.0	10	90	0.59	B	
10 (P15)	195	355	550	11.0	10.0	10	90	0.41	A	
11 (P13)	475	90	565	11.0	10.0	20	80	0.47	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Significant Impact

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

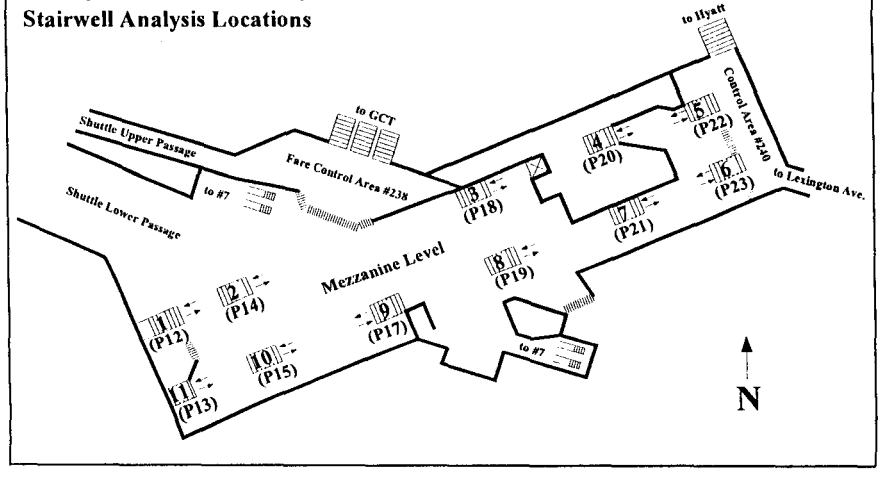

Table M - 19
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	90	120	210	11.0	10.0	10	90	0.47	B
2 (P14)	85	330	415	11.0	10.0	20	80	1.04	D *
3 (P18)	150	110	260	11.0	10.0	10	90	0.58	B
4 (P20)	60	170	230	11.0	10.0	20	80	0.58	B
5 (P22)	45	260	305	6.5	5.5	20	44	1.39	E
6 (P23)	245	220	465	6.5	5.5	10	50	1.88	F
7 (P21)	245	120	365	11.0	10.0	20	80	0.91	C
8 (P19)	155	135	290	11.0	10.0	10	90	0.64	B
9 (P17)	245	195	440	11.0	10.0	10	90	0.98	C
10 (P15)	195	175	370	11.0	10.0	10	90	0.82	C
11 (P13)	240	210	450	11.0	10.0	10	90	1.00	D

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

" * " Significant Impact

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

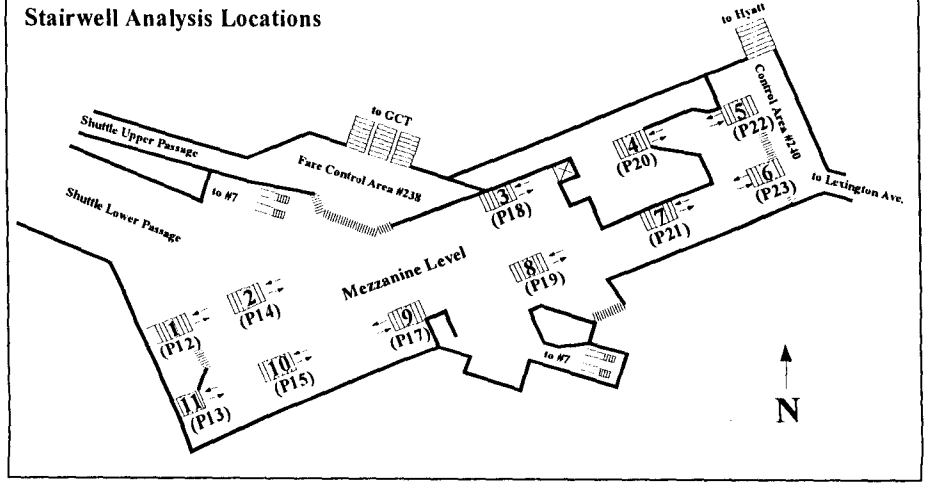

Table M - 19
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	240	300	540	11.0	10.0	10	90	0.40	A
2 (P14)	240	915	1,155	11.0	10.0	20	80	0.96	C
3 (P18)	405	310	715	11.0	10.0	10	90	0.53	B
4 (P20)	150	440	590	11.0	10.0	20	80	0.49	B
5 (P22)	90	715	805	6.5	5.5	20	44	1.22	D
6 (P23)	610	365	975	6.5	5.5	10	50	1.31	D
7 (P21)	635	285	920	11.0	10.0	20	80	0.77	C
8 (P19)	380	380	760	11.0	10.0	10	90	0.56	B
9 (P17)	605	550	1,155	11.0	10.0	10	90	0.86	C
10 (P15)	480	480	960	11.0	10.0	10	90	0.71	C
11 (P13)	545	495	1,040	11.0	10.0	10	90	0.77	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

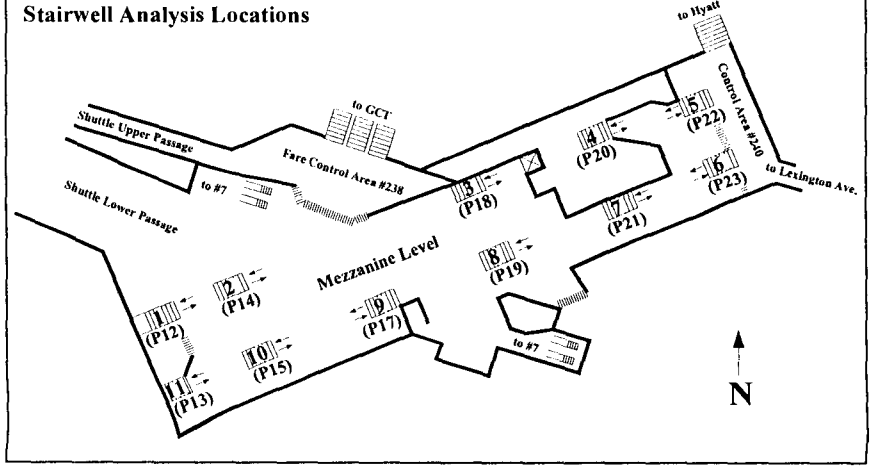

TABLE M-20

2020 BUILD
SUBWAY STAIRS
ANALYSES

Table M - 20
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	365	335	700	11.0	10.0	10	90	1.56	E *
2 (P14)	185	645	830	11.0	10.0	20	80	2.08	F *
3 (P18)	320	395	715	11.0	10.0	10	90	1.59	E *
4 (P20)	270	260	530	11.0	10.0	10	90	1.18	D
5 (P22)	260	180	440	6.5	5.5	10	50	1.78	F
6 (P23)	395	60	455	6.5	5.5	20	44	2.07	F
7 (P21)	305	35	340	11.0	10.0	20	80	0.85	C
8 (P19)	220	175	395	11.0	10.0	10	90	0.88	C
9 (P17)	120	190	310	11.0	10.0	10	90	0.69	B
10 (P15)	70	150	220	11.0	10.0	20	80	0.55	B
11 (P13)	170	50	220	11.0	10.0	20	80	0.55	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Significant Impact

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

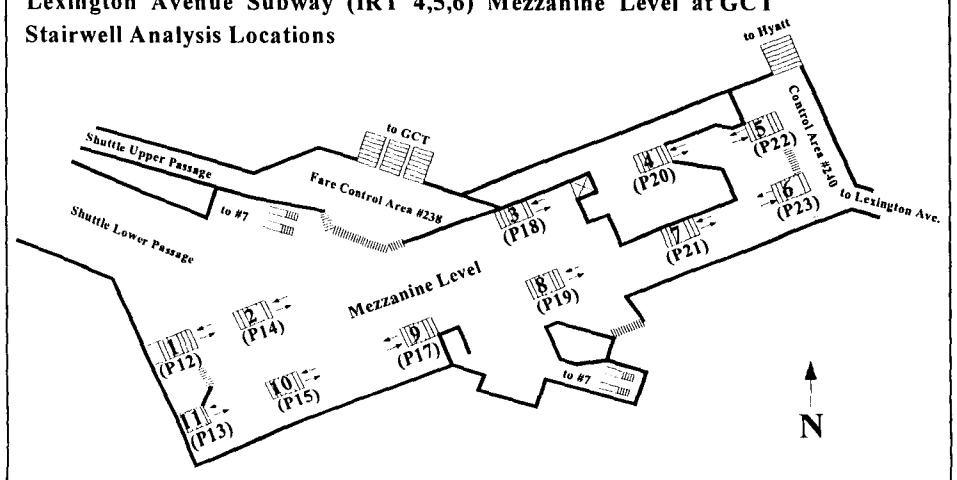

Table M - 20
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1 (P12)	895	900	1,795	11.0	10.0	10	90	1.33	D	*
2 (P14)	470	1,710	2,180	11.0	10.0	20	80	1.82	F	*
3 (P18)	730	965	1,695	11.0	10.0	10	90	1.26	D	*
4 (P20)	740	745	1,485	11.0	10.0	10	90	1.10	D	
5 (P22)	620	445	1,065	6.5	5.5	10	50	1.43	E	
6 (P23)	1,005	170	1,175	6.5	5.5	20	44	1.78	F	
7 (P21)	760	95	855	11.0	10.0	20	80	0.71	C	
8 (P19)	625	430	1,055	11.0	10.0	10	90	0.78	C	
9 (P17)	330	535	865	11.0	10.0	10	90	0.64	B	
10 (P15)	200	390	590	11.0	10.0	10	90	0.44	A	
11 (P13)	500	100	600	11.0	10.0	20	80	0.50	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Significant Impact

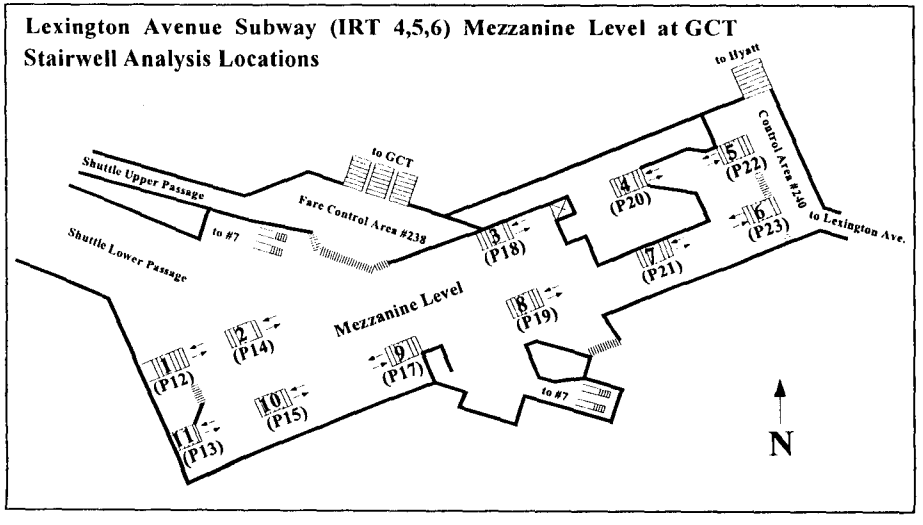

Table M - 20
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1 (P12)	100	125	225	11.0	10.0	10	90	0.50	B	
2 (P14)	90	340	430	11.0	10.0	20	80	1.08	D	
3 (P18)	170	115	285	11.0	10.0	10	90	0.63	B	
4 (P20)	65	180	245	11.0	10.0	20	80	0.61	B	
5 (P22)	45	270	315	6.5	5.5	20	44	1.43	E	
6 (P23)	270	230	500	6.5	5.5	10	50	2.02	F	
7 (P21)	275	125	400	11.0	10.0	20	80	1.00	D	
8 (P19)	175	145	320	11.0	10.0	10	90	0.71	C	
9 (P17)	260	200	460	11.0	10.0	10	90	1.02	D	*
10 (P15)	220	185	405	11.0	10.0	10	90	0.90	C	
11 (P13)	260	220	480	11.0	10.0	10	90	1.07	D	*

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Significant Impact

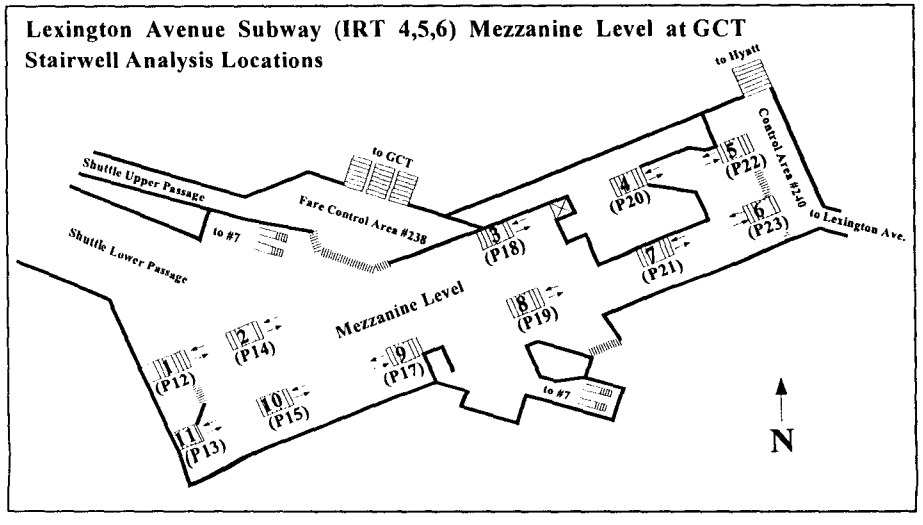

Table M - 20
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1 (P12)	260	310	570	11.0	10.0	10	90	0.42	A
2 (P14)	260	955	1,215	11.0	10.0	20	80	1.01	D
3 (P18)	440	325	765	11.0	10.0	10	90	0.57	B
4 (P20)	165	465	630	11.0	10.0	20	80	0.53	B
5 (P22)	95	750	845	6.5	5.5	20	44	1.28	D
6 (P23)	675	385	1,060	6.5	5.5	10	50	1.43	E
7 (P21)	695	305	1,000	11.0	10.0	20	80	0.83	C
8 (P19)	410	400	810	11.0	10.0	10	90	0.60	B
9 (P17)	660	570	1,230	11.0	10.0	10	90	0.91	C
10 (P15)	515	500	1,015	11.0	10.0	10	90	0.75	C
11 (P13)	585	515	1,100	11.0	10.0	10	90	0.81	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

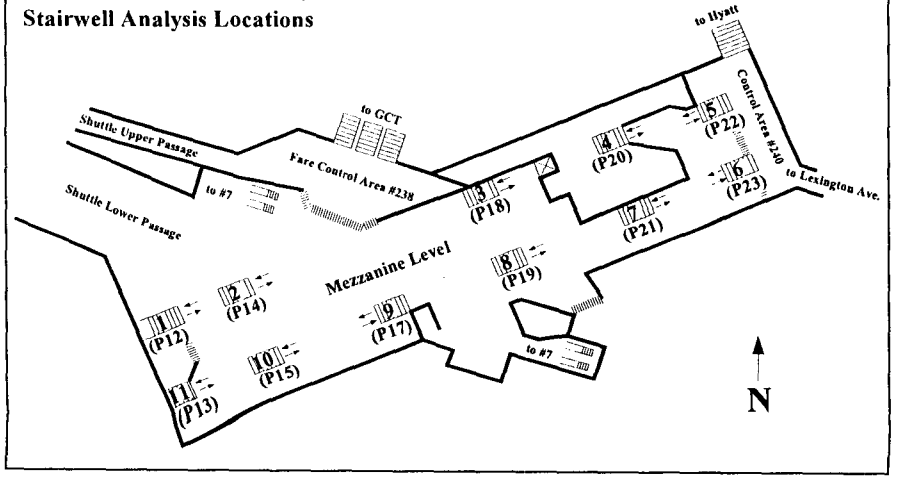

TABLE M-21

2010 MITIGATED BUILD SUBWAY STAIRS ANALYSES

Table M - 21
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1A (P10)	70	85	155	11.0	10.0	10	90	0.34	A	
1 (P12)	280	335	615	11.0	10.0	10	90	1.37	E	*
2 (P14)	170	535	705	11.0	10.0	20	80	1.76	F	*
3 (P18)	305	310	615	11.0	10.0	10	90	1.37	E	
4 (P20)	255	230	485	11.0	10.0	10	90	1.08	D	
5 (P22)	245	160	405	6.5	5.5	10	50	1.64	E	
6 (P23)	380	55	435	6.5	5.5	20	44	1.98	F	
7 (P21)	295	35	330	11.0	10.0	20	80	0.83	C	
8 (P19)	210	160	370	11.0	10.0	10	90	0.82	C	
9 (P17)	115	175	290	11.0	10.0	10	90	0.64	B	
10 (P15)	75	130	205	11.0	10.0	10	90	0.46	B	
11 (P13)	175	50	225	11.0	10.0	20	80	0.56	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Unmitigated Impact

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations

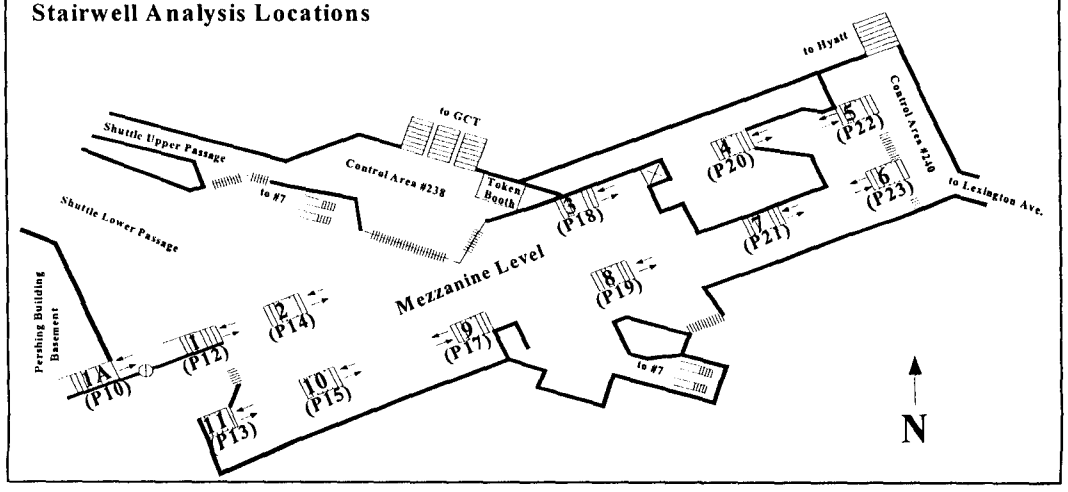

Table M - 21
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1A (P10)	200	245	445	11.0	10.0	10	90	0.33	A	
1 (P12)	685	930	1,615	11.0	10.0	10	90	1.20	D	*
2 (P14)	420	1,375	1,795	11.0	10.0	20	80	1.50	E	*
3 (P18)	700	740	1,440	11.0	10.0	10	90	1.07	D	*
4 (P20)	710	675	1,385	11.0	10.0	10	90	1.03	D	
5 (P22)	595	400	995	6.5	5.5	10	50	1.34	E	
6 (P23)	960	155	1,115	6.5	5.5	20	44	1.69	F	
7 (P21)	725	90	815	11.0	10.0	20	80	0.68	B	
8 (P19)	590	395	985	11.0	10.0	10	90	0.73	C	
9 (P17)	315	485	800	11.0	10.0	10	90	0.59	B	
10 (P15)	195	355	550	11.0	10.0	10	90	0.41	A	
11 (P13)	475	90	565	11.0	10.0	20	80	0.47	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Unmitigated Impact

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

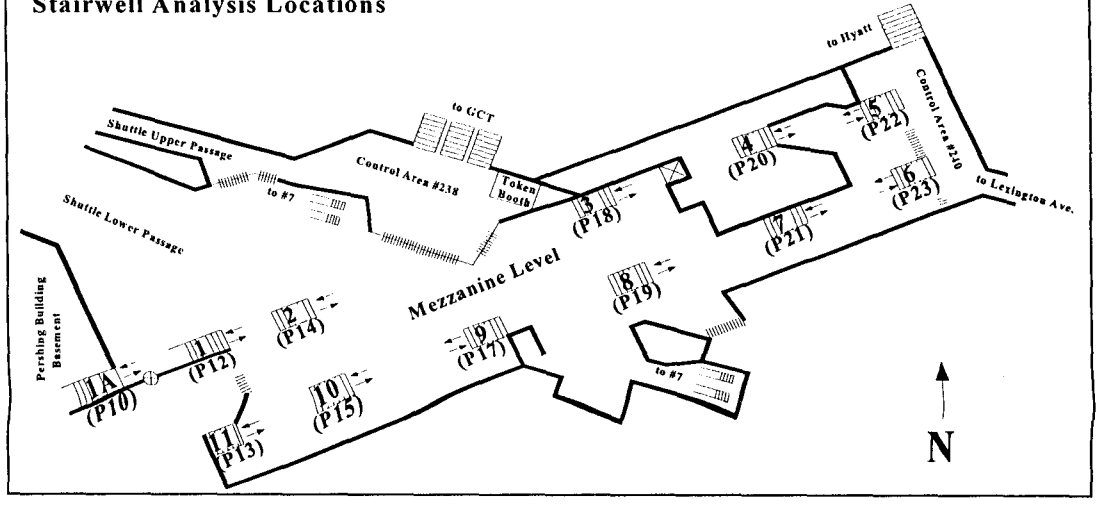

Table M - 21
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	45	30	75	11.0	10.0	10	90	0.17	A
1 (P12)	95	100	195	11.0	10.0	10	90	0.43	A
2 (P14)	70	320	390	11.0	10.0	20	80	0.98	C
3 (P18)	120	110	230	11.0	10.0	10	90	0.51	B
4 (P20)	60	170	230	11.0	10.0	20	80	0.58	B
5 (P22)	45	260	305	6.5	5.5	20	44	1.39	E
6 (P23)	245	220	465	6.5	5.5	10	50	1.88	F
7 (P21)	245	120	365	11.0	10.0	20	80	0.91	C
8 (P19)	155	135	290	11.0	10.0	10	90	0.64	B
9 (P17)	245	195	440	11.0	10.0	10	90	0.98	C
10 (P15)	195	175	370	11.0	10.0	10	90	0.82	C
11 (P13)	240	210	450	11.0	10.0	10	90	1.00	D

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

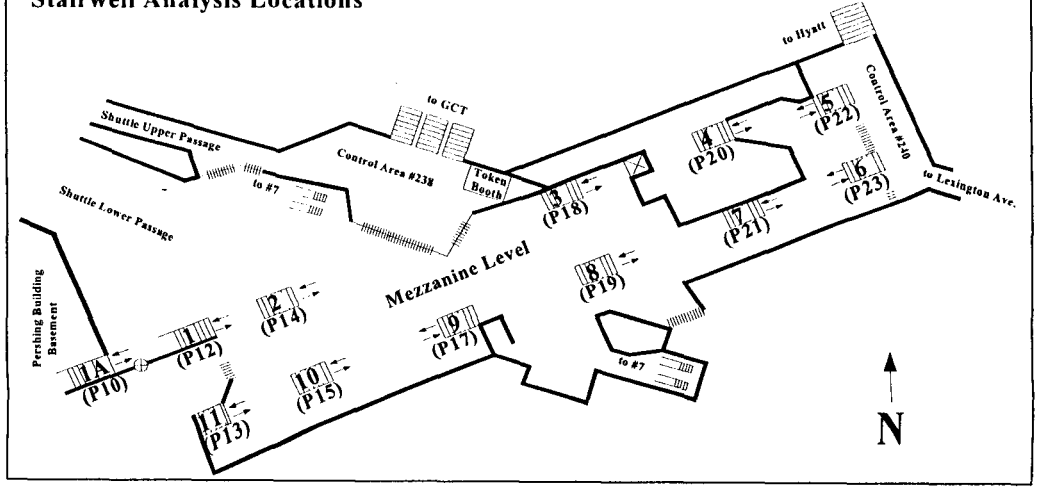

Table M - 21
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	125	100	225	11.0	10.0	10	90	0.17	A
1 (P12)	260	235	495	11.0	10.0	10	90	0.37	A
2 (P14)	195	880	1,075	11.0	10.0	20	80	0.90	C
3 (P18)	320	310	630	11.0	10.0	10	90	0.47	B
4 (P20)	150	440	590	11.0	10.0	20	80	0.49	B
5 (P22)	90	715	805	6.5	5.5	20	44	1.22	D
6 (P23)	610	365	975	6.5	5.5	10	50	1.31	D
7 (P21)	635	285	920	11.0	10.0	20	80	0.77	C
8 (P19)	380	380	760	11.0	10.0	10	90	0.56	B
9 (P17)	605	550	1,155	11.0	10.0	10	90	0.86	C
10 (P15)	480	480	960	11.0	10.0	10	90	0.71	C
11 (P13)	545	495	1,040	11.0	10.0	10	90	0.77	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

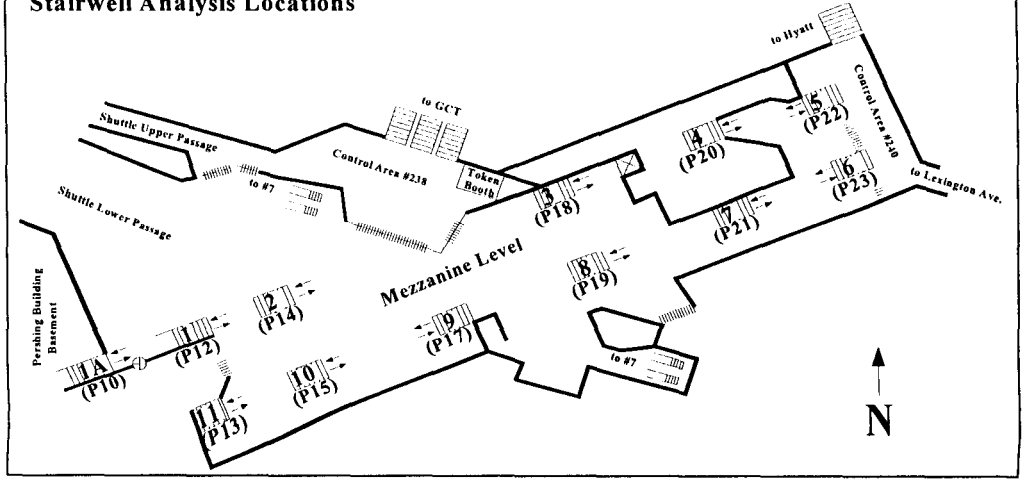

TABLE M-22

2020 MITIGATED BUILD SUBWAY STAIRS ANALYSES

Table M - 22
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1A (P10)	70	90	160	11.0	10.0	10	90	0.36	A	
1 (P12)	305	365	670	11.0	10.0	10	90	1.49	E	*
2 (P14)	175	585	760	11.0	10.0	20	80	1.90	F	*
3 (P18)	320	340	660	11.0	10.0	10	90	1.47	E	
4 (P20)	270	260	530	11.0	10.0	10	90	1.18	D	
5 (P22)	260	180	440	6.5	5.5	10	50	1.78	F	
6 (P23)	395	60	455	6.5	5.5	20	44	2.07	F	
7 (P21)	305	35	340	11.0	10.0	20	80	0.85	C	
8 (P19)	220	175	395	11.0	10.0	10	90	0.88	C	
9 (P17)	120	190	310	11.0	10.0	10	90	0.69	B	
10 (P15)	70	150	220	11.0	10.0	20	80	0.55	B	
11 (P13)	170	50	220	11.0	10.0	20	80	0.55	B	

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Unmitigated Impact

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations

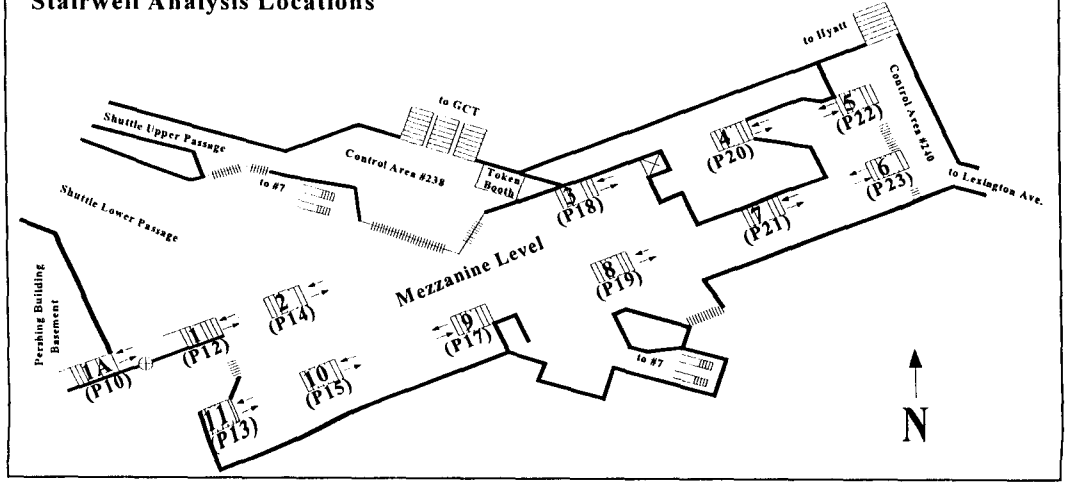

Table M - 22
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	205	260	465	11.0	10.0	10	90	0.34	A
1 (P12)	720	1,005	1,725	11.0	10.0	10	90	1.28	D
2 (P14)	440	1,515	1,955	11.0	10.0	20	80	1.63	E *
3 (P18)	730	820	1,550	11.0	10.0	10	90	1.15	D
4 (P20)	740	745	1,485	11.0	10.0	10	90	1.10	D
5 (P22)	620	445	1,065	6.5	5.5	10	50	1.43	E
6 (P23)	1,005	170	1,175	6.5	5.5	20	44	1.78	F
7 (P21)	760	95	855	11.0	10.0	20	80	0.71	C
8 (P19)	625	430	1,055	11.0	10.0	10	90	0.78	C
9 (P17)	330	535	865	11.0	10.0	10	90	0.64	B
10 (P15)	200	390	590	11.0	10.0	10	90	0.44	A
11 (P13)	500	100	600	11.0	10.0	20	80	0.50	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Unmitigated Impact

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

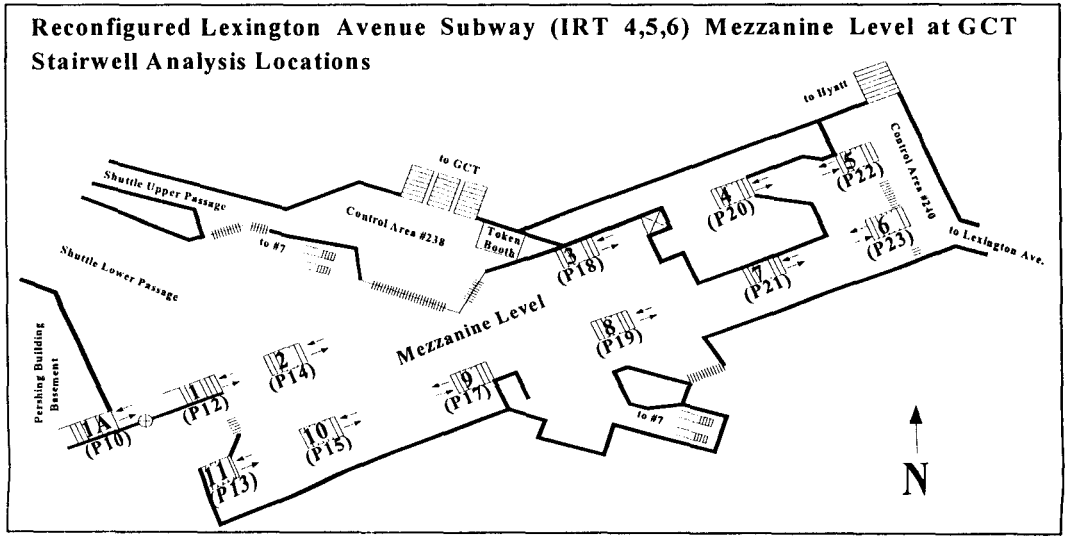

Table M - 22
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1A (P10)	45	35	80	11.0	10.0	10	90	0.18	A	
1 (P12)	110	100	210	11.0	10.0	10	90	0.47	B	
2 (P14)	75	330	405	11.0	10.0	20	80	1.01	D	
3 (P18)	135	115	250	11.0	10.0	10	90	0.56	B	
4 (P20)	65	180	245	11.0	10.0	20	80	0.61	B	
5 (P22)	45	270	315	6.5	5.5	20	44	1.43	E	
6 (P23)	270	230	500	6.5	5.5	10	50	2.04	F	
7 (P21)	275	125	400	11.0	10.0	20	80	1.00	D	
8 (P19)	175	145	320	11.0	10.0	10	90	0.71	C	
9 (P17)	260	200	460	11.0	10.0	10	90	1.02	D	*
10 (P15)	220	185	405	11.0	10.0	10	90	0.90	C	
11 (P13)	260	220	480	11.0	10.0	10	90	1.07	D	*

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

"*" Unmitigated Impact

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations

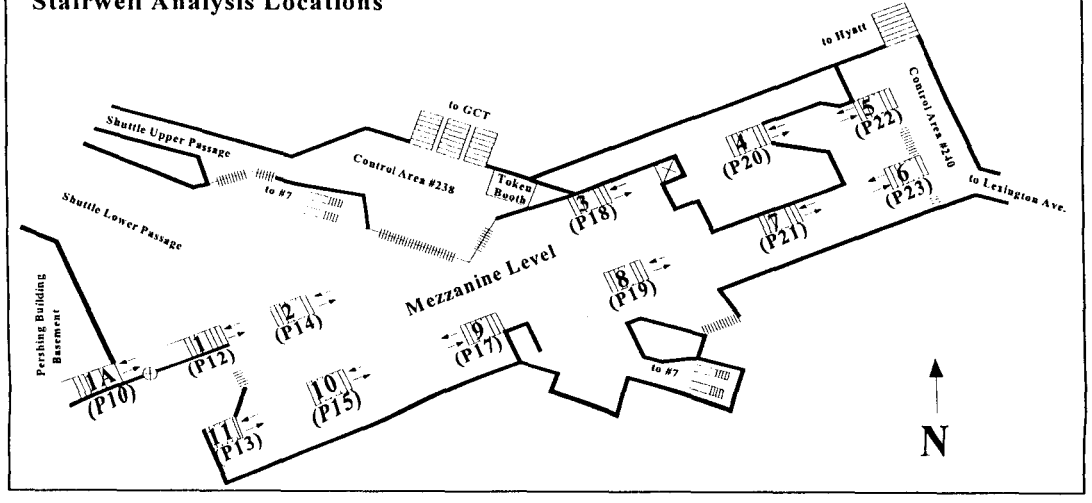

Table M - 22
EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	135	105	240	11.0	10.0	10	90	0.18	A
1 (P12)	280	240	520	11.0	10.0	10	90	0.39	A
2 (P14)	215	920	1,135	11.0	10.0	20	80	0.95	C
3 (P18)	350	325	675	11.0	10.0	10	90	0.50	B
4 (P20)	165	465	630	11.0	10.0	20	80	0.53	B
5 (P22)	95	750	845	6.5	5.5	20	44	1.28	D
6 (P23)	675	385	1,060	6.5	5.5	10	50	1.43	E
7 (P21)	695	305	1,000	11.0	10.0	20	80	0.83	C
8 (P19)	410	400	810	11.0	10.0	10	90	0.60	B
9 (P17)	660	570	1,230	11.0	10.0	10	90	0.91	C
10 (P15)	515	500	1,015	11.0	10.0	10	90	0.75	C
11 (P13)	585	515	1,100	11.0	10.0	10	90	0.81	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

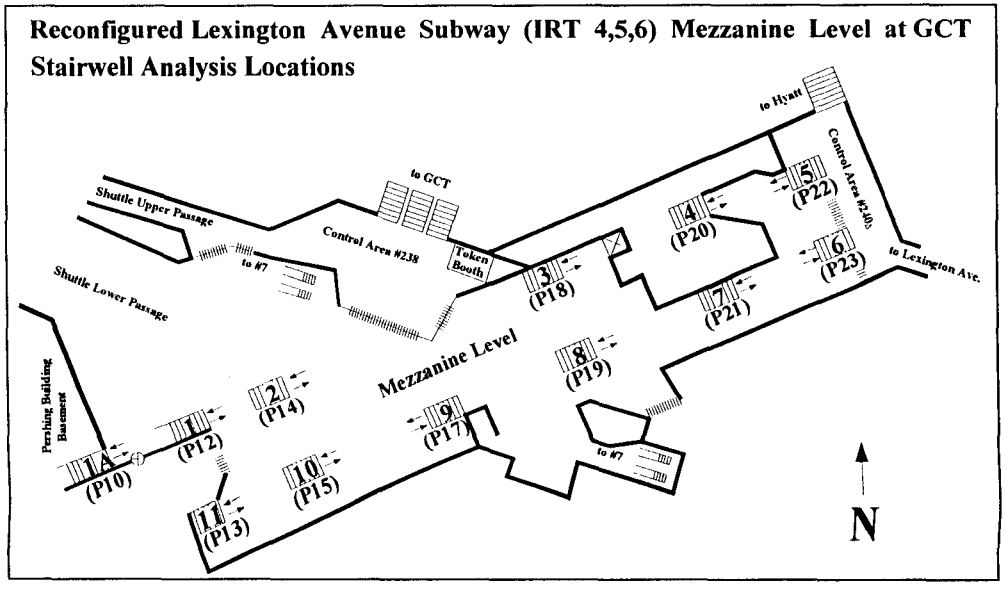

TABLE M-23

EXISTING
SUBWAY PLATFORM
TIME-SPACE ANALYSES

Table M - 23
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	125	1	7	875	430	37	224	0.17	71.0	16	1,136	**2,011**	**36%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	50	26	224	0.12	5.8	16	93	**268**	**9%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	355	40	224	0.18	63.4	16	1,014	**1,364**	**32%**	**C/D or better**
Zone 4	835	5	**4,175**	125	1	7	875	60	35	224	0.16	9.4	16	150	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	325	1	7	2,275	600	49	224	0.22	131.3	16	2,100	**4,375**	**90%**	**C/D - Mid-D**
Zone 6	575	5	**2,875**	75	1	7	525	135	30	224	0.13	18.1	16	289	**814**	**28%**	**C/D or better**
Zone 7	550	5	**2,750**	75	1	7	525	185	29	224	0.13	24.0	16	383	**908**	**33%**	**C/D or better**
Zone 8	2,165	5	**10,825**	75	1	7	525	220	48	224	0.21	47.1	16	754	**1,279**	**12%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	225	1	7	1,575	630	51	224	0.23	143.4	16	2,295	**3,870**	**40%**	**C/D or better**
Zone 2	570	5	**2,850**	100	1	7	700	625	27	224	0.12	75.3	16	1,205	**1,905**	**67%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	130	30	224	0.13	17.4	16	279	**629**	**21%**	**C/D or better**
Zone 4	1,050	5	**5,250**	175	1	7	1,225	615	49	224	0.22	134.5	16	2,153	**3,378**	**64%**	**C/D or better**
Zone 5	330	5	**1,650**	75	1	7	525	65	21	224	0.09	6.1	16	98	**623**	**38%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	470	42	224	0.19	88.1	16	1,410	**2,110**	**52%**	**C/D or better**
Zone 7	770	5	**3,850**	100	1	7	700	70	33	224	0.15	10.3	16	165	**865**	**22%**	**C/D or better**
Zone 8	1,155	5	**5,775**	125	1	7	875	400	29	224	0.13	51.8	16	829	**1,704**	**29%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

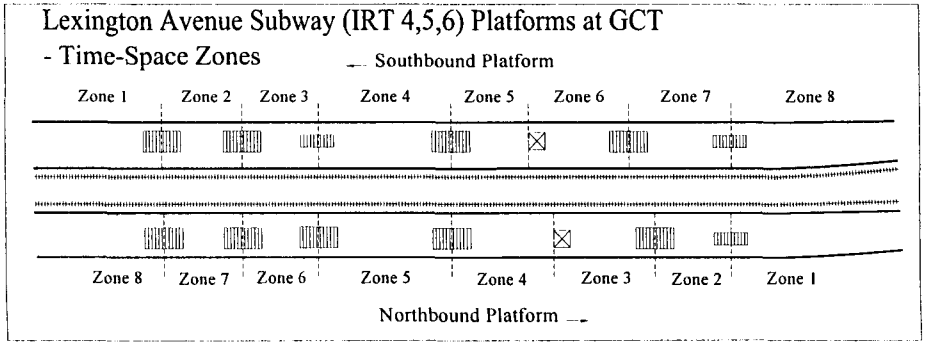

Table M - 23
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	375	1	7	2,625	1,115	37	224	0.17	184.2	16	2,947	**5,572**	**33%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	150	26	224	0.12	17.4	16	279	**804**	**9%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	910	40	224	0.18	162.5	16	2,600	**3,650**	**28%**	**C/D or better**
Zone 4	835	15	**12,525**	375	1	7	2,625	180	35	224	0.16	28.1	16	450	**3,075**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	975	1	7	6,825	1,695	49	224	0.22	370.8	16	5,933	**12,758**	**88%**	**C/D or better**
Zone 6	575	15	**8,625**	225	1	7	1,575	405	30	224	0.13	54.2	16	868	**2,443**	**28%**	**C/D or better**
Zone 7	550	15	**8,250**	225	1	7	1,575	490	29	224	0.13	63.4	16	1,015	**2,590**	**31%**	**C/D or better**
Zone 8	2,165	15	**32,475**	225	1	7	1,575	580	48	224	0.21	124.3	16	1,989	**3,564**	**11%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	675	1	7	4,725	1,705	51	224	0.23	388.2	16	6,211	**10,936**	**38%**	**C/D or better**
Zone 2	570	15	**8,550**	300	1	7	2,100	1,605	27	224	0.12	193.5	16	3,095	**5,195**	**61%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	390	30	224	0.13	52.2	16	836	**1,886**	**21%**	**C/D or better**
Zone 4	1,050	15	**15,750**	525	1	7	3,675	1,505	49	224	0.22	329.2	16	5,268	**8,943**	**57%**	**C/D or better**
Zone 5	330	15	**4,950**	225	1	7	1,575	195	21	224	0.09	18.3	16	293	**1,868**	**38%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	1,335	42	224	0.19	250.3	16	4,005	**6,105**	**50%**	**C/D or better**
Zone 7	770	15	**11,550**	300	1	7	2,100	210	33	224	0.15	30.9	16	495	**2,595**	**22%**	**C/D or better**
Zone 8	1,155	15	**17,325**	375	1	7	2,625	995	29	224	0.13	128.8	16	2,061	**4,686**	**27%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

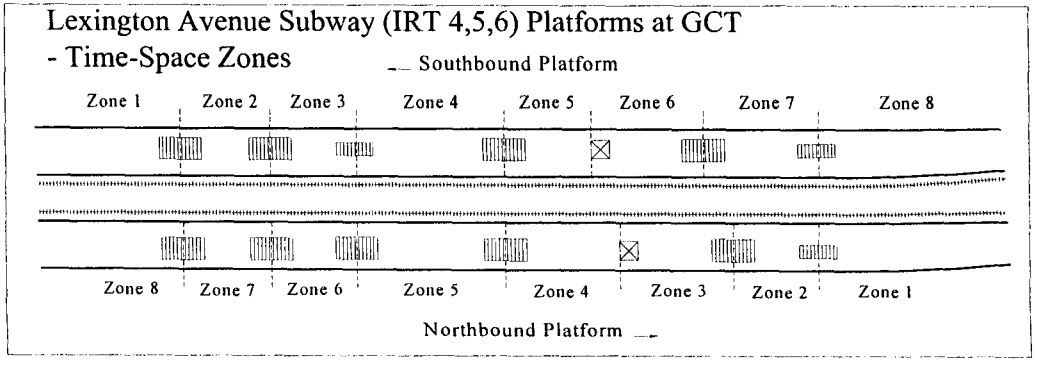

Table M - 23
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	200	1	7	1,400	355	37	224	0.17	58.6	16	938	**2,338**	**42%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	55	26	224	0.12	6.4	16	102	**452**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	125	1	7	875	410	40	224	0.18	73.2	16	1,171	**2,046**	**47%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	115	35	224	0.16	18.0	16	288	**988**	**24%**	**C/D or better**
Zone 5	970	5	**4,850**	200	1	7	1,400	665	49	224	0.22	145.5	16	2,328	**3,728**	**77%**	**C/D or better**
Zone 6	575	5	**2,875**	100	1	7	700	125	30	224	0.13	16.7	16	268	**968**	**34%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	370	29	224	0.13	47.9	16	766	**1,466**	**53%**	**C/D or better**
Zone 8	2,165	5	**10,825**	400	1	7	2,800	400	48	224	0.21	85.7	16	1,371	**4,171**	**39%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	275	1	7	1,925	280	51	224	0.23	63.8	16	1,020	**2,945**	**31%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	430	27	224	0.12	51.8	16	829	**1,704**	**60%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	120	30	224	0.13	16.1	16	257	**782**	**26%**	**C/D or better**
Zone 4	1,050	5	**5,250**	100	1	7	700	295	49	224	0.22	64.5	16	1,033	**1,733**	**33%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	100	21	224	0.09	9.4	16	150	**500**	**30%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	270	42	224	0.19	50.6	16	810	**1,510**	**37%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	65	33	224	0.15	9.6	16	153	**1,028**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	200	1	7	1,400	305	29	224	0.13	39.5	16	632	**2,032**	**35%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

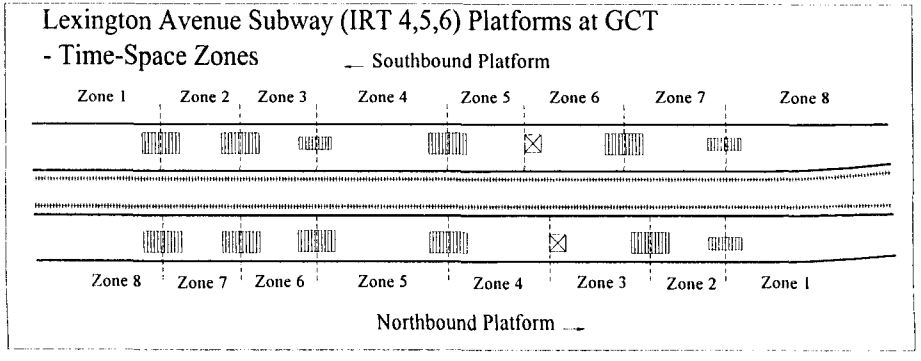

Table M - 23
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
1999 EXISTING CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				**QUEUE TIME - SPACE**				**WALK TIME - SPACE**									
Time - Space Zone	**Effective Space Available** (sqft)	**Analysis Duration (1)** (min)	**Total Time - Space Available** (sqft-min) **B * C**	**Number of Pax Waiting** (ped)	**Average Wait Time (2)** (min)	**Average Wait Space (3)** (sqft/ped)	**Total Wait Time - Space** (sqft-min) **E * F * G**	**Total Pax Volume** (ped)	**Average Walk Distance (4)** (ft)	**Average Walk Speed (5)** (fpm)	**Average Walk Time** (min) **J / K**	**Total Walk Time** (ped-min) **I * L**	**Average Walk Space (6)** (sqft/ped)	**Total Walk Time - Space** (sqft-min) **M * N**	**Total Time - Space Required** (sqft-min) **H + O**	**Time-Space Required as % of Time-Space Available** (sqft-min) **P / D**	**Level of Service** (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	600	1	7	4,200	975	37	224	0.17	161.0	16	2,577	**6,777**	**41%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	165	26	224	0.12	19.2	16	306	**1,356**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	375	1	7	2,625	1,070	40	224	0.18	191.1	16	3,057	**5,682**	**44%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	345	35	224	0.16	53.9	16	863	**2,963**	**24%**	**C/D or better**
Zone 5	970	15	**14,550**	600	1	7	4,200	1,755	49	224	0.22	383.9	16	6,143	**10,343**	**71%**	**C/D or better**
Zone 6	575	15	**8,625**	300	1	7	2,100	375	30	224	0.13	50.2	16	804	**2,904**	**34%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	955	29	224	0.13	123.6	16	1,978	**4,078**	**49%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,200	1	7	8,400	925	48	224	0.21	198.2	16	3,171	**11,571**	**36%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	825	1	7	5,775	750	51	224	0.23	170.8	16	2,732	**8,507**	**30%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	1,215	27	224	0.12	146.5	16	2,343	**4,968**	**58%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	360	30	224	0.13	48.2	16	771	**2,346**	**26%**	**C/D or better**
Zone 4	1,050	15	**15,750**	300	1	7	2,100	815	49	224	0.22	178.3	16	2,853	**4,953**	**31%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	300	21	224	0.09	28.1	16	450	**1,500**	**30%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	705	42	224	0.19	132.2	16	2,115	**4,215**	**35%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	195	33	224	0.15	28.7	16	460	**3,085**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	600	1	7	4,200	825	29	224	0.13	106.8	16	1,709	**5,909**	**34%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

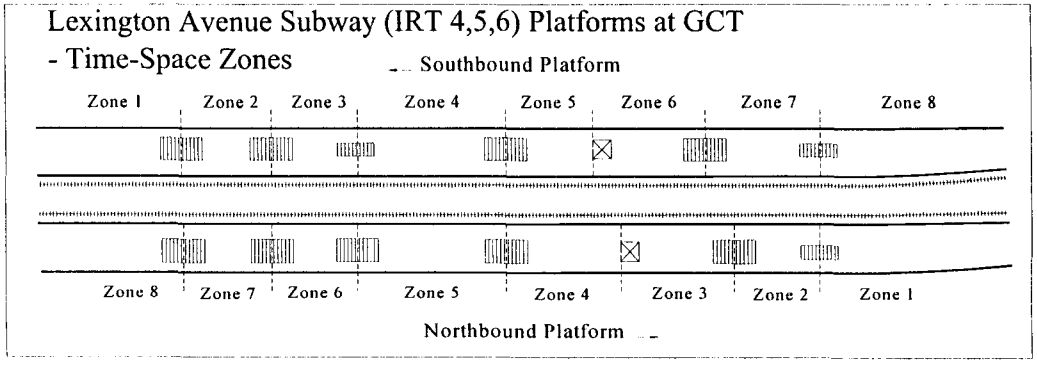

TABLE M-24

2010 NO BUILD
SUBWAY PLATFORM
TIME-SPACE ANALYSES

Table M - 24
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	125	1	7	875	455	37	224	0.17	75.2	16	1,203	**2,078**	**37%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	55	26	224	0.12	6.4	16	102	**277**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	375	40	224	0.18	67.0	16	1,071	**1,421**	**33%**	**C/D or better**
Zone 4	835	5	**4,175**	125	1	7	875	60	35	224	0.16	9.4	16	150	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	350	1	7	2,450	645	49	224	0.22	141.1	16	2,258	**4,708**	**97%**	**C/D - Mid-D**
Zone 6	575	5	**2,875**	75	1	7	525	145	30	224	0.13	19.4	16	311	**836**	**29%**	**C/D or better**
Zone 7	550	5	**2,750**	75	1	7	525	200	29	224	0.13	25.9	16	414	**939**	**34%**	**C/D or better**
Zone 8	2,165	5	**10,825**	75	1	7	525	235	48	224	0.21	50.4	16	806	**1,331**	**12%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	225	1	7	1,575	675	51	224	0.23	153.7	16	2,459	**4,034**	**42%**	**C/D or better**
Zone 2	570	5	**2,850**	100	1	7	700	690	27	224	0.12	83.2	16	1,331	**2,031**	**71%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	140	30	224	0.13	18.8	16	300	**650**	**21%**	**C/D or better**
Zone 4	1,050	5	**5,250**	175	1	7	1,225	670	49	224	0.22	146.6	16	2,345	**3,570**	**68%**	**C/D or better**
Zone 5	330	5	**1,650**	75	1	7	525	65	21	224	0.09	6.1	16	98	**623**	**38%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	505	42	224	0.19	94.7	16	1,515	**2,215**	**55%**	**C/D or better**
Zone 7	770	5	**3,850**	100	1	7	700	75	33	224	0.15	11.0	16	177	**877**	**23%**	**C/D or better**
Zone 8	1,155	5	**5,775**	125	1	7	875	425	29	224	0.13	55.0	16	880	**1,755**	**30%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

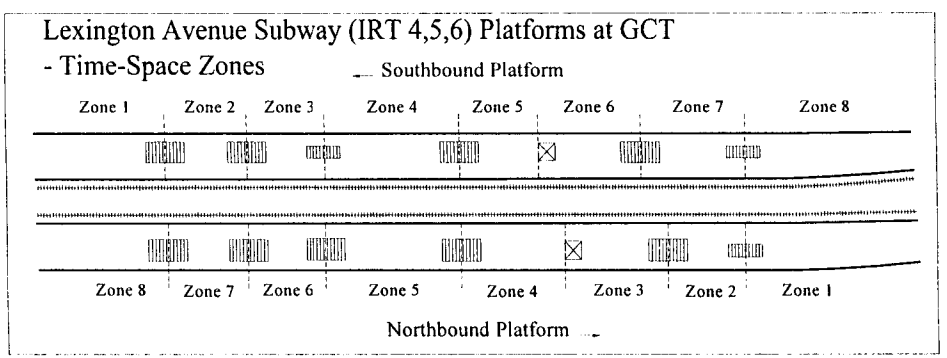

Table M - 24
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	375	1	7	2,625	1,180	37	224	0.17	194.9	16	3,119	**5,744**	**34%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	160	26	224	0.12	18.6	16	297	**822**	**9%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	965	40	224	0.18	172.3	16	2,757	**3,807**	**29%**	**C/D or better**
Zone 4	835	15	**12,525**	375	1	7	2,625	195	35	224	0.16	30.5	16	488	**3,113**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	1,050	1	7	7,350	1,825	49	224	0.22	399.2	16	6,388	**13,738**	**94%**	**C/D - Mid-D**
Zone 6	575	15	**8,625**	225	1	7	1,575	445	30	224	0.13	59.6	16	954	**2,529**	**29%**	**C/D or better**
Zone 7	550	15	**8,250**	225	1	7	1,575	530	29	224	0.13	68.6	16	1,098	**2,673**	**32%**	**C/D or better**
Zone 8	2,165	15	**32,475**	225	1	7	1,575	610	48	224	0.21	130.7	16	2,091	**3,666**	**11%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	675	1	7	4,725	1,845	51	224	0.23	420.1	16	6,721	**11,446**	**40%**	**C/D or better**
Zone 2	570	15	**8,550**	300	1	7	2,100	1,765	27	224	0.12	212.7	16	3,404	**5,504**	**64%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	425	30	224	0.13	56.9	16	911	**1,961**	**21%**	**C/D or better**
Zone 4	1,050	15	**15,750**	525	1	7	3,675	1,635	49	224	0.22	357.7	16	5,723	**9,398**	**60%**	**C/D or better**
Zone 5	330	15	**4,950**	225	1	7	1,575	205	21	224	0.09	19.2	16	308	**1,883**	**38%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	1,450	42	224	0.19	271.9	16	4,350	**6,450**	**53%**	**C/D or better**
Zone 7	770	15	**11,550**	300	1	7	2,100	230	33	224	0.15	33.9	16	542	**2,642**	**23%**	**C/D or better**
Zone 8	1,155	15	**17,325**	375	1	7	2,625	1,075	29	224	0.13	139.2	16	2,227	**4,852**	**28%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

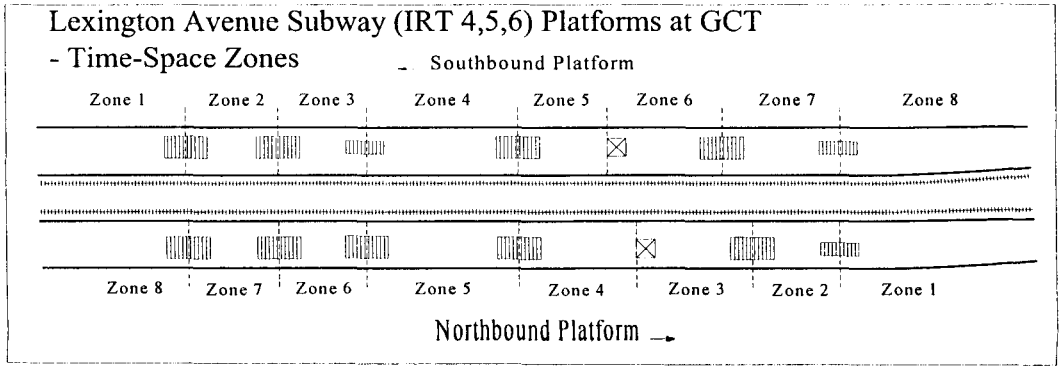

Table M - 24
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	200	1	7	1,400	490	37	224	0.17	80.9	16	1,295	**2,695**	**48%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	55	26	224	0.12	6.4	16	102	**452**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	125	1	7	875	445	40	224	0.18	79.5	16	1,271	**2,146**	**50%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	125	35	224	0.16	19.5	16	313	**1,013**	**24%**	**C/D or better**
Zone 5	970	5	**4,850**	200	1	7	1,400	725	49	224	0.22	158.6	16	2,538	**3,938**	**81%**	**C/D or better**
Zone 6	575	5	**2,875**	100	1	7	700	135	30	224	0.13	18.1	16	289	**989**	**34%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	390	29	224	0.13	50.5	16	808	**1,508**	**55%**	**C/D or better**
Zone 8	2,165	5	**10,825**	425	1	7	2,975	430	48	224	0.21	92.1	16	1,474	**4,449**	**41%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	300	1	7	2,100	300	51	224	0.23	68.3	16	1,093	**3,193**	**33%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	460	27	224	0.12	55.4	16	887	**1,762**	**62%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	125	30	224	0.13	16.7	16	268	**793**	**26%**	**C/D or better**
Zone 4	1,050	5	**5,250**	100	1	7	700	315	49	224	0.22	68.9	16	1,103	**1,803**	**34%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	110	21	224	0.09	10.3	16	165	**515**	**31%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	280	42	224	0.19	52.5	16	840	**1,540**	**38%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	65	33	224	0.15	9.6	16	153	**1,028**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	200	1	7	1,400	325	29	224	0.13	42.1	16	673	**2,073**	**36%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

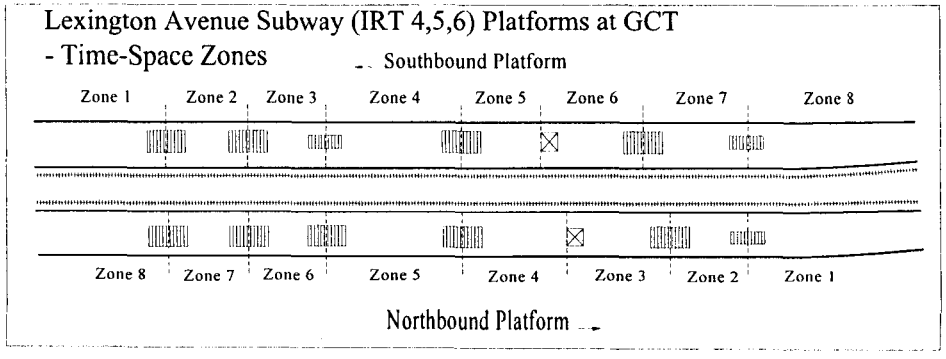

Table M - 24
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 NO BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	600	1	7	4,200	1,065	37	224	0.17	175.9	16	2,815	**7,015**	**42%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	175	26	224	0.12	20.3	16	325	**1,375**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	375	1	7	2,625	1,165	40	224	0.18	208.0	16	3,329	**5,954**	**46%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	375	35	224	0.16	58.6	16	938	**3,038**	**24%**	**C/D or better**
Zone 5	970	15	**14,550**	600	1	7	4,200	1,895	49	224	0.22	414.5	16	6,633	**10,833**	**74%**	**C/D or better**
Zone 6	575	15	**8,625**	300	1	7	2,100	400	30	224	0.13	53.6	16	857	**2,957**	**34%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	1,030	29	224	0.13	133.3	16	2,134	**4,234**	**51%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,275	1	7	8,925	1,000	48	224	0.21	214.3	16	3,429	**12,354**	**38%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	900	1	7	6,300	800	51	224	0.23	182.1	16	2,914	**9,214**	**32%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	1,315	27	224	0.12	158.5	16	2,536	**5,161**	**60%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	390	30	224	0.13	52.2	16	836	**2,411**	**26%**	**C/D or better**
Zone 4	1,050	15	**15,750**	300	1	7	2,100	870	49	224	0.22	190.3	16	3,045	**5,145**	**33%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	325	21	224	0.09	30.5	16	488	**1,538**	**31%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	750	42	224	0.19	140.6	16	2,250	**4,350**	**36%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	195	33	224	0.15	28.7	16	460	**3,085**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	600	1	7	4,200	875	29	224	0.13	113.3	16	1,813	**6,013**	**35%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

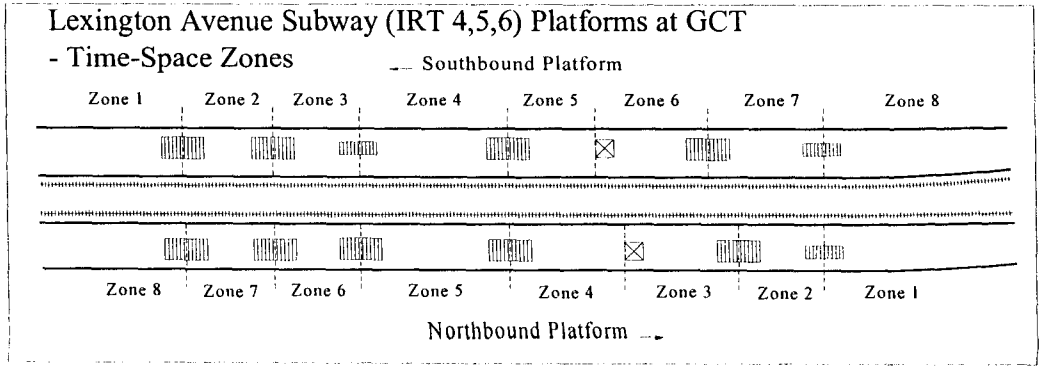

TABLE M-25

2020 NO BUILD
SUBWAY PLATFORM
TIME-SPACE ANALYSES

Table M - 25
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	150	1	7	1,050	475	37	224	0.17	78.5	16	1,255	**2,305**	**41%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	60	26	224	0.12	7.0	16	111	**286**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	395	40	224	0.18	70.5	16	1,129	**1,479**	**34%**	**C/D or better**
Zone 4	835	5	**4,175**	150	1	7	1,050	70	35	224	0.16	10.9	16	175	**1,225**	**29%**	**C/D or better**
Zone 5	970	5	**4,850**	400	1	5	2,000	695	49	211	0.23	161.4	13.5	2,179	**4,179**	**86%**	**Mid-D**
Zone 6	575	5	**2,875**	100	1	7	700	160	30	224	0.13	21.4	16	343	**1,043**	**36%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	210	29	224	0.13	27.2	16	435	**1,135**	**41%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	240	48	224	0.21	51.4	16	823	**1,523**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	275	1	7	1,925	725	51	224	0.23	165.1	16	2,641	**4,566**	**48%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	745	27	224	0.12	89.8	16	1,437	**2,312**	**81%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	155	30	224	0.13	20.8	16	332	**682**	**22%**	**C/D or better**
Zone 4	1,050	5	**5,250**	225	1	7	1,575	720	49	224	0.22	157.5	16	2,520	**4,095**	**78%**	**C/D or better**
Zone 5	330	5	**1,650**	100	1	7	700	75	21	224	0.09	7.0	16	113	**813**	**49%**	**C/D or better**
Zone 6	810	5	**4,050**	125	1	7	875	545	42	224	0.19	102.2	16	1,635	**2,510**	**62%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	85	33	224	0.15	12.5	16	200	**1,075**	**28%**	**C/D or better**
Zone 8	1,155	5	**5,775**	150	1	7	1,050	460	29	224	0.13	59.6	16	953	**2,003**	**35%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

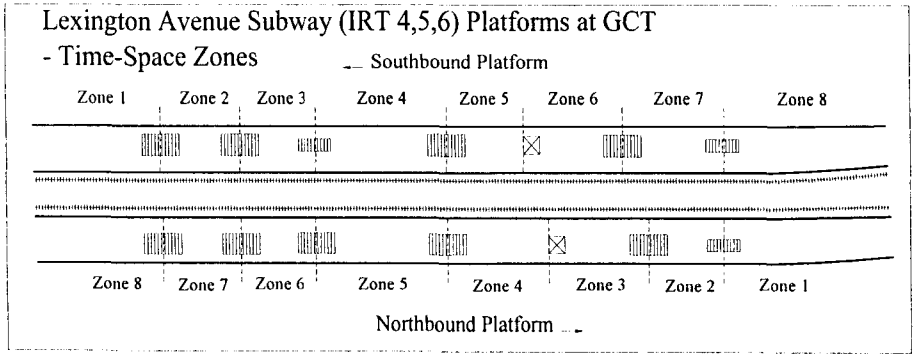

Table M - 25
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	450	1	7	3,150	1,245	37	224	0.17	205.6	16	3,290	**6,440**	**39%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	175	26	224	0.12	20.3	16	325	**850**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	1,015	40	224	0.18	181.3	16	2,900	**3,950**	**30%**	**C/D or better**
Zone 4	835	15	**12,525**	450	1	7	3,150	205	35	224	0.16	32.0	16	513	**3,663**	**29%**	**C/D or better**
Zone 5	970	15	**14,550**	1,200	1	5	6,000	1,965	49	211	0.23	456.3	13.5	6,160	**12,160**	**84%**	**Mid-D**
Zone 6	575	15	**8,625**	300	1	7	2,100	470	30	224	0.13	62.9	16	1,007	**3,107**	**36%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	580	29	224	0.13	75.1	16	1,201	**3,301**	**40%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	650	48	224	0.21	139.3	16	2,229	**4,329**	**13%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	825	1	7	5,775	1,980	51	224	0.23	450.8	16	7,213	**12,988**	**45%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	1,900	27	224	0.12	229.0	16	3,664	**6,289**	**74%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	465	30	224	0.13	62.3	16	996	**2,046**	**22%**	**C/D or better**
Zone 4	1,050	15	**15,750**	675	1	7	4,725	1,760	49	224	0.22	385.0	16	6,160	**10,885**	**69%**	**C/D or better**
Zone 5	330	15	**4,950**	300	1	7	2,100	225	21	224	0.09	21.1	16	338	**2,438**	**49%**	**C/D or better**
Zone 6	810	15	**12,150**	375	1	7	2,625	1,550	42	224	0.19	290.6	16	4,650	**7,275**	**60%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	245	33	224	0.15	36.1	16	578	**3,203**	**28%**	**C/D or better**
Zone 8	1,155	15	**17,325**	450	1	7	3,150	1,145	29	224	0.13	148.2	16	2,372	**5,522**	**32%**	**C/D or better**

NOTES:

(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

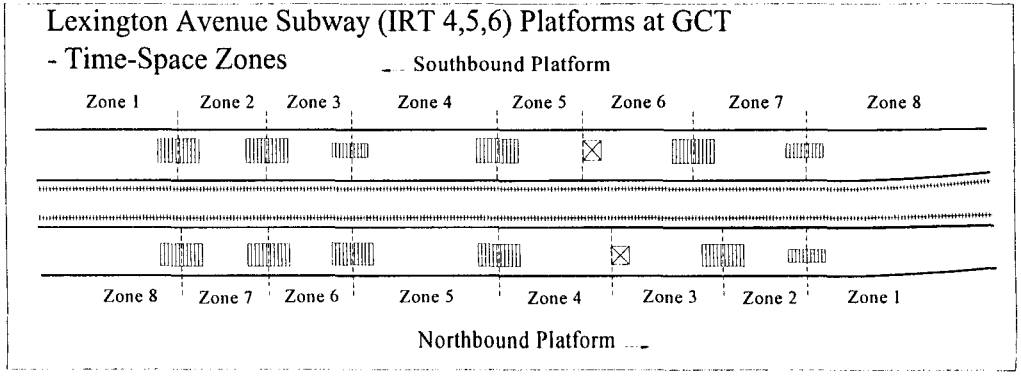

Table M - 25
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	225	1	7	1,575	530	37	224	0.17	87.5	16	1,401	**2,976**	**53%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	60	26	224	0.12	7.0	16	111	**461**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	125	1	7	875	485	40	224	0.18	86.6	16	1,386	**2,261**	**52%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	130	35	224	0.16	20.3	16	325	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	225	1	7	1,575	770	49	224	0.22	168.4	16	2,695	**4,270**	**88%**	**C/D or better**
Zone 6	575	5	**2,875**	100	1	7	700	140	30	224	0.13	18.8	16	300	**1,000**	**35%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	425	29	224	0.13	55.0	16	880	**1,580**	**57%**	**C/D or better**
Zone 8	2,165	5	**10,825**	450	1	7	3,150	460	48	224	0.21	98.6	16	1,577	**4,727**	**44%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	300	1	7	2,100	315	51	224	0.23	71.7	16	1,148	**3,248**	**34%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	475	27	224	0.12	57.3	16	916	**1,791**	**63%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	135	30	224	0.13	18.1	16	289	**814**	**27%**	**C/D or better**
Zone 4	1,050	5	**5,250**	100	1	7	700	340	49	224	0.22	74.4	16	1,190	**1,890**	**36%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	115	21	224	0.09	10.8	16	173	**523**	**32%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	300	42	224	0.19	56.3	16	900	**1,600**	**40%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	70	33	224	0.15	10.3	16	165	**1,040**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	225	1	7	1,575	335	29	224	0.13	43.4	16	694	**2,269**	**39%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

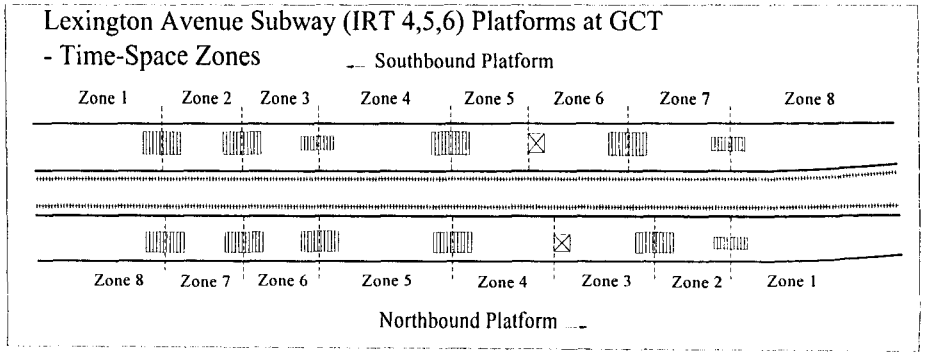

Table M - 25
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 NO BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	675	1	7	4,725	1,150	37	224	0.17	190.0	16	3,039	**7,764**	**46%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	180	26	224	0.12	20.9	16	334	**1,384**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	375	1	7	2,625	1,255	40	224	0.18	224.1	16	3,586	**6,211**	**48%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	400	35	224	0.16	62.5	16	1,000	**3,100**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	675	1	7	4,725	2,020	49	224	0.22	441.9	16	7,070	**11,795**	**81%**	**C/D or better**
Zone 6	575	15	**8,625**	300	1	7	2,100	435	30	224	0.13	58.3	16	932	**3,032**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	1,090	29	224	0.13	141.1	16	2,258	**4,358**	**53%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,350	1	7	9,450	1,065	48	224	0.21	228.2	16	3,651	**13,101**	**40%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	900	1	7	6,300	845	51	224	0.23	192.4	16	3,078	**9,378**	**33%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	1,360	27	224	0.12	163.9	16	2,623	**5,248**	**61%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	415	30	224	0.13	55.6	16	889	**2,464**	**27%**	**C/D or better**
Zone 4	1,050	15	**15,750**	300	1	7	2,100	935	49	224	0.22	204.5	16	3,273	**5,373**	**34%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	350	21	224	0.09	32.8	16	525	**1,575**	**32%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	795	42	224	0.19	149.1	16	2,385	**4,485**	**37%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	210	33	224	0.15	30.9	16	495	**3,120**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	675	1	7	4,725	915	29	224	0.13	118.5	16	1,895	**6,620**	**38%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

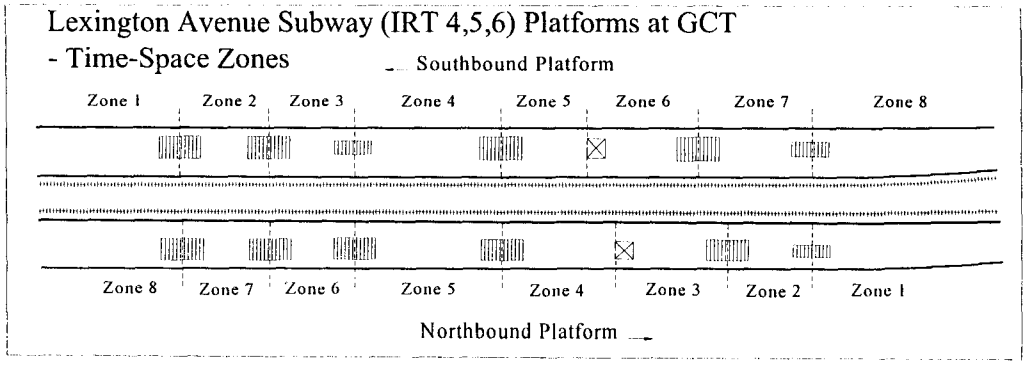

TABLE M-26

2010 BUILD
SUBWAY PLATFORM
TIME-SPACE ANALYSES

Table M - 26
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	125	1	7	875	460	37	224	0.17	76.0	16	1,216	**2,091**	**38%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	55	26	224	0.12	6.4	16	102	**277**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	380	40	224	0.18	67.9	16	1,086	**1,436**	**33%**	**C/D or better**
Zone 4	835	5	**4,175**	125	1	7	875	60	35	224	0.16	9.4	16	150	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	400	1	5	2,000	695	49	211	0.23	161.4	13.5	2,179	**4,179**	**86%**	**Mid-D**
Zone 6	575	5	**2,875**	75	1	7	525	145	30	224	0.13	19.4	16	311	**836**	**29%**	**C/D or better**
Zone 7	550	5	**2,750**	75	1	7	525	220	29	224	0.13	28.5	16	456	**981**	**36%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	240	48	224	0.21	51.4	16	823	**1,523**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	275	1	7	1,925	730	51	224	0.23	166.2	16	2,659	**4,584**	**48%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	790	27	224	0.12	95.2	16	1,524	**2,399**	**84%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	140	30	224	0.13	18.8	16	300	**650**	**21%**	**C/D or better**
Zone 4	1,050	5	**5,250**	225	1	7	1,575	735	49	224	0.22	160.8	16	2,573	**4,148**	**79%**	**C/D or better**
Zone 5	330	5	**1,650**	75	1	7	525	65	21	224	0.09	6.1	16	98	**623**	**38%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	515	42	224	0.19	96.6	16	1,545	**2,245**	**55%**	**C/D or better**
Zone 7	770	5	**3,850**	100	1	7	700	75	33	224	0.15	11.0	16	177	**877**	**23%**	**C/D or better**
Zone 8	1,155	5	**5,775**	125	1	7	875	435	29	224	0.13	56.3	16	901	**1,776**	**31%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

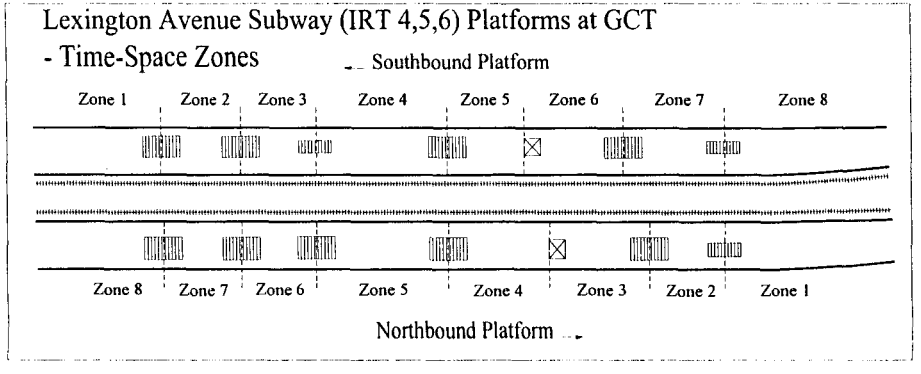

Table M - 26
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	375	1	7	2,625	1,195	37	224	0.17	197.4	16	3,158	**5,783**	**35%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	165	26	224	0.12	19.2	16	306	**831**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	975	40	224	0.18	174.1	16	2,786	**3,836**	**30%**	**C/D or better**
Zone 4	835	15	**12,525**	375	1	7	2,625	195	35	224	0.16	30.5	16	488	**3,113**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	1,200	1	5	6,000	1,975	49	211	0.23	458.6	13.5	6,192	**12,192**	**84%**	**Mid-D**
Zone 6	575	15	**8,625**	225	1	7	1,575	445	30	224	0.13	59.6	16	954	**2,529**	**29%**	**C/D or better**
Zone 7	550	15	**8,250**	225	1	7	1,575	590	29	224	0.13	76.4	16	1,222	**2,797**	**34%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	630	48	224	0.21	135.0	16	2,160	**4,260**	**13%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	825	1	7	5,775	2,035	51	224	0.23	463.3	16	7,413	**13,188**	**46%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	2,040	27	224	0.12	245.9	16	3,934	**6,559**	**77%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	425	30	224	0.13	56.9	16	911	**1,961**	**21%**	**C/D or better**
Zone 4	1,050	15	**15,750**	675	1	7	4,725	1,815	49	224	0.22	397.0	16	6,353	**11,078**	**70%**	**C/D or better**
Zone 5	330	15	**4,950**	225	1	7	1,575	205	21	224	0.09	19.2	16	308	**1,883**	**38%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	1,485	42	224	0.19	278.4	16	4,455	**6,555**	**54%**	**C/D or better**
Zone 7	770	15	**11,550**	300	1	7	2,100	240	33	224	0.15	35.4	16	566	**2,666**	**23%**	**C/D or better**
Zone 8	1,155	15	**17,325**	375	1	7	2,625	1,095	29	224	0.13	141.8	16	2,268	**4,893**	**28%**	**C/D or better**

NOTES:

(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

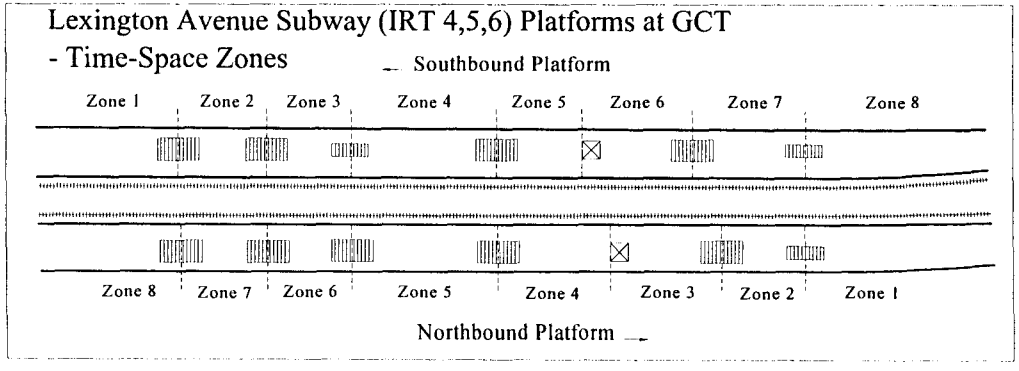

Table M - 26
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (pcd)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	200	1	7	1,400	530	37	224	0.17	87.5	16	1,401	**2,801**	**50%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	55	26	224	0.12	6.4	16	102	**452**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	125	1	7	875	455	40	224	0.18	81.3	16	1,300	**2,175**	**50%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	125	35	224	0.16	19.5	16	313	**1,013**	**24%**	**C/D or better**
Zone 5	970	5	**4,850**	250	1	7	1,750	815	49	224	0.22	178.3	16	2,853	**4,603**	**95%**	**C/D - Mid-D**
Zone 6	575	5	**2,875**	100	1	7	700	140	30	224	0.13	18.8	16	300	**1,000**	**35%**	**C/D or better**
Zone 7	550	5	**2,750**	125	1	7	875	440	29	224	0.13	57.0	16	911	**1,786**	**65%**	**C/D or better**
Zone 8	2,165	5	**10,825**	550	1	7	3,850	485	48	224	0.21	103.9	16	1,663	**5,513**	**51%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	350	1	7	2,450	330	51	224	0.23	75.1	16	1,202	**3,652**	**38%**	**C/D or better**
Zone 2	570	5	**2,850**	150	1	7	1,050	485	27	224	0.12	58.5	16	935	**1,985**	**70%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	125	30	224	0.13	16.7	16	268	**793**	**26%**	**C/D or better**
Zone 4	1,050	5	**5,250**	125	1	7	875	355	49	224	0.22	77.7	16	1,243	**2,118**	**40%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	110	21	224	0.09	10.3	16	165	**515**	**31%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	285	42	224	0.19	53.4	16	855	**1,555**	**38%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	65	33	224	0.15	9.6	16	153	**1,028**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	200	1	7	1,400	325	29	224	0.13	42.1	16	673	**2,073**	**36%**	**C/D or better**

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

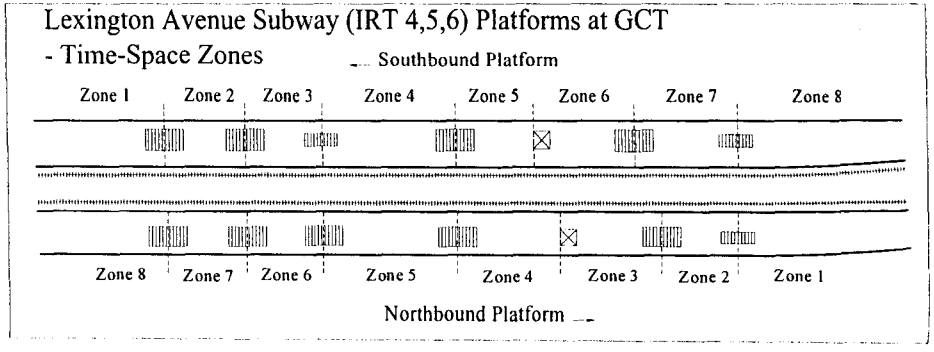

Table M - 26
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	600	1	7	4,200	1,095	37	224	0.17	180.9	16	2,894	**7,094**	**42%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	180	26	224	0.12	20.9	16	334	**1,384**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	375	1	7	2,625	1,195	40	224	0.18	213.4	16	3,414	**6,039**	**47%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	375	35	224	0.16	58.6	16	938	**3,038**	**24%**	**C/D or better**
Zone 5	970	15	**14,550**	750	1	7	5,250	2,190	49	224	0.22	479.1	16	7,665	**12,915**	**89%**	**C/D or better**
Zone 6	575	15	**8,625**	300	1	7	2,100	410	30	224	0.13	54.9	16	879	**2,979**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	375	1	7	2,625	1,195	29	224	0.13	154.7	16	2,475	**5,100**	**62%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,650	1	7	11,550	1,155	48	224	0.21	247.5	16	3,960	**15,510**	**48%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	1,050	1	7	7,350	875	51	224	0.23	199.2	16	3,188	**10,538**	**37%**	**C/D or better**
Zone 2	570	15	**8,550**	450	1	7	3,150	1,365	27	224	0.12	164.5	16	2,633	**5,783**	**68%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	390	30	224	0.13	52.2	16	836	**2,411**	**26%**	**C/D or better**
Zone 4	1,050	15	**15,750**	375	1	7	2,625	985	49	224	0.22	215.5	16	3,448	**6,073**	**39%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	325	21	224	0.09	30.5	16	488	**1,538**	**31%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	770	42	224	0.19	144.4	16	2,310	**4,410**	**36%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	210	33	224	0.15	30.9	16	495	**3,120**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	600	1	7	4,200	880	29	224	0.13	113.9	16	1,823	**6,023**	**35%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

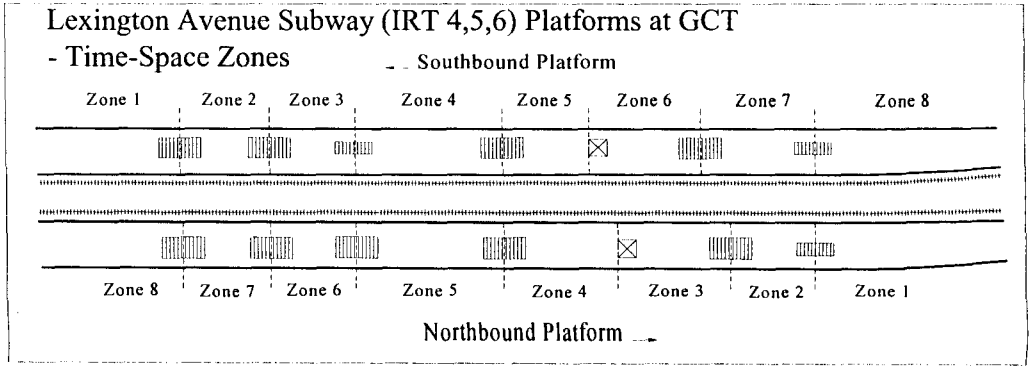

TABLE M-27

2020 BUILD
SUBWAY PLATFORM
TIME-SPACE ANALYSES

Table M - 27
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	150	1	7	1,050	480	37	224	0.17	79.3	16	1,269	**2,319**	**42%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	60	26	224	0.12	7.0	16	111	**286**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	400	40	224	0.18	71.4	16	1,143	**1,493**	**35%**	**C/D or better**
Zone 4	835	5	**4,175**	150	1	7	1,050	65	35	224	0.16	10.2	16	163	**1,213**	**29%**	**C/D or better**
Zone 5	970	5	**4,850**	450	1	5	2,250	745	49	211	0.23	173.0	13.5	2,336	**4,586**	**95%**	**Mid-D - D/E**
Zone 6	575	5	**2,875**	100	1	7	700	160	30	224	0.13	21.4	16	343	**1,043**	**36%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	230	29	224	0.13	29.8	16	476	**1,176**	**43%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	235	48	224	0.21	50.4	16	806	**1,506**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	325	1	7	2,275	790	51	224	0.23	179.9	16	2,878	**5,153**	**54%**	**C/D or better**
Zone 2	570	5	**2,850**	150	1	7	1,050	840	27	224	0.12	101.3	16	1,620	**2,670**	**94%**	**C/D - Mid-D**
Zone 3	610	5	**3,050**	50	1	7	350	155	30	224	0.13	20.8	16	332	**682**	**22%**	**C/D or better**
Zone 4	1,050	5	**5,250**	275	1	7	1,925	785	49	224	0.22	171.7	16	2,748	**4,673**	**89%**	**C/D or better**
Zone 5	330	5	**1,650**	100	1	7	700	75	21	224	0.09	7.0	16	113	**813**	**49%**	**C/D or better**
Zone 6	810	5	**4,050**	125	1	7	875	555	42	224	0.19	104.1	16	1,665	**2,540**	**63%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	85	33	224	0.15	12.5	16	200	**1,075**	**28%**	**C/D or better**
Zone 8	1,155	5	**5,775**	150	1	7	1,050	470	29	224	0.13	60.8	16	974	**2,024**	**35%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

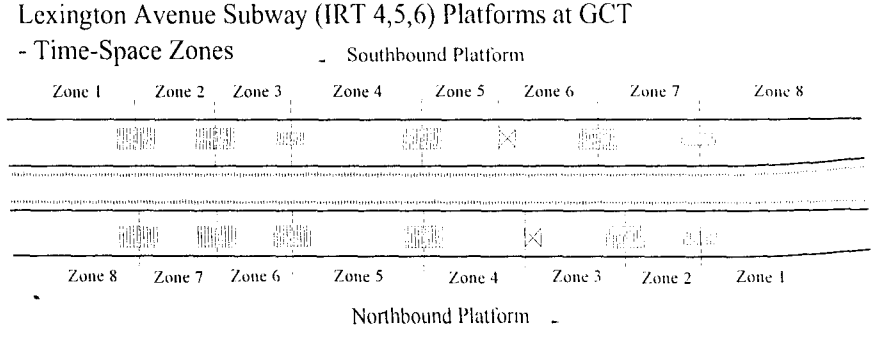

Table M - 27
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	450	1	7	3,150	1,260	37	224	0.17	208.1	16	3,330	**6,480**	**39%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	180	26	224	0.12	20.9	16	334	**859**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	1,030	40	224	0.18	183.9	16	2,943	**3,993**	**31%**	**C/D or better**
Zone 4	835	15	**12,525**	450	1	7	3,150	205	35	224	0.16	32.0	16	513	**3,663**	**29%**	**C/D or better**
Zone 5	970	15	**14,550**	1,350	1	5	6,750	2,125	49	211	0.23	493.5	13.5	6,662	**13,412**	**92%**	**Mid-D - D/E**
Zone 6	575	15	**8,625**	300	1	7	2,100	470	30	224	0.13	62.9	16	1,007	**3,107**	**36%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	645	29	224	0.13	83.5	16	1,336	**3,436**	**42%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	670	48	224	0.21	143.6	16	2,297	**4,397**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	975	1	7	6,825	2,070	51	224	0.23	471.3	16	7,541	**14,366**	**50%**	**C/D or better**
Zone 2	570	15	**8,550**	450	1	7	3,150	2,215	27	224	0.12	267.0	16	4,272	**7,422**	**87%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	465	30	224	0.13	62.3	16	996	**2,046**	**22%**	**C/D or better**
Zone 4	1,050	15	**15,750**	825	1	7	5,775	1,950	49	224	0.22	426.6	16	6,825	**12,600**	**80%**	**C/D or better**
Zone 5	330	15	**4,950**	300	1	7	2,100	225	21	224	0.09	21.1	16	338	**2,438**	**49%**	**C/D or better**
Zone 6	810	15	**12,150**	375	1	7	2,625	1,585	42	224	0.19	297.2	16	4,755	**7,380**	**61%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	255	33	224	0.15	37.6	16	601	**3,226**	**28%**	**C/D or better**
Zone 8	1,155	15	**17,325**	450	1	7	3,150	1,165	29	224	0.13	150.8	16	2,413	**5,563**	**32%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

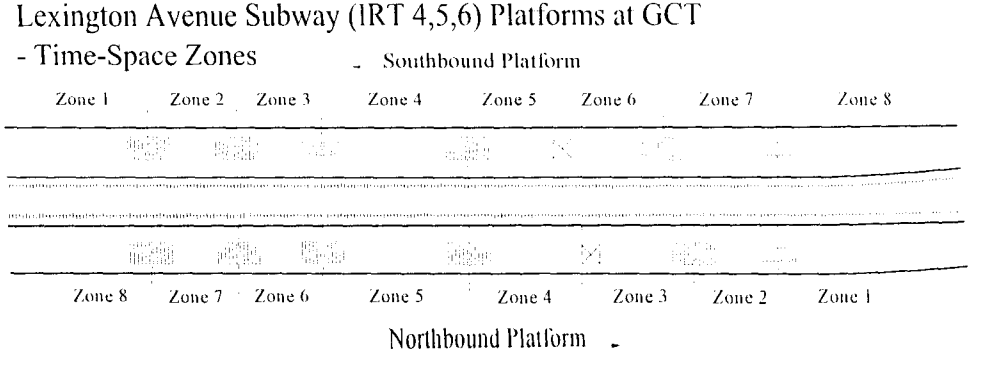

Table M - 27
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	225	1	7	1,575	535	37	224	0.17	88.4	16	1,414	**2,989**	**54%**	C/D or better
Zone 2	580	5	**2,899**	50	1	7	350	60	26	224	0.12	7.0	16	111	**461**	**16%**	C/D or better
Zone 3	865	5	**4,325**	125	1	7	875	490	40	224	0.18	87.5	16	1,400	**2,275**	**53%**	C/D or better
Zone 4	835	5	**4,175**	100	1	7	700	130	35	224	0.16	20.3	16	325	**1,025**	**25%**	C/D or better
Zone 5	970	5	**4,850**	300	1	5	1,500	865	49	211	0.23	200.9	13.5	2,712	**4,212**	**87%**	Mid-D *
Zone 6	575	5	**2,875**	100	1	7	700	140	30	224	0.13	18.8	16	300	**1,000**	**35%**	C/D or better
Zone 7	550	5	**2,750**	125	1	7	875	480	29	224	0.13	62.1	16	994	**1,869**	**68%**	C/D or better
Zone 8	2,165	5	**10,825**	575	1	7	4,025	515	48	224	0.21	110.4	16	1,766	**5,791**	**53%**	C/D or better
Southbound IRT Platform																	
Zone 1	1,920	5	**9,600**	350	1	7	2,450	345	51	224	0.23	78.5	16	1,257	**3,707**	**39%**	C/D or better
Zone 2	570	5	**2,850**	150	1	7	1,050	500	27	224	0.12	60.3	16	964	**2,014**	**71%**	C/D or better
Zone 3	610	5	**3,050**	75	1	7	525	135	30	224	0.13	18.1	16	289	**814**	**27%**	C/D or better
Zone 4	1,050	5	**5,250**	125	1	7	875	380	49	224	0.22	83.1	16	1,330	**2,205**	**42%**	C/D or better
Zone 5	330	5	**1,650**	50	1	7	350	115	21	224	0.09	10.8	16	173	**523**	**32%**	C/D or better
Zone 6	810	5	**4,050**	100	1	7	700	305	42	224	0.19	57.2	16	915	**1,615**	**40%**	C/D or better
Zone 7	770	5	**3,850**	125	1	7	875	70	33	224	0.15	10.3	16	165	**1,040**	**27%**	C/D or better
Zone 8	1,155	5	**5,775**	225	1	7	1,575	340	29	224	0.13	44.0	16	704	**2,279**	**39%**	C/D or better

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

" * " Significant Impacts

Lexington Avenue Subway (IRT 4,5,6) Platforms at GCT
- Time-Space Zones

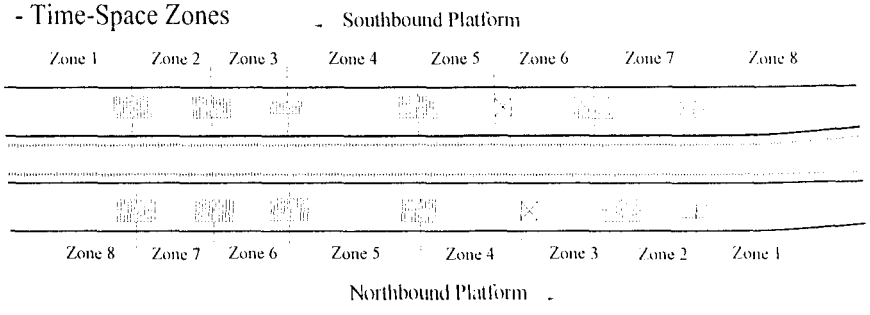

Table M - 27
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	675	1	7	4,725	1,170	37	224	0.17	193.3	16	3,092	**7,817**	**47%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	185	26	224	0.12	21.5	16	344	**1,394**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	375	1	7	2,625	1,290	40	224	0.18	230.4	16	3,686	**6,311**	**49%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	400	35	224	0.16	62.5	16	1,000	**3,100**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	900	1	5	4,500	2,325	49	211	0.23	539.9	13.5	7,289	**11,789**	**81%**	**Mid-D**
Zone 6	575	15	**8,625**	300	1	7	2,100	435	30	224	0.13	58.3	16	932	**3,032**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	375	1	7	2,625	1,260	29	224	0.13	163.1	16	2,610	**5,235**	**63%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,725	1	7	12,075	1,225	48	224	0.21	262.5	16	4,200	**16,275**	**50%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	1,920	15	**28,800**	1,050	1	7	7,350	930	51	224	0.23	211.7	16	3,388	**10,738**	**37%**	**C/D or better**
Zone 2	570	15	**8,550**	450	1	7	3,150	1,450	27	224	0.12	174.8	16	2,796	**5,946**	**70%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	415	30	224	0.13	55.6	16	889	**2,464**	**27%**	**C/D or better**
Zone 4	1,050	15	**15,750**	375	1	7	2,625	1,060	49	224	0.22	231.9	16	3,710	**6,335**	**40%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	350	21	224	0.09	32.8	16	525	**1,575**	**32%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	815	42	224	0.19	152.8	16	2,445	**4,545**	**37%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	215	33	224	0.15	31.7	16	507	**3,132**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	675	1	7	4,725	920	29	224	0.13	119.1	16	1,906	**6,631**	**38%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

Lexington Avenue Subway (IRT 4,5,6) Platforms at GCT
- Time-Space Zones

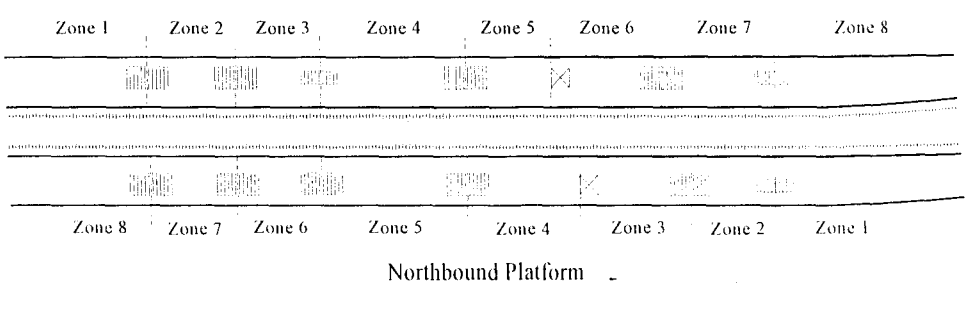

TABLE M-28

2010 MITIGATED BUILD SUBWAY PLATFORM TIME-SPACE ANALYSES

Table M - 28
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	150	1	7	1,050	515	37	224	0.17	85.1	16	1,361	**2,411**	**43%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	55	26	224	0.12	6.4	16	102	**277**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	310	40	224	0.18	55.4	16	886	**1,236**	**29%**	**C/D or better**
Zone 4	835	5	**4,175**	125	1	7	875	60	35	224	0.16	9.4	16	150	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	400	1	5	2,000	695	49	211	0.23	161.4	13.5	2,179	**4,179**	**86%**	**Mid-D**
Zone 6	575	5	**2,875**	75	1	7	525	145	30	224	0.13	19.4	16	311	**836**	**29%**	**C/D or better**
Zone 7	550	5	**2,750**	75	1	7	525	220	29	224	0.13	28.5	16	456	**981**	**36%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	240	48	224	0.21	51.4	16	823	**1,523**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	325	1	7	2,275	870	51	224	0.23	198.1	16	3,169	**5,444**	**39%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	715	27	224	0.12	86.2	16	1,379	**2,254**	**79%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	140	30	224	0.13	18.8	16	300	**650**	**21%**	**C/D or better**
Zone 4	1,050	5	**5,250**	200	1	7	1,400	680	49	224	0.22	148.8	16	2,380	**3,780**	**72%**	**C/D or better**
Zone 5	330	5	**1,650**	75	1	7	525	65	21	224	0.09	6.1	16	98	**623**	**38%**	**C/D or better**
Zone 6	810	5	**4,050**	75	1	7	525	430	42	224	0.19	80.6	16	1,290	**1,815**	**45%**	**C/D or better**
Zone 7	770	5	**3,850**	100	1	7	700	75	33	224	0.15	11.0	16	177	**877**	**23%**	**C/D or better**
Zone 8	1,155	5	**5,775**	150	1	7	1,050	505	29	224	0.13	65.4	16	1,046	**2,096**	**36%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

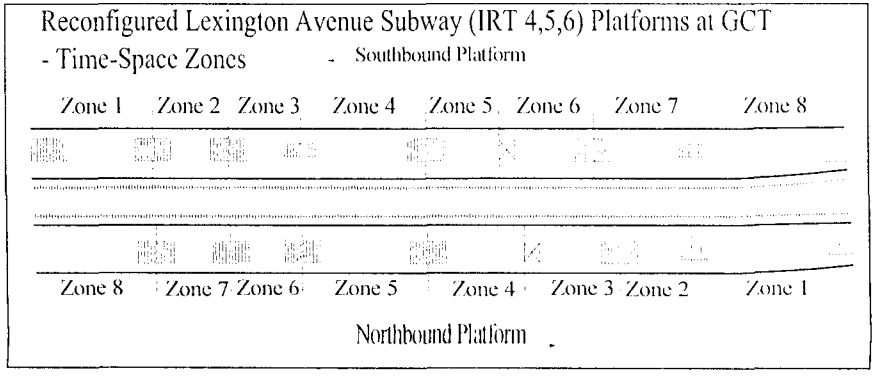

Table M - 28
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	225	1	7	1,575	1,310	37	224	0.17	216.4	16	3,462	**5,037**	**30%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	165	26	224	0.12	19.2	16	306	**831**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	825	40	224	0.18	147.3	16	2,357	**3,407**	**26%**	**C/D or better**
Zone 4	835	15	**12,525**	375	1	7	2,625	195	35	224	0.16	30.5	16	488	**3,113**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	1,200	1	5	6,000	1,975	49	211	0.23	458.6	13.5	6,192	**12,192**	**84%**	**Mid-D**
Zone 6	575	15	**8,625**	225	1	7	1,575	445	30	224	0.13	59.6	16	954	**2,529**	**29%**	**C/D or better**
Zone 7	550	15	**8,250**	225	1	7	1,575	590	29	224	0.13	76.4	16	1,222	**2,797**	**34%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	630	48	224	0.21	135.0	16	2,160	**4,260**	**13%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	975	1	7	6,825	2,470	51	224	0.23	562.4	16	8,998	**15,823**	**37%**	**C/D or better**
Zone 2	570	15	**8,550**	300	1	7	2,100	1,825	27	224	0.12	220.0	16	3,520	**5,620**	**66%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	425	30	224	0.13	56.9	16	911	**1,961**	**21%**	**C/D or better**
Zone 4	1,050	15	**15,750**	600	1	7	4,200	1,665	49	224	0.22	364.2	16	5,828	**10,028**	**64%**	**C/D or better**
Zone 5	330	15	**4,950**	225	1	7	1,575	205	21	224	0.09	19.2	16	308	**1,883**	**38%**	**C/D or better**
Zone 6	810	15	**12,150**	225	1	7	1,575	1,200	42	224	0.19	225.0	16	3,600	**5,175**	**43%**	**C/D or better**
Zone 7	770	15	**11,550**	300	1	7	2,100	240	33	224	0.15	35.4	16	566	**2,666**	**23%**	**C/D or better**
Zone 8	1,155	15	**17,325**	300	1	7	2,100	1,325	29	224	0.13	171.5	16	2,745	**4,845**	**28%**	**C/D or better**

NOTES:

(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

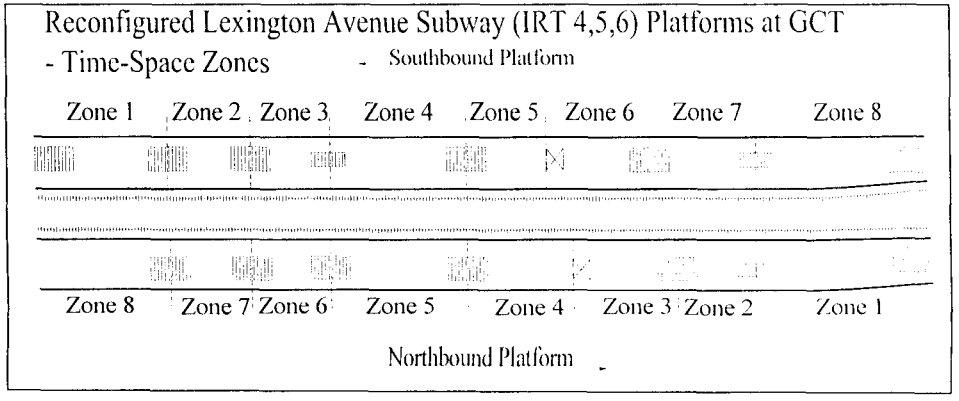

Table M - 28
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	225	1	7	1,575	560	37	224	0.17	92.5	16	1,480	**3,055**	**55%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	55	26	224	0.12	6.4	16	102	**452**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	100	1	7	700	365	40	224	0.18	65.2	16	1,043	**1,743**	**40%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	125	35	224	0.16	19.5	16	313	**1,013**	**24%**	**C/D or better**
Zone 5	970	5	**4,850**	250	1	7	1,750	815	49	224	0.22	178.3	16	2,853	**4,603**	**95%**	**C/D - Mid-D**
Zone 6	575	5	**2,875**	100	1	7	700	140	30	224	0.13	18.8	16	300	**1,000**	**35%**	**C/D or better**
Zone 7	550	5	**2,750**	125	1	7	875	440	29	224	0.13	57.0	16	911	**1,786**	**65%**	**C/D or better**
Zone 8	2,165	5	**10,825**	550	1	7	3,850	485	48	224	0.21	103.9	16	1,663	**5,513**	**51%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	450	1	7	3,150	410	51	224	0.23	93.3	16	1,494	**4,644**	**33%**	**C/D or better**
Zone 2	570	5	**2,850**	150	1	7	1,050	460	27	224	0.12	55.4	16	887	**1,937**	**68%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	125	30	224	0.13	16.7	16	268	**793**	**26%**	**C/D or better**
Zone 4	1,050	5	**5,250**	100	1	7	700	320	49	224	0.22	70.0	16	1,120	**1,820**	**35%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	110	21	224	0.09	10.3	16	165	**515**	**31%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	250	42	224	0.19	46.9	16	750	**1,450**	**36%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	65	33	224	0.15	9.6	16	153	**1,028**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	200	1	7	1,400	340	29	224	0.13	44.0	16	704	**2,104**	**36%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

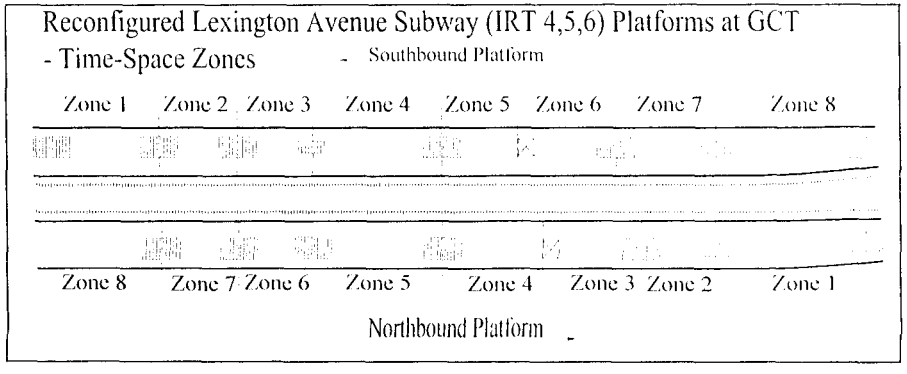

Table M - 28
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	750	1	7	5,250	1,270	37	224	0.17	209.8	16	3,356	**8,606**	**51%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	180	26	224	0.12	20.9	16	334	**1,384**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	300	1	7	2,100	940	40	224	0.18	167.9	16	2,686	**4,786**	**37%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	375	35	224	0.16	58.6	16	938	**3,038**	**24%**	**C/D or better**
Zone 5	970	15	**14,550**	750	1	7	5,250	2,190	49	224	0.22	479.1	16	7,665	**12,915**	**89%**	**C/D or better**
Zone 6	575	15	**8,625**	300	1	7	2,100	410	30	224	0.13	54.9	16	879	**2,979**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	375	1	7	2,625	1,195	29	224	0.13	154.7	16	2,475	**5,100**	**62%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,650	1	7	11,550	1,155	48	224	0.21	247.5	16	3,960	**15,510**	**48%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	1,350	1	7	9,450	1,115	51	224	0.23	253.9	16	4,062	**13,512**	**32%**	**C/D or better**
Zone 2	570	15	**8,550**	450	1	7	3,150	1,275	27	224	0.12	153.7	16	2,459	**5,609**	**66%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	390	30	224	0.13	52.2	16	836	**2,411**	**26%**	**C/D or better**
Zone 4	1,050	15	**15,750**	300	1	7	2,100	885	49	224	0.22	193.6	16	3,098	**5,198**	**33%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	325	21	224	0.09	30.5	16	488	**1,538**	**31%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	685	42	224	0.19	128.4	16	2,055	**4,155**	**34%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	210	33	224	0.15	30.9	16	495	**3,120**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	675	1	7	4,725	935	29	224	0.13	121.0	16	1,937	**6,662**	**38%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

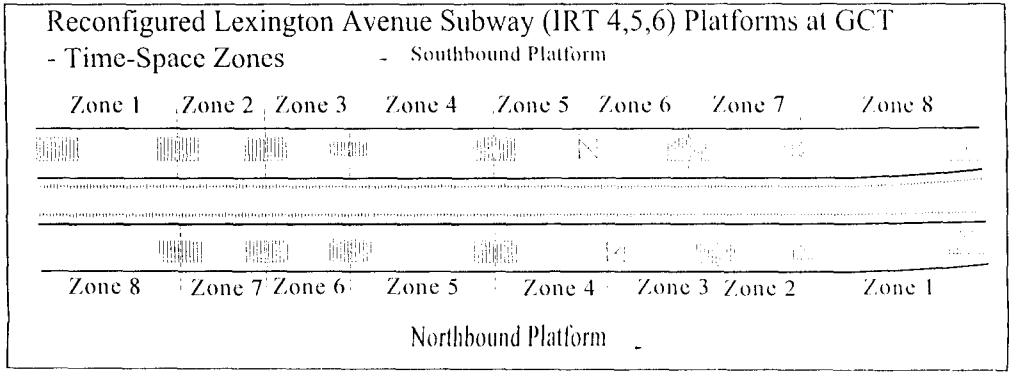

TABLE M-29

2020 MITIGATED BUILD SUBWAY PLATFORM TIME-SPACE ANALYSES

Table M - 29
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	175	1	7	1,225	535	37	224	0.17	88.4	16	1,414	**2,639**	**47%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	60	26	224	0.12	7.0	16	111	**286**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	330	40	224	0.18	58.9	16	943	**1,293**	**30%**	**C/D or better**
Zone 4	835	5	**4,175**	150	1	7	1,050	65	35	224	0.16	10.2	16	163	**1,213**	**29%**	**C/D or better**
Zone 5	970	5	**4,850**	450	1	5	2,250	745	49	211	0.23	173.0	13.5	2,336	**4,586**	**95%**	**Mid-D - D/E**
Zone 6	575	5	**2,875**	100	1	7	700	160	30	224	0.13	21.4	16	343	**1,043**	**36%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	230	29	224	0.13	29.8	16	476	**1,176**	**43%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	235	48	224	0.21	50.4	16	806	**1,506**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	375	1	7	2,625	930	51	224	0.23	211.7	16	3,388	**6,013**	**43%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	770	27	224	0.12	92.8	16	1,485	**2,360**	**83%**	**C/D or better**
Zone 3	610	5	**3,050**	50	1	7	350	155	30	224	0.13	20.8	16	332	**682**	**22%**	**C/D or better**
Zone 4	1,050	5	**5,250**	250	1	7	1,750	725	49	224	0.22	158.6	16	2,538	**4,288**	**82%**	**C/D or better**
Zone 5	330	5	**1,650**	100	1	7	700	75	21	224	0.09	7.0	16	113	**813**	**49%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	465	42	224	0.19	87.2	16	1,395	**2,095**	**52%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	85	33	224	0.15	12.5	16	200	**1,075**	**28%**	**C/D or better**
Zone 8	1,155	5	**5,775**	175	1	7	1,225	545	29	224	0.13	70.6	16	1,129	**2,354**	**41%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

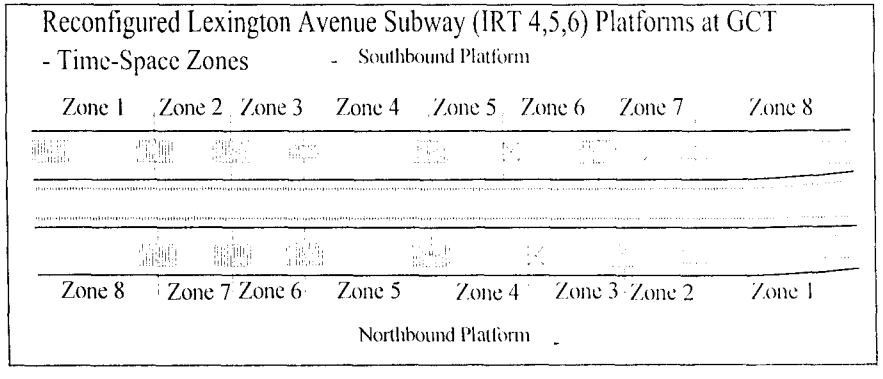

Table M - 29
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	525	1	7	3,675	1,385	37	224	0.17	228.8	16	3,660	**7,335**	**44%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	180	26	224	0.12	20.9	16	334	**859**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	870	40	224	0.18	155.4	16	2,486	**3,536**	**27%**	**C/D or better**
Zone 4	835	15	**12,525**	450	1	7	3,150	205	35	224	0.16	32.0	16	513	**3,663**	**29%**	**C/D or better**
Zone 5	970	15	**14,550**	1,350	1	5	6,750	2,125	49	211	0.23	493.5	13.5	6,662	**13,412**	**92%**	**Mid-D - D/E**
Zone 6	575	15	**8,625**	300	1	7	2,100	470	30	224	0.13	62.9	16	1,007	**3,107**	**36%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	645	29	224	0.13	83.5	16	1,336	**3,436**	**42%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	670	48	224	0.21	143.6	16	2,297	**4,397**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	1,200	1	7	8,400	2,490	51	224	0.23	566.9	16	9,071	**17,471**	**41%**	**C/D or better**
Zone 2	570	15	**8,550**	375	1	7	2,625	1,990	27	224	0.12	239.9	16	3,838	**6,463**	**76%**	**C/D or better**
Zone 3	610	15	**9,150**	150	1	7	1,050	465	30	224	0.13	62.3	16	996	**2,046**	**22%**	**C/D or better**
Zone 4	1,050	15	**15,750**	750	1	7	5,250	1,795	49	224	0.22	392.7	16	6,283	**11,533**	**73%**	**C/D or better**
Zone 5	330	15	**4,950**	300	1	7	2,100	225	21	224	0.09	21.1	16	338	**2,438**	**49%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	1,285	42	224	0.19	240.9	16	3,855	**5,955**	**49%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	255	33	224	0.15	37.6	16	601	**3,226**	**28%**	**C/D or better**
Zone 8	1,155	15	**17,325**	525	1	7	3,675	1,425	29	224	0.13	184.5	16	2,952	**6,627**	**38%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

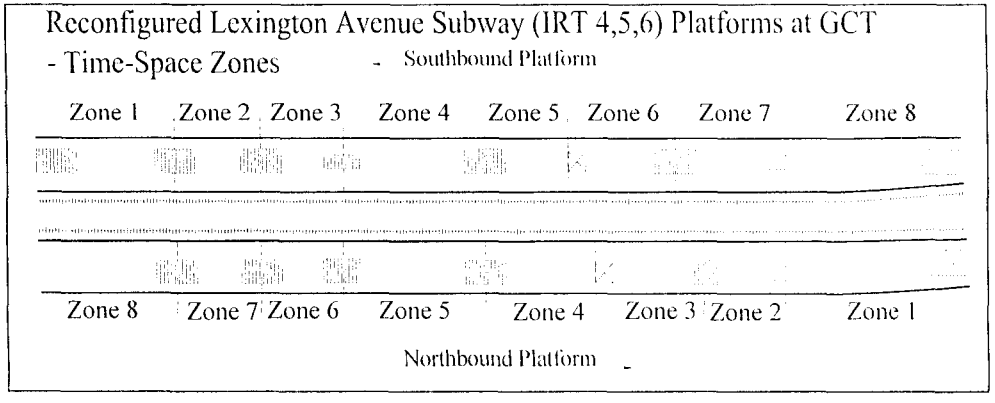

Table M - 29
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	250	1	7	1,750	610	37	224	0.17	100.8	16	1,612	**3,362**	60%	C/D or better
Zone 2	580	5	**2,899**	50	1	7	350	60	26	224	0.12	7.0	16	111	**461**	16%	C/D or better
Zone 3	865	5	**4,325**	100	1	7	700	390	40	224	0.18	69.6	16	1,114	**1,814**	42%	C/D or better
Zone 4	835	5	**4,175**	100	1	7	700	130	35	224	0.16	20.3	16	325	**1,025**	25%	C/D or better
Zone 5	970	5	**4,850**	300	1	5	1,500	865	49	211	0.23	200.9	13.5	2,712	**4,212**	87%	Mid-D
Zone 6	575	5	**2,875**	100	1	7	700	140	30	224	0.13	18.8	16	300	**1,000**	35%	C/D or better
Zone 7	550	5	**2,750**	125	1	7	875	480	29	224	0.13	62.1	16	994	**1,869**	68%	C/D or better
Zone 8	2,165	5	**10,825**	575	1	7	4,025	515	48	224	0.21	110.4	16	1,766	**5,791**	53%	C/D or better
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	450	1	7	3,150	425	51	224	0.23	96.8	16	1,548	**4,698**	33%	C/D or better
Zone 2	570	5	**2,850**	150	1	7	1,050	475	27	224	0.12	57.3	16	916	**1,966**	69%	C/D or better
Zone 3	610	5	**3,050**	75	1	7	525	135	30	224	0.13	18.1	16	289	**814**	27%	C/D or better
Zone 4	1,050	5	**5,250**	100	1	7	700	345	49	224	0.22	75.5	16	1,208	**1,908**	36%	C/D or better
Zone 5	330	5	**1,650**	50	1	7	350	115	21	224	0.09	10.8	16	173	**523**	32%	C/D or better
Zone 6	810	5	**4,050**	100	1	7	700	270	42	224	0.19	50.6	16	810	**1,510**	37%	C/D or better
Zone 7	770	5	**3,850**	125	1	7	875	70	33	224	0.15	10.3	16	165	**1,040**	27%	C/D or better
Zone 8	1,155	5	**5,775**	250	1	7	1,750	360	29	224	0.13	46.6	16	746	**2,496**	43%	C/D or better

NOTES:
(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

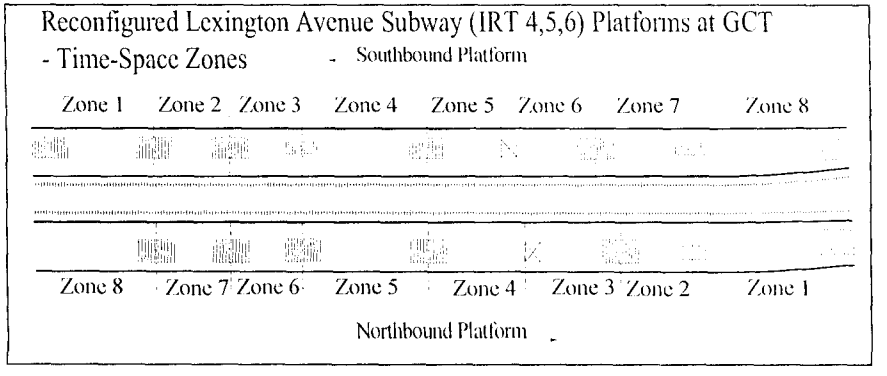

Table M - 29
EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	825	1	7	5,775	1,370	37	224	0.17	226.3	16	3,621	**9,396**	**56%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	185	26	224	0.12	21.5	16	344	**1,394**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	300	1	7	2,100	1,010	40	224	0.18	180.4	16	2,886	**4,986**	**38%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	400	35	224	0.16	62.5	16	1,000	**3,100**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	900	1	7	6,300	2,325	49	224	0.22	508.6	16	8,138	**14,438**	**99%**	**C/D - Mid-D**
Zone 6	575	15	**8,625**	300	1	7	2,100	435	30	224	0.13	58.3	16	932	**3,032**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	375	1	7	2,625	1,260	29	224	0.13	163.1	16	2,610	**5,235**	**63%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,725	1	7	12,075	1,225	48	224	0.21	262.5	16	4,200	**16,275**	**50%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	1,425	1	7	9,975	1,180	51	224	0.23	268.7	16	4,299	**14,274**	**34%**	**C/D or better**
Zone 2	570	15	**8,550**	450	1	7	3,150	1,355	27	224	0.12	163.3	16	2,613	**5,763**	**67%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	415	30	224	0.13	55.6	16	889	**2,464**	**27%**	**C/D or better**
Zone 4	1,050	15	**15,750**	300	1	7	2,100	955	49	224	0.22	208.9	16	3,343	**5,443**	**35%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	350	21	224	0.09	32.8	16	525	**1,575**	**32%**	**C/D or better**
Zone 6	810	15	**12,150**	225	1	7	1,575	725	42	224	0.19	135.9	16	2,175	**3,750**	**31%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	215	33	224	0.15	31.7	16	507	**3,132**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	750	1	7	5,250	980	29	224	0.13	126.9	16	2,030	**7,280**	**42%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

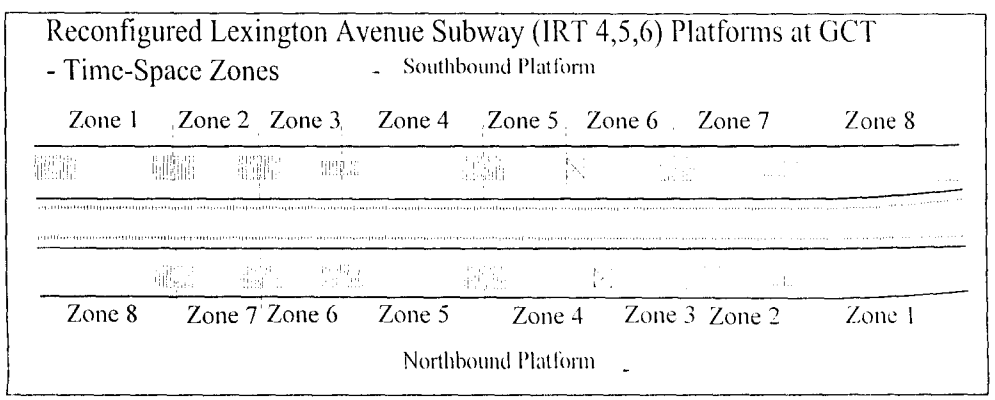

TABLE M-30

LIRR PLATFORM ANALYSES

Table M - 30
PLATFORM STAIRS ANALYSES
LIRR PLATFORMS 1 - 5 @ GRAND CENTRAL TERMINAL
2010 BUILD CONDITIONS 5 MINUTES WITHIN PEAK AM PERIOD

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax / min)		
48th Street Stair	285	0	285	6.0	5.5	0	55	1.04	D
47th Street Stair	280	0	280	6.0	5.5	0	55	1.02	D
45th Street Stair	80	0	80	6.0	5.5	0	55	0.29	A
45th Street Escalator	160	0	160	-	-	-	75	0.43	under capacity
43rd Street Stair to 43rd Street Underpass (Plat. 4 / 5)	115	0	115	6.0	5.5	0	55	0.42	A
43rd Street Esc. to Biltmore Room (Plat. 4 / 5)	135	0	135	-	-	-	75	0.36	under capacity
43rd Street Stair to Suburban Concourse (Plat. 1 / 2 / 3)	60	0	60	6.0	5.5	0	55	0.22	A
43rd Street Esc. to Suburban Concourse (Plat. 1 / 2 / 3)	125	0	125	-	-	-	75	0.33	under capacity

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min. signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Table M - 30
PLATFORM STAIRS ANALYSES
LIRR PLATFORMS 1 - 5 @ GRAND CENTRAL TERMINAL
2020 BUILD CONDITIONS 5 MINUTES WITHIN PEAK AM PERIOD

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax / min)		
48th Street Stair	300	0	300	6.0	5.5	0	55	1.09	D
47th Street Stair	295	0	295	6.0	5.5	0	55	1.07	D
45th Street Stair	85	0	85	6.0	5.5	0	55	0.31	A
45th Street Escalator	170	0	170	-	-	-	75	0.45	under capacity
43rd Street Stair to 43rd Street Underpass (Plat. 4 / 5)	120	0	120	6.0	5.5	0	55	0.44	A
43rd Street Esc. to Biltmore Room (Plat. 4 / 5)	140	0	140	-	-	-	75	0.37	under capacity
43rd Street Stair to Suburban Concourse (Plat. 1 / 2 / 3)	65	0	65	6.0	5.5	0	55	0.24	A
43rd Street Esc. to Suburban Concourse (Plat. 1 / 2 / 3)	130	0	130	-	-	-	75	0.35	under capacity

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

TABLE M-31

GCT EXTERNAL / NEA ANALYSES

Table M - 31
TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS -- 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 50%
LIRR pax load (one 12-car train): 1,356
MNR pax load (one 10-car train): 1,130

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	AVAILABLE TIME - SPACE			QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	305	5.0	7.0	10,679	305	100	224	0.45	136.2	16.0	2,179	12,858	31%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	305	5.0	5.0	7,628	305	100	211	0.47	144.6	13.5	1,952	9,579	23%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	305	5.0	2.5	3,814	305	100	174	0.57	175.3	8.5	1,490	5,304	13%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	915	7.5	7.0	48,053	915	100	224	0.45	408.7	16.0	6,538	54,592	43%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	915	7.5	5.0	34,324	915	100	211	0.47	433.8	13.5	5,856	40,179	32%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	915	7.5	2.5	17,162	915	100	174	0.57	526.0	8.5	4,471	21,633	17%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	27.1%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	606	5.0	7.0	21,207	606	320	224	1.43	865.7	16.0	13,851	35,057	39%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	606	5.0	5.0	15,148	606	320	211	1.52	918.8	13.5	12,404	27,552	31%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	606	5.0	2.5	7,574	606	320	174	1.84	1,114.3	8.5	9,472	17,045	19%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	1,818	7.5	7.0	95,430	1,818	320	224	1.43	2,597.0	16.0	41,552	136,982	51%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	1,818	7.5	5.0	68,164	1,818	320	211	1.52	2,756.5	13.5	37,212	105,377	39%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	1,818	7.5	2.5	34,082	1,818	320	174	1.84	3,342.9	8.5	28,415	62,497	23%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	27.1%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	409	5.0	7.0	14,317	409	318	224	1.42	581.4	16.0	9,302	23,618	51%	OK
2	8,800	5.0	44,000	197	5.0	7.0	6,890	197	320	224	1.43	281.3	16.0	4,500	11,390	26%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	409	5.0	5.0	10,226	409	318	211	1.51	617.1	13.5	8,330	18,556	40%	OK
2	8,800	5.0	44,000	197	5.0	5.0	4,922	197	320	224	1.43	281.3	13.5	3,797	8,719	20%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	409	5.0	2.5	5,113	409	318	174	1.83	748.3	8.5	6,361	11,474	25%	OK
2	8,800	5.0	44,000	197	5.0	2.5	2,461	197	320	224	1.43	281.3	8.5	2,391	4,851	11%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	1,227	7.5	7.0	64,424	1,227	318	224	1.42	1,744.1	16.0	27,905	92,330	67%	OK
2	8,800	15.0	132,000	591	7.5	7.0	31,006	591	320	224	1.43	843.8	16.0	13,500	44,506	34%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	1,227	7.5	5.0	46,017	1,227	318	224	1.42	1,744.1	13.5	23,545	69,562	50%	OK
2	8,800	15.0	132,000	591	7.5	5.0	22,147	591	320	224	1.43	843.8	13.5	11,391	33,538	25%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	1,227	7.5	2.5	23,009	1,227	318	174	1.83	2,245.0	8.5	19,083	42,092	31%	OK
2	8,800	15.0	132,000	591	7.5	2.5	11,073	591	320	224	1.43	843.8	8.5	7,172	18,246	14%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	130	5.0	7.0	4,556	130	100	224	0.45	58.1	16.0	930	5,486	25%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	130	5.0	5.0	3,254	130	100	211	0.47	61.7	13.5	833	4,087	19%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	130	5.0	2.5	1,627	130	100	174	0.57	74.8	8.5	636	2,263	10%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	391	7.5	7.0	20,503	391	100	224	0.45	174.4	16.0	2,790	23,292	35%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	391	7.5	5.0	14,645	391	100	211	0.47	185.1	13.5	2,498	17,143	26%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	391	7.5	2.5	7,322	391	100	174	0.57	224.4	8.5	1,908	9,230	14%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

Table M - 31
TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS -- 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 75%
LIRR pax load (one 12-car train): 1,356
MNR pax load (one 10-car train): 1,130

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	458	5.0	7.0	16,018	458	100	224	0.45	204.3	16.0	3,269	19,287	46%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	458	5.0	5.0	11,441	458	100	211	0.47	216.9	13.5	2,928	14,369	34%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	458	5.0	2.5	5,721	458	100	174	0.57	263.0	8.5	2,236	7,956	19%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	1,373	7.5	7.0	72,080	1,373	100	224	0.45	613.0	16.0	9,808	81,888	65%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	1,373	7.5	5.0	51,486	1,373	100	211	0.47	650.6	13.5	8,783	60,269	48%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	1,373	7.5	2.5	25,743	1,373	100	174	0.57	789.1	8.5	6,707	32,450	26%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	27.1%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	909	5.0	7.0	31,810	909	320	224	1.43	1,298.5	16.0	20,776	52,586	58%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	909	5.0	5.0	22,721	909	320	211	1.52	1,378.2	13.5	18,606	41,328	46%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	909	5.0	2.5	11,361	909	320	174	1.84	1,671.5	8.5	14,207	25,568	28%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	2,727	7.5	7.0	143,145	2,727	320	224	1.43	3,895.5	16.0	62,327	205,473	76%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	2,727	7.5	5.0	102,247	2,727	320	211	1.52	4,134.7	13.5	55,818	158,065	59%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	2,727	7.5	2.5	51,123	2,727	320	174	1.84	5,014.4	8.5	42,622	93,746	35%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	27.1%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	614	5.0	7.0	21,475	614	318	224	1.42	872.0	16.0	13,953	35,427	77%	OK
2	8,800	5.0	44,000	295	5.0	7.0	10,335	295	320	224	1.43	421.9	16.0	6,750	17,085	39%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	614	5.0	5.0	15,339	614	318	211	1.51	925.6	13.5	12,495	27,835	61%	OK
2	8,800	5.0	44,000	295	5.0	5.0	7,382	295	320	224	1.43	421.9	13.5	5,695	13,078	30%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	614	5.0	2.5	7,670	614	318	174	1.83	1,122.5	8.5	9,541	17,211	37%	OK
2	8,800	5.0	44,000	295	5.0	2.5	3,691	295	320	224	1.43	421.9	8.5	3,586	7,277	17%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	1,841	7.5	7.0	96,637	1,841	318	224	1.42	2,616.1	16.0	41,858	138,494	100%	OK
2	8,800	15.0	132,000	886	7.5	7.0	46,509	886	320	224	1.43	1,265.7	16.0	20,250	66,759	51%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	1,841	7.5	5.0	69,026	1,841	318	224	1.42	2,616.1	13.5	35,317	104,344	76%	OK
2	8,800	15.0	132,000	886	7.5	5.0	33,220	886	320	224	1.43	1,265.7	13.5	17,086	50,307	38%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	1,841	7.5	2.5	34,513	1,841	318	174	1.83	3,367.6	8.5	28,624	63,137	46%	OK
2	8,800	15.0	132,000	886	7.5	2.5	16,610	886	320	224	1.43	1,265.7	8.5	10,758	27,368	21%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	195	5.0	7.0	6,834	195	100	224	0.45	87.2	16.0	1,395	8,229	37%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	195	5.0	5.0	4,882	195	100	211	0.47	92.5	13.5	1,249	6,131	28%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	195	5.0	2.5	2,441	195	100	174	0.57	112.2	8.5	954	3,395	15%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	586	7.5	7.0	30,754	586	100	224	0.45	261.5	16.0	4,185	34,939	53%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	586	7.5	5.0	21,967	586	100	211	0.47	277.6	13.5	3,748	25,715	39%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	586	7.5	2.5	10,984	586	100	174	0.57	336.7	8.5	2,862	13,845	21%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

Table M - 31
TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS -- 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 75%
LIRR pax load (one 12-car train): 1,254
MNR pax load (one 10-car train): 1,045

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sq ft)	Analysis Duration (1) (min)	Total Time - Space Available (sq ft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sq ft/ped)	Total Wait Time - Space (sq ft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sq ft/ped)	Total Walk Time - Space (sq ft-min) M * N	Total Time - Space Required (sq ft-min) H + O	Time-Space Required as % of Time-Space Available (sq ft-min) P / D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	423	5.0	7.0	14,816	423	100	224	0.45	189.0	16.0	3,024	17,840	42%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	423	5.0	5.0	10,583	423	100	211	0.47	200.6	13.5	2,708	13,291	32%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	423	5.0	2.5	5,292	423	100	174	0.57	243.3	8.5	2,068	7,360	18%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	1,270	7.5	7.0	66,674	1,270	100	224	0.45	567.0	16.0	9,072	75,746	60%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	1,270	7.5	5.0	47,624	1,270	100	211	0.47	601.8	13.5	8,125	55,749	44%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	1,270	7.5	2.5	23,812	1,270	100	174	0.57	729.9	8.5	6,204	30,016	24%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	40.0%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	1,043	5.0	7.0	36,503	1,043	320	224	1.43	1,490.1	16.0	23,841	60,344	67%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	1,043	5.0	5.0	26,074	1,043	320	211	1.52	1,581.6	13.5	21,351	47,425	53%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	1,043	5.0	2.5	13,037	1,043	320	174	1.84	1,918.1	8.5	16,304	29,340	33%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	3,129	7.5	7.0	164,265	3,129	320	224	1.43	4,470.2	16.0	71,523	235,788	87%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	3,129	7.5	5.0	117,332	3,129	320	211	1.52	4,744.7	13.5	64,054	181,386	67%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	3,129	7.5	2.5	58,666	3,129	320	174	1.84	5,754.2	8.5	48,911	107,577	40%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	40.0%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	640	5.0	7.0	22,392	640	318	224	1.42	909.3	16.0	14,549	36,941	80%	OK
2	8,800	5.0	44,000	403	5.0	7.0	14,111	403	320	224	1.43	576.0	16.0	9,216	23,327	53%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	640	5.0	5.0	15,995	640	318	211	1.51	965.1	13.5	13,029	29,024	63%	OK
2	8,800	5.0	44,000	403	5.0	5.0	10,079	403	320	224	1.43	576.0	13.5	7,776	17,855	41%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	640	5.0	2.5	7,997	640	318	174	1.83	1,170.5	8.5	9,949	17,946	39%	OK
2	8,800	5.0	44,000	403	5.0	2.5	5,040	403	320	224	1.43	576.0	8.5	4,896	9,936	23%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	1,919	7.5	7.0	100,766	1,919	318	224	1.42	2,727.9	16.0	43,646	144,412	105%	fails
2	8,800	15.0	132,000	1,210	7.5	7.0	63,499	1,210	320	224	1.43	1,728.0	16.0	27,648	91,147	69%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	1,919	7.5	5.0	71,976	1,919	318	224	1.42	2,727.9	13.5	36,826	108,802	79%	OK
2	8,800	15.0	132,000	1,210	7.5	5.0	45,356	1,210	320	224	1.43	1,728.0	13.5	23,328	68,685	52%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	1,919	7.5	2.5	35,988	1,919	318	174	1.83	3,511.5	8.5	29,847	65,835	48%	OK
2	8,800	15.0	132,000	1,210	7.5	2.5	22,678	1,210	320	224	1.43	1,728.0	8.5	14,688	37,366	28%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	181	5.0	7.0	6,322	181	100	224	0.45	80.6	16.0	1,290	7,612	35%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	181	5.0	5.0	4,515	181	100	211	0.47	85.6	13.5	1,156	5,671	26%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	181	5.0	2.5	2,258	181	100	174	0.57	103.8	8.5	882	3,140	14%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	542	7.5	7.0	28,448	542	100	224	0.45	241.9	16.0	3,871	32,318	49%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	542	7.5	5.0	20,320	542	100	211	0.47	256.8	13.5	3,467	23,786	36%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	542	7.5	2.5	10,160	542	100	174	0.57	311.4	8.5	2,647	12,807	19%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

Table M - 31

TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS – 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 50%
LIRR pax load (one 12-car train): 1,254
MNR pax load (one 10-car train): 1,045

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	282	5.0	7.0	9,878	282	100	224	0.45	126.0	16.0	2,016	11,894	28%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	282	5.0	5.0	7,055	282	100	211	0.47	133.7	13.5	1,805	8,861	21%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	282	5.0	2.5	3,528	282	100	174	0.57	162.2	8.5	1,379	4,906	12%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	847	7.5	7.0	44,449	847	100	224	0.45	378.0	16.0	6,048	50,497	40%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	847	7.5	5.0	31,749	847	100	211	0.47	401.2	13.5	5,416	37,166	29%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	847	7.5	2.5	15,875	847	100	174	0.57	486.6	8.5	4,136	20,011	16%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	40.0%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	695	5.0	7.0	24,336	695	320	224	1.43	993.4	16.0	15,894	40,230	45%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	695	5.0	5.0	17,383	695	320	211	1.52	1,054.4	13.5	14,234	31,617	35%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	695	5.0	2.5	8,691	695	320	174	1.84	1,278.7	8.5	10,869	19,560	22%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	2,086	7.5	7.0	109,510	2,086	320	224	1.43	2,980.1	16.0	47,682	157,192	58%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	2,086	7.5	5.0	78,221	2,086	320	211	1.52	3,163.2	13.5	42,703	120,924	45%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	2,086	7.5	2.5	39,111	2,086	320	174	1.84	3,836.1	8.5	32,607	71,718	27%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	40.0%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	427	5.0	7.0	14,928	427	318	224	1.42	606.2	16.0	9,699	24,627	54%	OK
2	8,800	5.0	44,000	269	5.0	7.0	9,407	269	320	224	1.43	384.0	16.0	6,144	15,551	35%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	427	5.0	5.0	10,663	427	318	211	1.51	643.4	13.5	8,686	19,349	42%	OK
2	8,800	5.0	44,000	269	5.0	5.0	6,719	269	320	224	1.43	384.0	13.5	5,184	11,904	27%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	427	5.0	2.5	5,332	427	318	174	1.83	780.3	8.5	6,633	11,964	26%	OK
2	8,800	5.0	44,000	269	5.0	2.5	3,360	269	320	224	1.43	384.0	8.5	3,264	6,624	15%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	1,280	7.5	7.0	67,177	1,280	318	224	1.42	1,818.6	16.0	29,097	96,275	70%	OK
2	8,800	15.0	132,000	806	7.5	7.0	42,333	806	320	224	1.43	1,152.0	16.0	18,432	60,765	46%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	1,280	7.5	5.0	47,984	1,280	318	224	1.42	1,818.6	13.5	24,551	72,535	53%	OK
2	8,800	15.0	132,000	806	7.5	5.0	30,238	806	320	224	1.43	1,152.0	13.5	15,552	45,790	35%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	1,280	7.5	2.5	23,992	1,280	318	174	1.83	2,341.0	8.5	19,898	43,890	32%	OK
2	8,800	15.0	132,000	806	7.5	2.5	15,119	806	320	224	1.43	1,152.0	8.5	9,792	24,911	19%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	120	5.0	7.0	4,214	120	100	224	0.45	53.8	16.0	860	5,075	23%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	120	5.0	5.0	3,010	120	100	211	0.47	57.1	13.5	770	3,781	17%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	120	5.0	2.5	1,505	120	100	174	0.57	69.2	8.5	588	2,093	10%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	361	7.5	7.0	18,965	361	100	224	0.45	161.3	16.0	2,581	21,546	33%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	361	7.5	5.0	13,546	361	100	211	0.47	171.2	13.5	2,311	15,857	24%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	361	7.5	2.5	6,773	361	100	174	0.57	207.6	8.5	1,765	8,538	13%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

Table M - 31
TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS – 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 25%
LIRR pax load (one 12-car train): 1,254
MNR pax load (one 10-car train): 1,045

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	141	5.0	7.0	4,939	141	100	224	0.45	63.0	16.0	1,008	5,947	14%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	141	5.0	5.0	3,528	141	100	211	0.47	66.9	13.5	903	4,430	11%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	141	5.0	2.5	1,764	141	100	174	0.57	81.1	8.5	689	2,453	6%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	423	7.5	7.0	22,225	423	100	224	0.45	189.0	16.0	3,024	25,249	20%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	423	7.5	5.0	15,875	423	100	211	0.47	200.6	13.5	2,708	18,583	15%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	423	7.5	2.5	7,937	423	100	174	0.57	243.3	8.5	2,068	10,005	8%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	40.0%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	348	5.0	7.0	12,168	348	320	224	1.43	496.7	16.0	7,947	20,115	22%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	348	5.0	5.0	8,691	348	320	211	1.52	527.2	13.5	7,117	15,808	18%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	348	5.0	2.5	4,346	348	320	174	1.84	639.4	8.5	5,435	9,780	11%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	1,043	7.5	7.0	54,755	1,043	320	224	1.43	1,490.1	16.0	23,841	78,596	29%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	1,043	7.5	5.0	39,111	1,043	320	211	1.52	1,581.6	13.5	21,351	60,462	22%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	1,043	7.5	2.5	19,555	1,043	320	174	1.84	1,918.1	8.5	16,304	35,859	13%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	40.0%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	213	5.0	7.0	7,464	213	318	224	1.42	303.1	16.0	4,850	12,314	27%	OK
2	8,800	5.0	44,000	134	5.0	7.0	4,704	134	320	224	1.43	192.0	16.0	3,072	7,776	18%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	213	5.0	5.0	5,332	213	318	211	1.51	321.7	13.5	4,343	9,675	21%	OK
2	8,800	5.0	44,000	134	5.0	5.0	3,360	134	320	224	1.43	192.0	13.5	2,592	5,952	14%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	213	5.0	2.5	2,666	213	318	174	1.83	390.2	8.5	3,316	5,982	13%	OK
2	8,800	5.0	44,000	134	5.0	2.5	1,680	134	320	224	1.43	192.0	8.5	1,632	3,312	8%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	640	7.5	7.0	33,589	640	318	224	1.42	909.3	16.0	14,549	48,137	35%	OK
2	8,800	15.0	132,000	403	7.5	7.0	21,166	403	320	224	1.43	576.0	16.0	9,216	30,382	23%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	640	7.5	5.0	23,992	640	318	224	1.42	909.3	13.5	12,275	36,267	26%	OK
2	8,800	15.0	132,000	403	7.5	5.0	15,119	403	320	224	1.43	576.0	13.5	7,776	22,895	17%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	640	7.5	2.5	11,996	640	318	174	1.83	1,170.5	8.5	9,949	21,945	16%	OK
2	8,800	15.0	132,000	403	7.5	2.5	7,559	403	320	224	1.43	576.0	8.5	4,896	12,455	9%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	60	5.0	7.0	2,107	60	100	224	0.45	26.9	16.0	430	2,537	12%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	60	5.0	5.0	1,505	60	100	211	0.47	28.5	13.5	385	1,890	9%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	60	5.0	2.5	753	60	100	174	0.57	34.6	8.5	294	1,047	5%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	181	7.5	7.0	9,483	181	100	224	0.45	80.6	16.0	1,290	10,773	16%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	181	7.5	5.0	6,773	181	100	211	0.47	85.6	13.5	1,156	7,929	12%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	181	7.5	2.5	3,387	181	100	174	0.57	103.8	8.5	882	4,269	6%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

Table M - 31
TIME-SPACE ANALYSES OF CROSSPASSAGEWAYS @ GRAND CENTRAL TERMINAL
FUTURE BUILD CONDITIONS -- 5/15-MINUTES DURING PM PEAK PERIOD

% waiting in xpassage: 25%
LIRR pax load (one 12-car train): 1,356
MNR pax load (one 10-car train): 1,130

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
48th Street Crosspassage (LIRR only)								% pax using :		22.5%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	5.0	42,000	153	5.0	7.0	5,339	153	100	224	0.45	68.1	16.0	1,090	6,429	15%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	5.0	42,000	153	5.0	5.0	3,814	153	100	211	0.47	72.3	13.5	976	4,790	11%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	5.0	42,000	153	5.0	2.5	1,907	153	100	174	0.57	87.7	8.5	745	2,652	6%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	8,400	15.0	126,000	458	7.5	7.0	24,027	458	100	224	0.45	204.3	16.0	3,269	27,296	22%	OK
Using LOS mid-D Analysis Criteria																	
1	8,400	15.0	126,000	458	7.5	5.0	17,162	458	100	211	0.47	216.9	13.5	2,928	20,090	16%	OK
Using LOS mid-E Analysis Criteria																	
1	8,400	15.0	126,000	458	7.5	2.5	8,581	458	100	174	0.57	263.0	8.5	2,236	10,817	9%	OK
47th Street Crosspassage (LIRR / MNR)								% LIRR / MNR pax using :		22.1%	27.1%						
5-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	5.0	90,000	303	5.0	7.0	10,603	303	320	224	1.43	432.8	16.0	6,925	17,529	19%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	5.0	90,000	303	5.0	5.0	7,574	303	320	211	1.52	459.4	13.5	6,202	13,776	15%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	5.0	90,000	303	5.0	2.5	3,787	303	320	174	1.84	557.2	8.5	4,736	8,523	9%	OK
15-minute Analysis Period with one time-space zone (the entire crosspassageway)																	
Using LOS C/D Analysis Criteria																	
1	18,000	15.0	270,000	909	7.5	7.0	47,715	909	320	224	1.43	1,298.5	16.0	20,776	68,491	25%	OK
Using LOS mid-D Analysis Criteria																	
1	18,000	15.0	270,000	909	7.5	5.0	34,082	909	320	211	1.52	1,378.2	13.5	18,606	52,688	20%	OK
Using LOS mid-E Analysis Criteria																	
1	18,000	15.0	270,000	909	7.5	2.5	17,041	909	320	174	1.84	1,671.5	8.5	14,207	31,249	12%	OK
5-minute Analysis Period w/ 2 time-space zones								% LIRR / MNR pax using :		22.1%	27.1%						
Using LOS C/D Analysis Criteria																	
1	9,200	5.0	46,000	205	5.0	7.0	7,158	205	318	224	1.42	290.7	16.0	4,651	11,809	26%	OK
2	8,800	5.0	44,000	98	5.0	7.0	3,445	98	320	224	1.43	140.6	16.0	2,250	5,695	13%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	5.0	46,000	205	5.0	5.0	5,113	205	318	211	1.51	308.5	13.5	4,165	9,278	20%	OK
2	8,800	5.0	44,000	98	5.0	5.0	2,461	98	320	224	1.43	140.6	13.5	1,898	4,359	10%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	5.0	46,000	205	5.0	2.5	2,557	205	318	174	1.83	374.2	8.5	3,180	5,737	12%	OK
2	8,800	5.0	44,000	98	5.0	2.5	1,230	98	320	224	1.43	140.6	8.5	1,195	2,426	6%	OK
15-minute Analysis Period w/ 2 time-space zones																	
Using LOS C/D Analysis Criteria																	
1	9,200	15.0	138,000	614	7.5	7.0	32,212	614	318	224	1.42	872.0	16.0	13,953	46,165	33%	OK
2	8,800	15.0	132,000	295	7.5	7.0	15,503	295	320	224	1.43	421.9	16.0	6,750	22,253	17%	OK
Using LOS mid-D Analysis Criteria																	
1	9,200	15.0	138,000	614	7.5	5.0	23,009	614	318	224	1.42	872.0	13.5	11,772	34,781	25%	OK
2	8,800	15.0	132,000	295	7.5	5.0	11,073	295	320	224	1.43	421.9	13.5	5,695	16,769	13%	OK
Using LOS mid-E Analysis Criteria																	
1	9,200	15.0	138,000	614	7.5	2.5	11,504	614	318	174	1.83	1,122.5	8.5	9,541	21,046	15%	OK
2	8,800	15.0	132,000	295	7.5	2.5	5,537	295	320	224	1.43	421.9	8.5	3,586	9,123	7%	OK
45th Street Crosspassage (LIRR only)								% pax using :		9.6%							
5-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	5.0	22,000	65	5.0	7.0	2,278	65	100	224	0.45	29.1	16.0	465	2,743	12%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	5.0	22,000	65	5.0	5.0	1,627	65	100	211	0.47	30.8	13.5	416	2,044	9%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	5.0	22,000	65	5.0	2.5	814	65	100	174	0.57	37.4	8.5	318	1,132	5%	OK
15-minute Analysis Period																	
Using LOS C/D Analysis Criteria																	
1	4,400	15.0	66,000	195	7.5	7.0	10,251	195	100	224	0.45	87.2	16.0	1,395	11,646	18%	OK
Using LOS mid-D Analysis Criteria																	
1	4,400	15.0	66,000	195	7.5	5.0	7,322	195	100	211	0.47	92.5	13.5	1,249	8,572	13%	OK
Using LOS mid-E Analysis Criteria																	
1	4,400	15.0	66,000	195	7.5	2.5	3,661	195	100	174	0.57	112.2	8.5	954	4,615	7%	OK

NOTES:
(1) Analysis period is the 5/15-minute period just before train doors open during peak PM period.
(2) Based on percentage of passengers arriving before the start of the analysis period.
(3) Average queue space of 7, 5, and 2.5 square feet per pedestrian signify LOS C/D, mid-D, and mid-E conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224, 211, and 174 feet per minute signify LOS C/D, mid-D, and mid-E conditions, respectively.
(6) Average walk space of 16, 13.5, and 8.5 square feet per pedestrian signify LOS C/D,mid-D, and mid-E conditions, respectively.

TABLE M-32

SUBWAY STAIRS ANALYSES OF P16 STAIRWELL

Table M-32

EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	70	85	155	11.0	10.0	10	90	0.34	A
1 (P12)	195	270	465	11.0	10.0	10	90	1.03	D
2 (P14)	135	395	530	11.0	10.0	20	80	1.33	D
2A (P16)	205	280	485	11.0	10.0	10	90	1.08	D
3 (P18)	230	240	470	11.0	10.0	10	90	1.04	D
4 (P20)	255	230	485	11.0	10.0	10	90	1.08	D
5 (P22)	245	160	405	6.5	5.5	10	50	1.64	E
6 (P23)	380	55	435	6.5	5.5	20	44	1.98	F
7 (P21)	295	35	330	11.0	10.0	20	80	0.83	C
8 (P19)	210	160	370	11.0	10.0	10	90	0.82	C
9 (P17)	115	175	290	11.0	10.0	10	90	0.64	B
10 (P15)	75	130	205	11.0	10.0	10	90	0.46	B
11 (P13)	175	50	225	11.0	10.0	20	80	0.56	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations

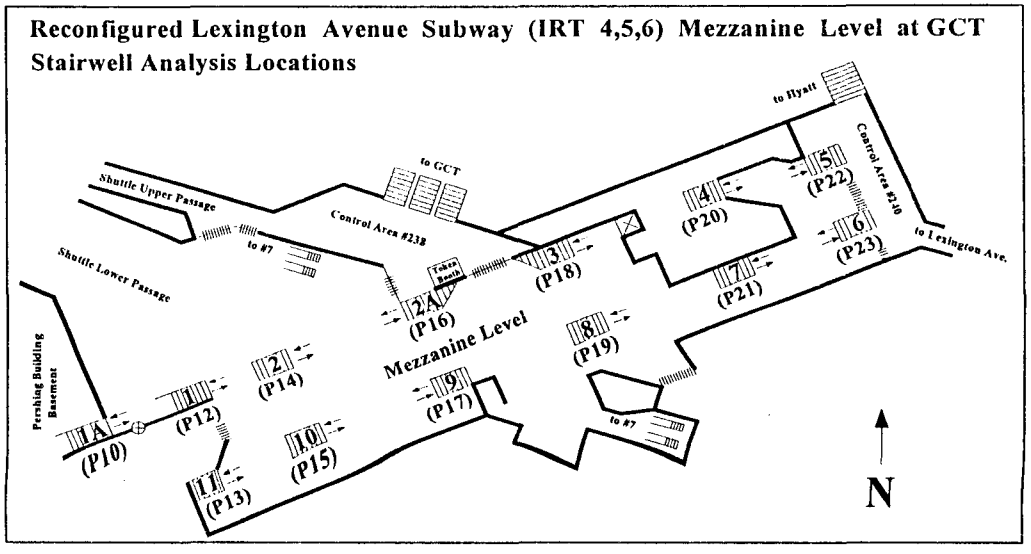

Table M-32

EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	200	245	445	11.0	10.0	10	90	0.33	A
1 (P12)	470	755	1,225	11.0	10.0	10	90	0.91	C
2 (P14)	335	1,020	1,355	11.0	10.0	20	80	1.13	D
2A (P16)	505	710	1,215	11.0	10.0	10	90	0.90	C
3 (P18)	525	575	1,100	11.0	10.0	10	90	0.81	C
4 (P20)	710	675	1,385	11.0	10.0	10	90	1.03	D
5 (P22)	595	400	995	6.5	5.5	10	50	1.34	E
6 (P23)	960	155	1,115	6.5	5.5	20	44	1.69	F
7 (P21)	725	90	815	11.0	10.0	20	80	0.68	B
8 (P19)	590	395	985	11.0	10.0	10	90	0.73	C
9 (P17)	315	485	800	11.0	10.0	10	90	0.59	B
10 (P15)	195	355	550	11.0	10.0	10	90	0.41	A
11 (P13)	475	90	565	11.0	10.0	20	80	0.47	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

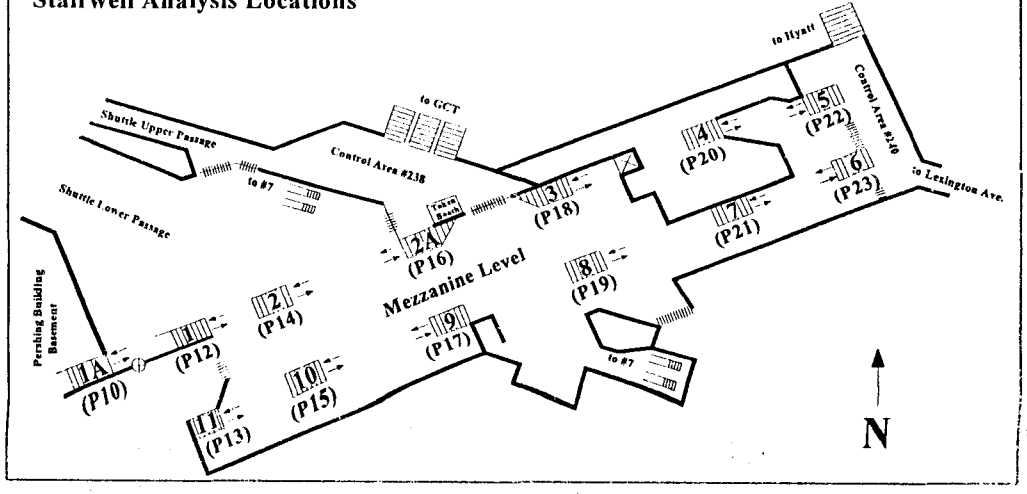

Table M-32

EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	45	30	75	11.0	10.0	10	90	0.17	A
1 (P12)	75	70	145	11.0	10.0	10	90	0.32	A
2 (P14)	60	245	305	11.0	10.0	20	80	0.76	C
2A (P16)	70	145	215	11.0	10.0	10	80	0.54	B
3 (P18)	95	80	175	11.0	10.0	10	90	0.39	A
4 (P20)	60	170	230	11.0	10.0	20	80	0.58	B
5 (P22)	45	260	305	6.5	5.5	20	44	1.39	E
6 (P23)	245	220	465	6.5	5.5	10	50	1.88	F
7 (P21)	245	120	365	11.0	10.0	20	80	0.91	C
8 (P19)	155	135	290	11.0	10.0	10	90	0.64	B
9 (P17)	245	195	440	11.0	10.0	10	90	0.98	C
10 (P15)	195	175	370	11.0	10.0	10	90	0.82	C
11 (P13)	240	210	450	11.0	10.0	10	90	1.00	D

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations

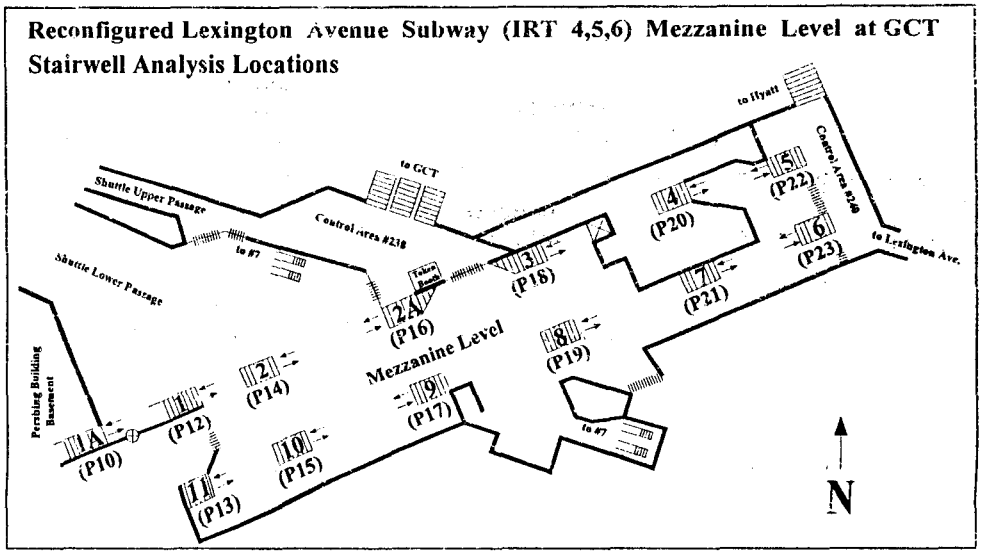

Table M-32

EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	125	100	225	11.0	10.0	10	90	0.17	A
1 (P12)	210	160	370	11.0	10.0	10	90	0.27	A
2 (P14)	160	685	845	11.0	10.0	20	80	0.70	C
2A (P16)	185	385	570	11.0	10.0	10	80	0.48	B
3 (P18)	245	230	475	11.0	10.0	10	90	0.35	A
4 (P20)	150	440	590	11.0	10.0	20	80	0.49	B
5 (P22)	90	715	805	6.5	5.5	20	44	1.22	D
6 (P23)	610	365	975	6.5	5.5	10	50	1.31	D
7 (P21)	635	285	920	11.0	10.0	20	80	0.77	C
8 (P19)	380	380	760	11.0	10.0	10	90	0.56	B
9 (P17)	605	550	1,155	11.0	10.0	10	90	0.86	C
10 (P15)	480	480	960	11.0	10.0	10	90	0.71	C
11 (P13)	545	495	1,040	11.0	10.0	10	90	0.77	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT Stairwell Analysis Locations

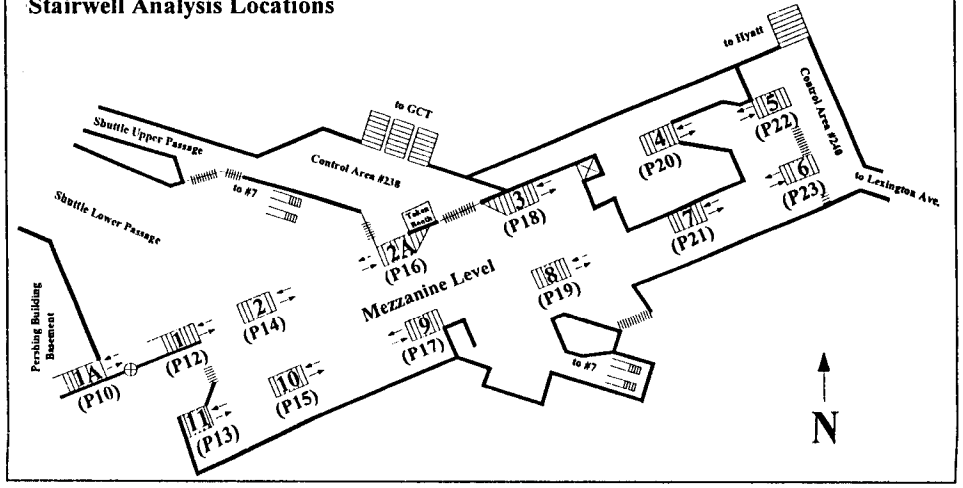

Table M-32

EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK AM 15-MINUTE PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	70	90	160	11.0	10.0	10	90	0.36	A
1 (P12)	215	295	510	11.0	10.0	10	90	1.13	D
2 (P14)	140	430	570	11.0	10.0	20	80	1.43	E
2A (P16)	215	310	525	11.0	10.0	10	90	1.17	D
3 (P18)	235	260	495	11.0	10.0	10	90	1.10	D
4 (P20)	270	260	530	11.0	10.0	10	90	1.18	D
5 (P22)	260	180	440	6.5	5.5	10	50	1.78	F
6 (P23)	395	60	455	6.5	5.5	20	44	2.07	F
7 (P21)	305	35	340	11.0	10.0	20	80	0.85	C
8 (P19)	220	175	395	11.0	10.0	10	90	0.88	C
9 (P17)	120	190	310	11.0	10.0	10	90	0.69	B
10 (P15)	70	150	220	11.0	10.0	20	80	0.55	B
11 (P13)	170	50	220	11.0	10.0	20	80	0.55	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

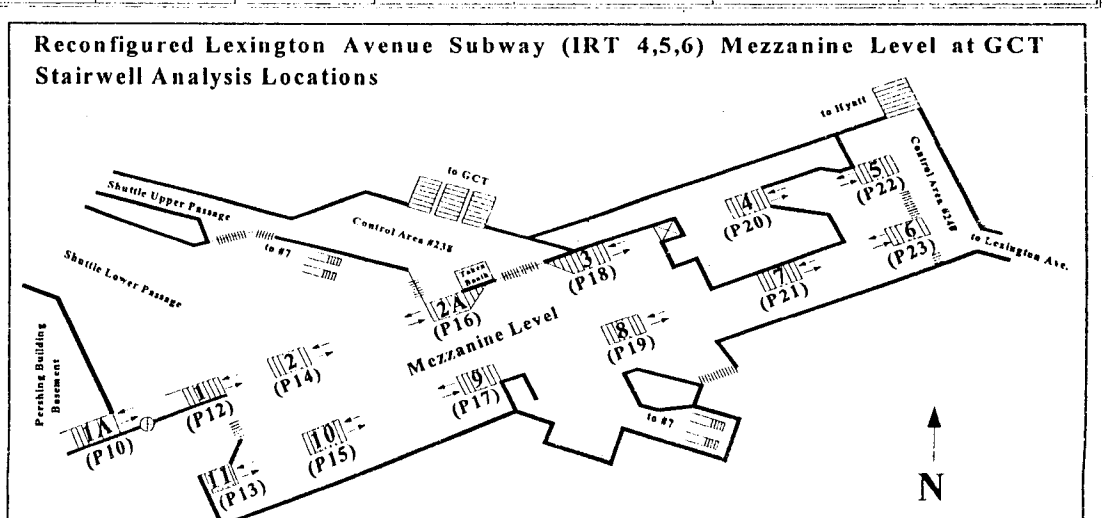

Table M-32

EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD (8:35 - 8:50)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	205	260	465	11.0	10.0	10	90	0.34	A
1 (P12)	495	810	1,305	11.0	10.0	10	90	0.97	C
2 (P14)	350	1,130	1,480	11.0	10.0	20	80	1.23	D
2A (P16)	530	790	1,320	11.0	10.0	10	90	0.98	C
3 (P18)	545	635	1,180	11.0	10.0	10	90	0.87	C
4 (P20)	740	745	1,485	11.0	10.0	10	90	1.10	D
5 (P22)	620	445	1,065	6.5	5.5	10	50	1.43	E
6 (P23)	1,005	170	1,175	6.5	5.5	20	44	1.78	F
7 (P21)	760	95	855	11.0	10.0	20	80	0.71	C
8 (P19)	625	430	1,055	11.0	10.0	10	90	0.78	C
9 (P17)	330	535	865	11.0	10.0	10	90	0.64	B
10 (P15)	200	390	590	11.0	10.0	10	90	0.44	A
11 (P13)	500	100	600	11.0	10.0	20	80	0.50	B

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

(2) V/C ratios < 0.45 signifies LOS A; < 0.7 signifies LOS B; < 1.00 signifies LOS C; <1.33 signifies LOS D; < 1.67 signifies LOS E; > 1.67 signifies LOS F.

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

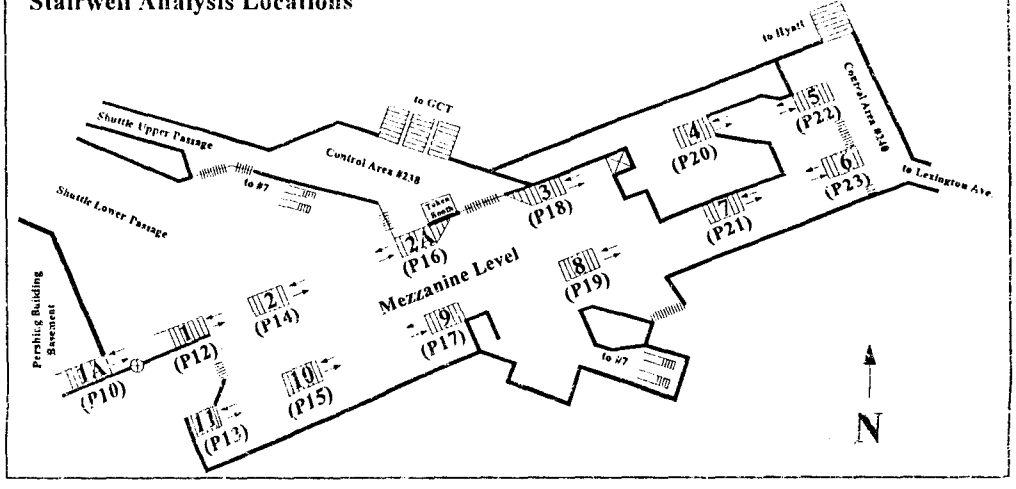

Table M-32

EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS PEAK 5 MINUTES WITHIN PEAK PM 15-MINUTE PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)	
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)			
1A (P10)	45	35	80	11.0	10.0	10	90	0.18	A	
1 (P12)	90	70	160	11.0	10.0	10	90	0.36	A	
2 (P14)	65	255	320	11.0	10.0	20	80	0.80	C	
2A (P16)	75	145	220	11.0	10.0	10	90	0.49	B	
3 (P18)	105	85	190	11.0	10.0	10	90	0.42	A	
4 (P20)	65	180	245	11.0	10.0	20	80	0.61	B	
5 (P22)	45	270	315	6.5	5.5	20	44	1.43	E	
6 (P23)	270	230	500	6.5	5.5	10	50	2.02	F	
7 (P21)	275	125	400	11.0	10.0	20	80	1.00	D	
8 (P19)	175	145	320	11.0	10.0	10	90	0.71	C	
9 (P17)	260	200	460	11.0	10.0	10	90	1.02	D	*
10 (P15)	220	185	405	11.0	10.0	10	90	0.90	C	
11 (P13)	260	220	480	11.0	10.0	10	90	1.07	D	*

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

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"*" Unmitigated Impact

Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

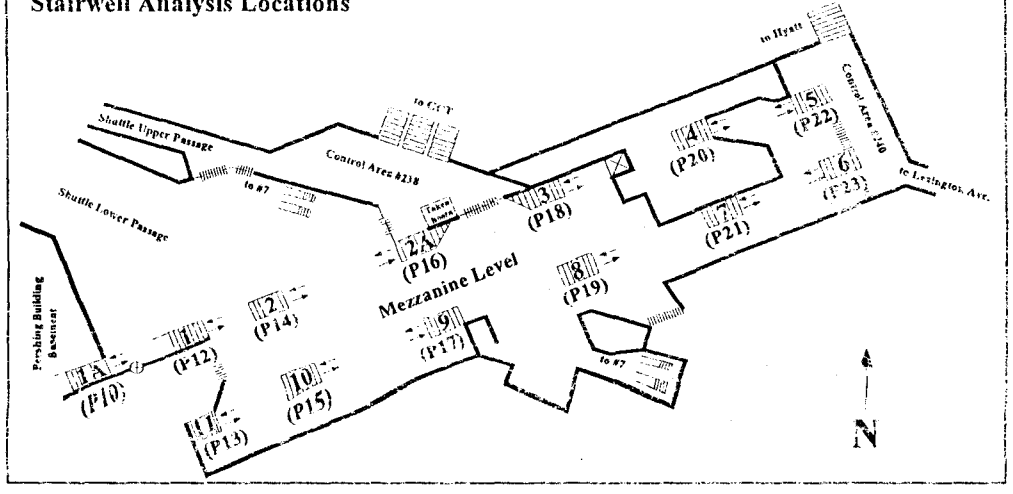

Table M-32

EIS SUBWAY STAIRS ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD (5:10 - 5:25)

PEDESTRIAN CIRCULATION ELEMENT	PEDESTRIAN VOLUME (pax)			WIDTH (ft)		MAXIMUM PROCESSING RATE (1)		V/C	LOS (2)
STAIRWELL NUMBER	UP	DOWN	TOTAL	GROSS	EFFECTIVE	% REDUCTION	(pax/min)		
1A (P10)	135	105	240	11.0	10.0	10	90	0.18	A
1 (P12)	225	160	385	11.0	10.0	10	90	0.29	A
2 (P14)	175	715	890	11.0	10.0	20	80	0.74	C
2A (P16)	200	400	600	11.0	10.0	10	80	0.50	B
3 (P18)	270	245	515	11.0	10.0	10	90	0.38	A
4 (P20)	165	465	630	11.0	10.0	20	80	0.53	B
5 (P22)	95	750	845	6.5	5.5	20	44	1.28	D
6 (P23)	675	385	1,060	6.5	5.5	10	50	1.43	E
7 (P21)	695	305	1,000	11.0	10.0	20	80	0.83	C
8 (P19)	410	400	810	11.0	10.0	10	90	0.60	B
9 (P17)	660	570	1,230	11.0	10.0	10	90	0.91	C
10 (P15)	515	500	1,015	11.0	10.0	10	90	0.75	C
11 (P13)	585	515	1,100	11.0	10.0	10	90	0.81	C

NOTES:

(1) Based on an average unit (effective) width flow rate of 10 pax/ft/min, signifying LOS C/D threshold. Also adjusted for pedestrian flow in opposing directions: Capacity reduction factors of 0%, 10%, and 20% applied for 100%, 50-66%, and 67-99% pedestrian flow in one direction, respectively.

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Reconfigured Lexington Avenue Subway (IRT 4,5,6) Mezzanine Level at GCT
Stairwell Analysis Locations

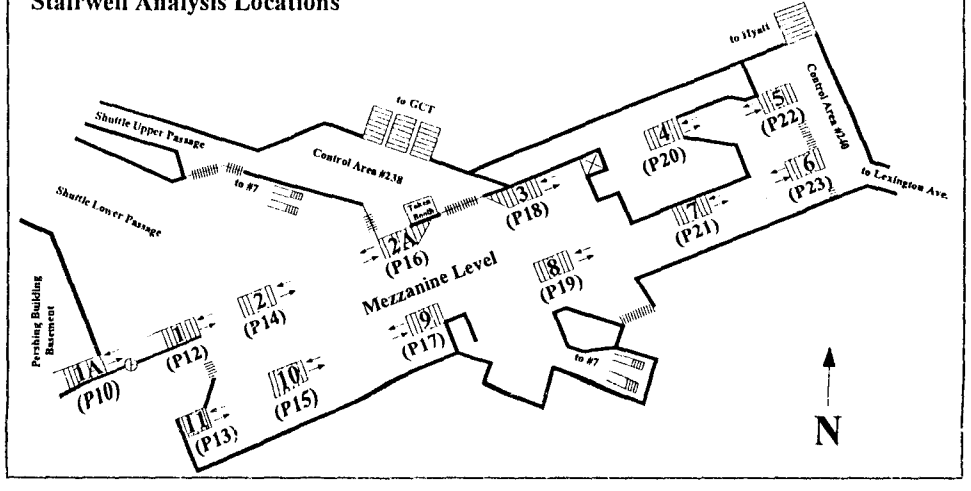


Table M-32

EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	150	1	7	1,050	515	37	224	0.17	85.1	16	1,361	**2,411**	**43%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	55	26	224	0.12	6.4	16	102	**277**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	310	40	224	0.18	55.4	16	886	**1,236**	**29%**	**C/D or better**
Zone 4	835	5	**4,175**	125	1	7	875	60	35	224	0.16	9.4	16	150	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	400	1	5	2,000	695	49	211	0.23	161.4	13.5	2,179	**4,179**	**86%**	**Mid-D**
Zone 6	575	5	**2,875**	75	1	7	525	145	30	224	0.13	19.4	16	311	**836**	**29%**	**C/D or better**
Zone 7	550	5	**2,750**	75	1	7	525	220	29	224	0.13	28.5	16	456	**981**	**36%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	240	48	224	0.21	51.4	16	823	**1,523**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	225	1	7	1,575	710	51	224	0.23	161.7	16	2,586	**4,161**	**30%**	**C/D or better**
Zone 2	570	5	**2,850**	100	1	7	700	540	27	224	0.12	65.1	16	1,041	**1,741**	**61%**	**C/D or better**
Zone 3	610	5	**3,050**	150	1	7	1,050	140	30	224	0.13	18.8	16	300	**1,350**	**44%**	**C/D or better**
Zone 4	1,050	5	**5,250**	225	1	7	1,575	1,040	49	224	0.22	227.5	16	3,640	**5,215**	**99%**	**C/D - Mid-D**
Zone 5	330	5	**1,650**	75	1	7	525	65	21	224	0.09	6.1	16	98	**623**	**38%**	**C/D or better**
Zone 6	810	5	**4,050**	75	1	7	525	430	42	224	0.19	80.6	16	1,290	**1,815**	**45%**	**C/D or better**
Zone 7	770	5	**3,850**	100	1	7	700	75	33	224	0.15	11.0	16	177	**877**	**23%**	**C/D or better**
Zone 8	1,155	5	**5,775**	150	1	7	1,050	505	29	224	0.13	65.4	16	1,046	**2,096**	**36%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

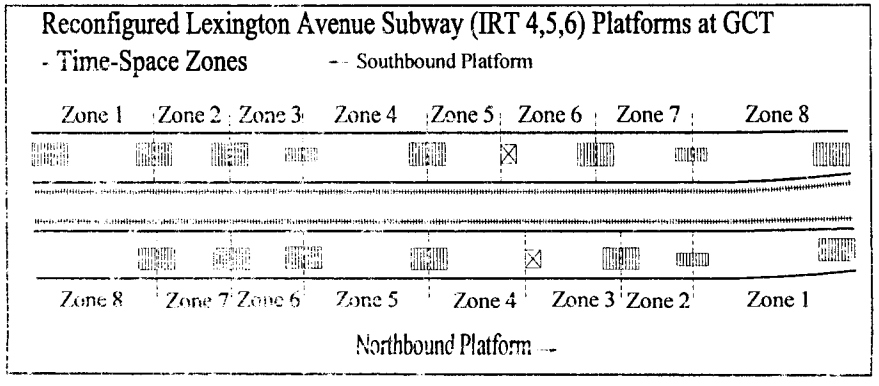


Table M-32

EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	225	1	7	1,575	1,310	37	224	0.17	216.4	16	3,462	**5,037**	**30%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	165	26	224	0.12	19.2	16	306	**831**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	825	40	224	0.18	147.3	16	2,357	**3,407**	**26%**	**C/D or better**
Zone 4	835	15	**12,525**	375	1	7	2,625	195	35	224	0.16	30.5	16	488	**3,113**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	1,200	1	5	6,000	1,975	49	211	0.23	458.6	13.5	6,192	**12,192**	**84%**	**Mid-D**
Zone 6	575	15	**8,625**	225	1	7	1,575	445	30	224	0.13	59.6	16	954	**2,529**	**29%**	**C/D or better**
Zone 7	550	15	**8,250**	225	1	7	1,575	590	29	224	0.13	76.4	16	1,222	**2,797**	**34%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	630	48	224	0.21	135.0	16	2,160	**4,260**	**13%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	825	1	7	5,775	2,050	51	224	0.23	466.7	16	7,468	**13,243**	**31%**	**C/D or better**
Zone 2	570	15	**8,550**	300	1	7	2,100	1,405	27	224	0.12	169.4	16	2,710	**4,810**	**56%**	**C/D or better**
Zone 3	610	15	**9,150**	450	1	7	3,150	425	30	224	0.13	56.9	16	911	**4,061**	**44%**	**C/D or better**
Zone 4	1,050	15	**15,750**	675	1	7	4,725	2,605	49	224	0.22	569.8	16	9,118	**13,843**	**88%**	**C/D or better**
Zone 5	330	15	**4,950**	225	1	7	1,575	205	21	224	0.09	19.2	16	308	**1,883**	**38%**	**C/D or better**
Zone 6	810	15	**12,150**	225	1	7	1,575	1,200	42	224	0.19	225.0	16	3,600	**5,175**	**43%**	**C/D or better**
Zone 7	770	15	**11,550**	300	1	7	2,100	240	33	224	0.15	35.4	16	566	**2,666**	**23%**	**C/D or better**
Zone 8	1,155	15	**17,325**	300	1	7	2,100	1,325	29	224	0.13	171.5	16	2,745	**4,845**	**28%**	**C/D or better**

NOTES:

(1) Analysis period is the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

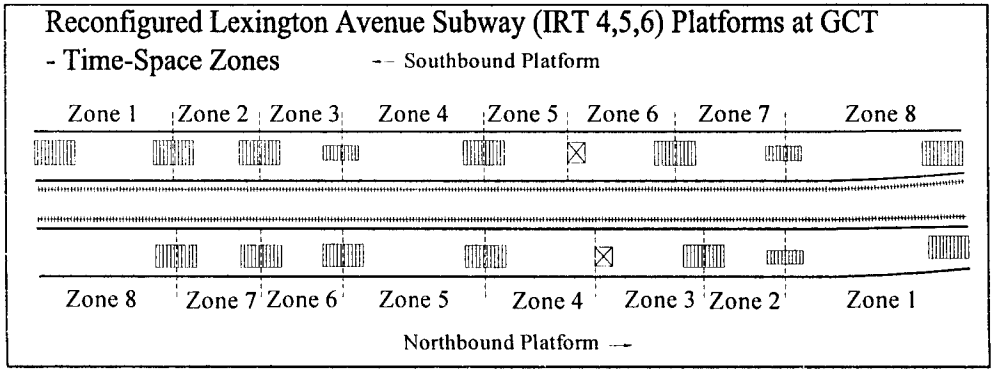


Table M-32

EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	225	1	7	1,575	560	37	224	0.17	92.5	16	1,480	**3,055**	**55%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	55	26	224	0.12	6.4	16	102	**452**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	100	1	7	700	365	40	224	0.18	65.2	16	1,043	**1,743**	**40%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	125	35	224	0.16	19.5	16	313	**1,013**	**24%**	**C/D or better**
Zone 5	970	5	**4,850**	250	1	7	1,750	815	49	224	0.22	178.3	16	2,853	**4,603**	**95%**	**C/D - Mid-D**
Zone 6	575	5	**2,875**	100	1	7	700	140	30	224	0.13	18.8	16	300	**1,000**	**35%**	**C/D or better**
Zone 7	550	5	**2,750**	125	1	7	875	440	29	224	0.13	57.0	16	911	**1,786**	**65%**	**C/D or better**
Zone 8	2,165	5	**10,825**	550	1	7	3,850	485	48	224	0.21	103.9	16	1,663	**5,513**	**51%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	375	1	7	2,625	345	51	224	0.23	78.5	16	1,257	**3,882**	**28%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	315	27	224	0.12	38.0	16	608	**1,483**	**52%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	125	30	224	0.13	16.7	16	268	**793**	**26%**	**C/D or better**
Zone 4	1,050	5	**5,250**	175	1	7	1,225	515	49	224	0.22	112.7	16	1,803	**3,028**	**58%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	110	21	224	0.09	10.3	16	165	**515**	**31%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	250	42	224	0.19	46.9	16	750	**1,450**	**36%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	65	33	224	0.15	9.6	16	153	**1,028**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	200	1	7	1,400	340	29	224	0.13	44.0	16	704	**2,104**	**36%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

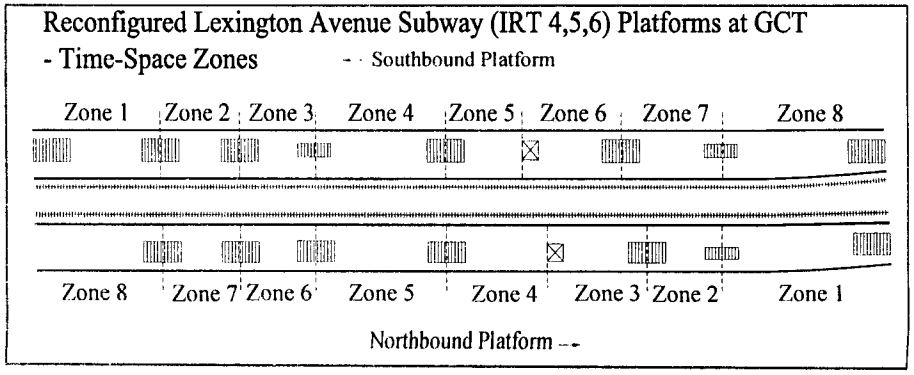


Table M-32

EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2010 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	750	1	7	5,250	1,270	37	224	0.17	209.8	16	3,356	**8,606**	**51%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	180	26	224	0.12	20.9	16	334	**1,384**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	300	1	7	2,100	940	40	224	0.18	167.9	16	2,686	**4,786**	**37%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	375	35	224	0.16	58.6	16	938	**3,038**	**24%**	**C/D or better**
Zone 5	970	15	**14,550**	750	1	7	5,250	2,190	49	224	0.22	479.1	16	7,665	**12,915**	**89%**	**C/D or better**
Zone 6	575	15	**8,625**	300	1	7	2,100	410	30	224	0.13	54.9	16	879	**2,979**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	375	1	7	2,625	1,195	29	224	0.13	154.7	16	2,475	**5,100**	**62%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,650	1	7	11,550	1,155	48	224	0.21	247.5	16	3,960	**15,510**	**48%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	1,200	1	7	8,400	960	51	224	0.23	218.6	16	3,497	**11,897**	**28%**	**C/D or better**
Zone 2	570	15	**8,550**	300	1	7	2,100	1,010	27	224	0.12	121.7	16	1,948	**4,048**	**47%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	390	30	224	0.13	52.2	16	836	**2,411**	**26%**	**C/D or better**
Zone 4	1,050	15	**15,750**	525	1	7	3,675	1,405	49	224	0.22	307.3	16	4,918	**8,593**	**55%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	325	21	224	0.09	30.5	16	488	**1,538**	**31%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	685	42	224	0.19	128.4	16	2,055	**4,155**	**34%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	210	33	224	0.15	30.9	16	495	**3,120**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	675	1	7	4,725	935	29	224	0.13	121.0	16	1,937	**6,662**	**38%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

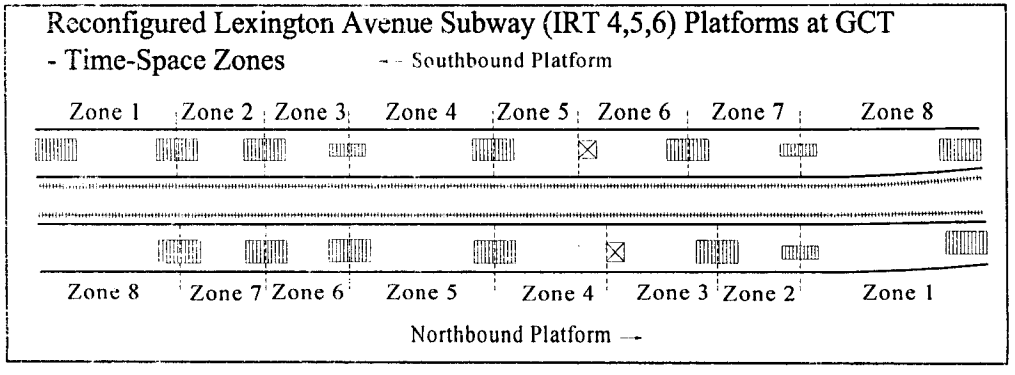


Table M-32

EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 5 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	5,575	175	1	7	1,225	535	27	224	0.17	88.4	16	1,414	**2,639**	**47%**	**C/D or better**
Zone 2	580	5	**2,899**	25	1	7	175	60	26	224	0.12	7.0	16	111	**286**	**10%**	**C/D or better**
Zone 3	865	5	**4,325**	50	1	7	350	330	40	224	0.18	58.9	16	943	**1,293**	**30%**	**C/D or better**
Zone 4	835	5	**4,175**	150	1	7	1,050	65	35	224	0.16	10.2	16	163	**1,213**	**29%**	**C/D or better**
Zone 5	970	5	**4,850**	450	1	5	2,250	745	49	211	0.23	173.0	13.5	2,336	**4,586**	**95%**	**Mid-D - D/E**
Zone 6	575	5	**2,875**	100	1	7	700	160	30	224	0.13	21.4	16	343	**1,043**	**36%**	**C/D or better**
Zone 7	550	5	**2,750**	100	1	7	700	230	29	224	0.13	29.8	16	476	**1,176**	**43%**	**C/D or better**
Zone 8	2,165	5	**10,825**	100	1	7	700	235	48	224	0.21	50.4	16	806	**1,506**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	325	1	7	2,275	760	51	224	0.23	173.0	16	2,769	**5,044**	**36%**	**C/D or better**
Zone 2	570	5	**2,850**	100	1	7	700	580	27	224	0.12	69.9	16	1,119	**1,819**	**64%**	**C/D or better**
Zone 3	610	5	**3,050**	150	1	7	1,050	155	30	224	0.13	20.8	16	332	**1,382**	**45%**	**C/D or better**
Zone 4	1,050	5	**5,250**	300	1	5	1,500	1,105	49	211	0.23	256.6	13.5	3,464	**4,964**	**95%**	**Mid-D - D/E**
Zone 5	330	5	**1,650**	100	1	7	700	75	21	224	0.09	7.0	16	113	**813**	**49%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	465	42	224	0.19	87.2	16	1,395	**2,095**	**52%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	85	33	224	0.15	12.5	16	200	**1,075**	**28%**	**C/D or better**
Zone 8	1,155	5	**5,775**	175	1	7	1,225	545	29	224	0.13	70.6	16	1,129	**2,354**	**41%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak AM period (8:35-8:50).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.
(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

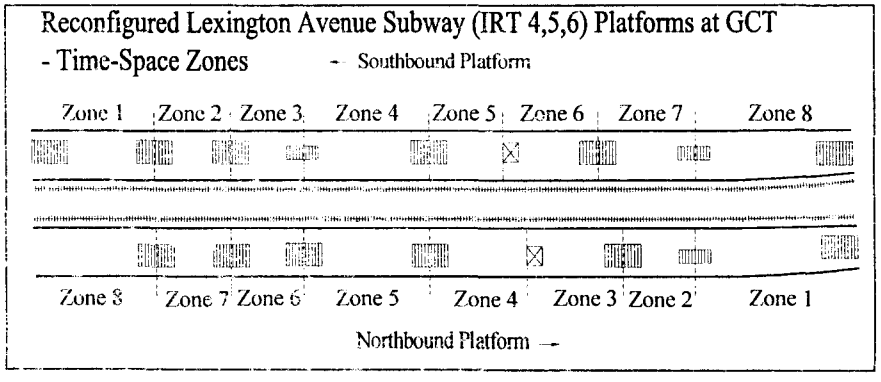


Table M-32

EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE AM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	525	1	7	3,675	1,385	37	224	0.17	228.8	16	3,660	**7,335**	**44%**	**C/D or better**
Zone 2	580	15	**8,697**	75	1	7	525	180	26	224	0.12	20.9	16	334	**859**	**10%**	**C/D or better**
Zone 3	865	15	**12,975**	150	1	7	1,050	870	40	224	0.18	155.4	16	2,486	**3,536**	**27%**	**C/D or better**
Zone 4	835	15	**12,525**	450	1	7	3,150	205	35	224	0.16	32.0	16	513	**3,663**	**29%**	**C/D or better**
Zone 5	970	15	**14,550**	1,350	1	5	6,750	2,125	49	211	0.23	493.5	13.5	6,662	**13,412**	**92%**	**Mid-D - D/E**
Zone 6	575	15	**8,625**	300	1	7	2,100	470	30	224	0.13	62.9	16	1,007	**3,107**	**36%**	**C/D or better**
Zone 7	550	15	**8,250**	300	1	7	2,100	645	29	224	0.13	83.5	16	1,336	**3,436**	**42%**	**C/D or better**
Zone 8	2,165	15	**32,475**	300	1	7	2,100	670	48	224	0.21	143.6	16	2,297	**4,397**	**14%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	975	1	7	6,825	2,045	51	224	0.23	465.6	16	7,450	**14,275**	**34%**	**C/D or better**
Zone 2	570	15	**8,550**	300	1	7	2,100	1,515	27	224	0.12	182.6	16	2,922	**5,022**	**59%**	**C/D or better**
Zone 3	610	15	**9,150**	450	1	7	3,150	465	30	224	0.13	62.3	16	996	**4,146**	**45%**	**C/D or better**
Zone 4	1,050	15	**15,750**	1,200	1	5	6,000	2,815	49	211	0.23	653.7	13.5	8,825	**14,825**	**94%**	**Mid-D - D/E**
Zone 5	330	15	**4,950**	300	1	7	2,100	225	21	224	0.09	21.1	16	338	**2,438**	**49%**	**C/D or better**
Zone 6	810	15	**12,150**	300	1	7	2,100	1,285	42	224	0.19	240.9	16	3,855	**5,955**	**49%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	255	33	224	0.15	37.6	16	601	**3,226**	**28%**	**C/D or better**
Zone 8	1,155	15	**17,325**	525	1	7	3,675	1,425	29	224	0.13	184.5	16	2,952	**6,627**	**38%**	**C/D or better**

NOTES:

(1) Analysis period is the 15-minute peak AM period (8:35-8:50).

(2) Based on one-minute platform observations.

(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

(4) Average walking distance across time-space zone.

(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.

(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

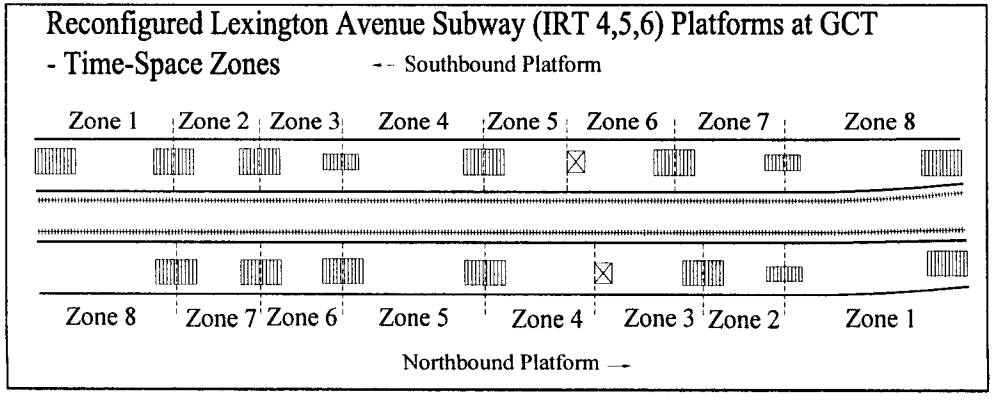


Table M-32

EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 5 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	5	**5,575**	250	1	7	1,750	610	37	224	0.17	100.8	16	1,612	**3,362**	**60%**	**C/D or better**
Zone 2	580	5	**2,899**	50	1	7	350	60	26	224	0.12	7.0	16	111	**461**	**16%**	**C/D or better**
Zone 3	865	5	**4,325**	100	1	7	700	390	40	224	0.18	69.6	16	1,114	**1,814**	**42%**	**C/D or better**
Zone 4	835	5	**4,175**	100	1	7	700	130	35	224	0.16	20.3	16	325	**1,025**	**25%**	**C/D or better**
Zone 5	970	5	**4,850**	300	1	5	1,500	865	49	211	0.23	200.9	13.5	2,712	**4,212**	**87%**	**Mid-D**
Zone 6	575	5	**2,875**	100	1	7	700	140	30	224	0.13	18.8	16	300	**1,000**	**35%**	**C/D or better**
Zone 7	550	5	**2,750**	125	1	7	875	480	29	224	0.13	62.1	16	994	**1,869**	**68%**	**C/D or better**
Zone 8	2,165	5	**10,825**	575	1	7	4,025	515	48	224	0.21	110.4	16	1,766	**5,791**	**53%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	5	**14,100**	375	1	7	2,625	365	51	224	0.23	83.1	16	1,330	**3,955**	**28%**	**C/D or better**
Zone 2	570	5	**2,850**	125	1	7	875	380	27	224	0.12	45.8	16	733	**1,608**	**56%**	**C/D or better**
Zone 3	610	5	**3,050**	75	1	7	525	135	30	224	0.13	18.1	16	289	**814**	**27%**	**C/D or better**
Zone 4	1,050	5	**5,250**	175	1	7	1,225	540	49	224	0.22	118.1	16	1,890	**3,115**	**59%**	**C/D or better**
Zone 5	330	5	**1,650**	50	1	7	350	115	21	224	0.09	10.8	16	173	**523**	**32%**	**C/D or better**
Zone 6	810	5	**4,050**	100	1	7	700	270	42	224	0.19	50.6	16	810	**1,510**	**37%**	**C/D or better**
Zone 7	770	5	**3,850**	125	1	7	875	70	33	224	0.15	10.3	16	165	**1,040**	**27%**	**C/D or better**
Zone 8	1,155	5	**5,775**	250	1	7	1,750	360	29	224	0.13	46.6	16	746	**2,496**	**43%**	**C/D or better**

NOTES:

(1) Analysis period is the peak 5 minutes within the 15-minute peak PM period (5:10-5:25).

(2) Based on one-minute platform observations.

(3) Average queue space of 7 and 5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

(4) Average walking distance across time-space zone.

(5) Average walk speed of 224 and 211 feet per minute signify LOS C/D and mid-D conditions, respectively.

(6) Average walk space of 16 and 13.5 square feet per pedestrian signify LOS C/D and mid-D conditions, respectively.

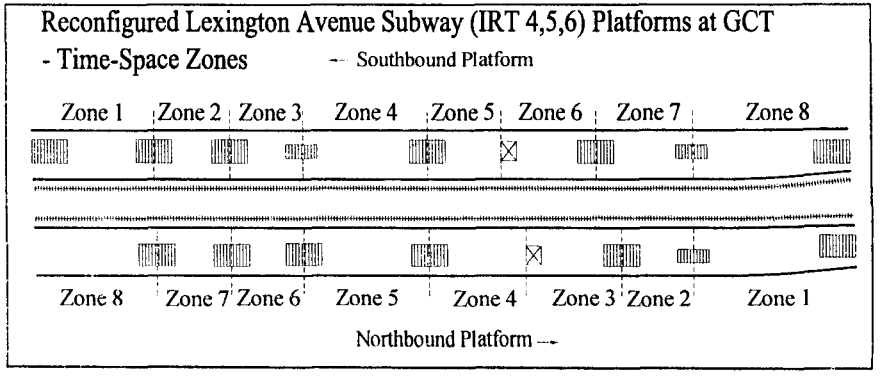


Table M-32

EIS PEDESTRIAN TIME - SPACE ANALYSES
LEXINGTON AVENUE SUBWAY (IRT 4,5,6) PLATFORMS @ GRAND CENTRAL TERMINAL
2020 MITIGATED BUILD CONDITIONS 15 MINUTE PM PEAK PERIOD

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
AVAILABLE TIME - SPACE				QUEUE TIME - SPACE				WALK TIME - SPACE									
Time - Space Zone	Effective Space Available (sqft)	Analysis Duration (1) (min)	Total Time - Space Available (sqft-min) B * C	Number of Pax Waiting (ped)	Average Wait Time (2) (min)	Average Wait Space (3) (sqft/ped)	Total Wait Time - Space (sqft-min) E * F * G	Total Pax Volume (ped)	Average Walk Distance (4) (ft)	Average Walk Speed (5) (fpm)	Average Walk Time (min) J / K	Total Walk Time (ped-min) I * L	Average Walk Space (6) (sqft/ped)	Total Walk Time - Space (sqft-min) M * N	Total Time - Space Required (sqft-min) H + O	Time-Space Required as % of Time-Space Available (sqft-min) P / D	Level of Service (LOS)
Northbound IRT Platform																	
Zone 1	1,115	15	**16,725**	825	1	7	5,775	1,370	37	224	0.17	226.3	16	3,621	**9,396**	**56%**	**C/D or better**
Zone 2	580	15	**8,697**	150	1	7	1,050	185	26	224	0.12	21.5	16	344	**1,394**	**16%**	**C/D or better**
Zone 3	865	15	**12,975**	300	1	7	2,100	1,010	40	224	0.18	180.4	16	2,886	**4,986**	**38%**	**C/D or better**
Zone 4	835	15	**12,525**	300	1	7	2,100	400	35	224	0.16	62.5	16	1,000	**3,100**	**25%**	**C/D or better**
Zone 5	970	15	**14,550**	900	1	7	6,300	2,325	49	224	0.22	508.6	16	8,138	**14,438**	**99%**	**C/D - Mid-D**
Zone 6	575	15	**8,625**	300	1	7	2,100	435	30	224	0.13	58.3	16	932	**3,032**	**35%**	**C/D or better**
Zone 7	550	15	**8,250**	375	1	7	2,625	1,260	29	224	0.13	163.1	16	2,610	**5,235**	**63%**	**C/D or better**
Zone 8	2,165	15	**32,475**	1,725	1	7	12,075	1,225	48	224	0.21	262.5	16	4,200	**16,275**	**50%**	**C/D or better**
Southbound IRT Platform																	
Zone 1	2,820	15	**42,300**	1,200	1	7	8,400	1,005	51	224	0.23	228.8	16	3,661	**12,061**	**29%**	**C/D or better**
Zone 2	570	15	**8,550**	300	1	7	2,100	1,070	27	224	0.12	129.0	16	2,064	**4,164**	**49%**	**C/D or better**
Zone 3	610	15	**9,150**	225	1	7	1,575	415	30	224	0.13	55.6	16	889	**2,464**	**27%**	**C/D or better**
Zone 4	1,050	15	**15,750**	525	1	7	3,675	1,505	49	224	0.22	329.2	16	5,268	**8,943**	**57%**	**C/D or better**
Zone 5	330	15	**4,950**	150	1	7	1,050	350	21	224	0.09	32.8	16	525	**1,575**	**32%**	**C/D or better**
Zone 6	810	15	**12,150**	225	1	7	1,575	725	42	224	0.19	135.9	16	2,175	**3,750**	**31%**	**C/D or better**
Zone 7	770	15	**11,550**	375	1	7	2,625	215	33	224	0.15	31.7	16	507	**3,132**	**27%**	**C/D or better**
Zone 8	1,155	15	**17,325**	750	1	7	5,250	980	29	224	0.13	126.9	16	2,030	**7,280**	**42%**	**C/D or better**

NOTES:
(1) Analysis period is the 15-minute peak PM period (5:10-5:25).
(2) Based on one-minute platform observations.
(3) Average queue space of 7 square feet per pedestrian signifies LOS C/D conditions.
(4) Average walking distance across time-space zone.
(5) Average walk speed of 224 feet per minute signifies LOS C/D conditions.
(6) Average walk space of 16 square feet per pedestrian signifies LOS C/D conditions.

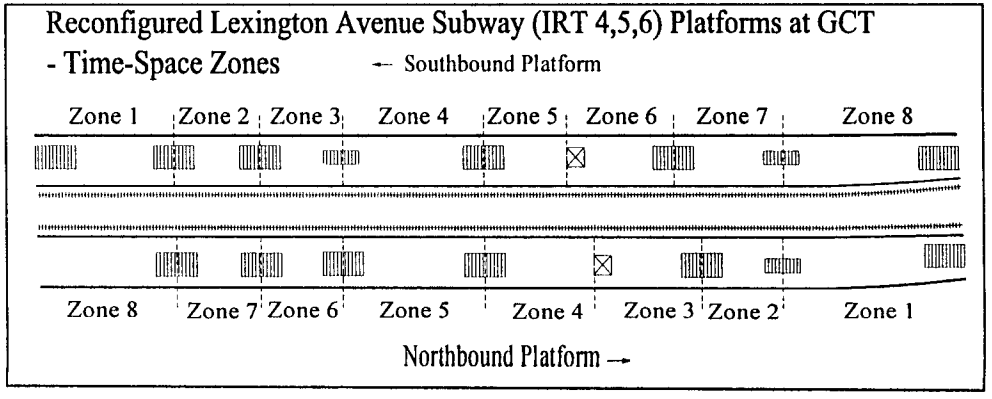
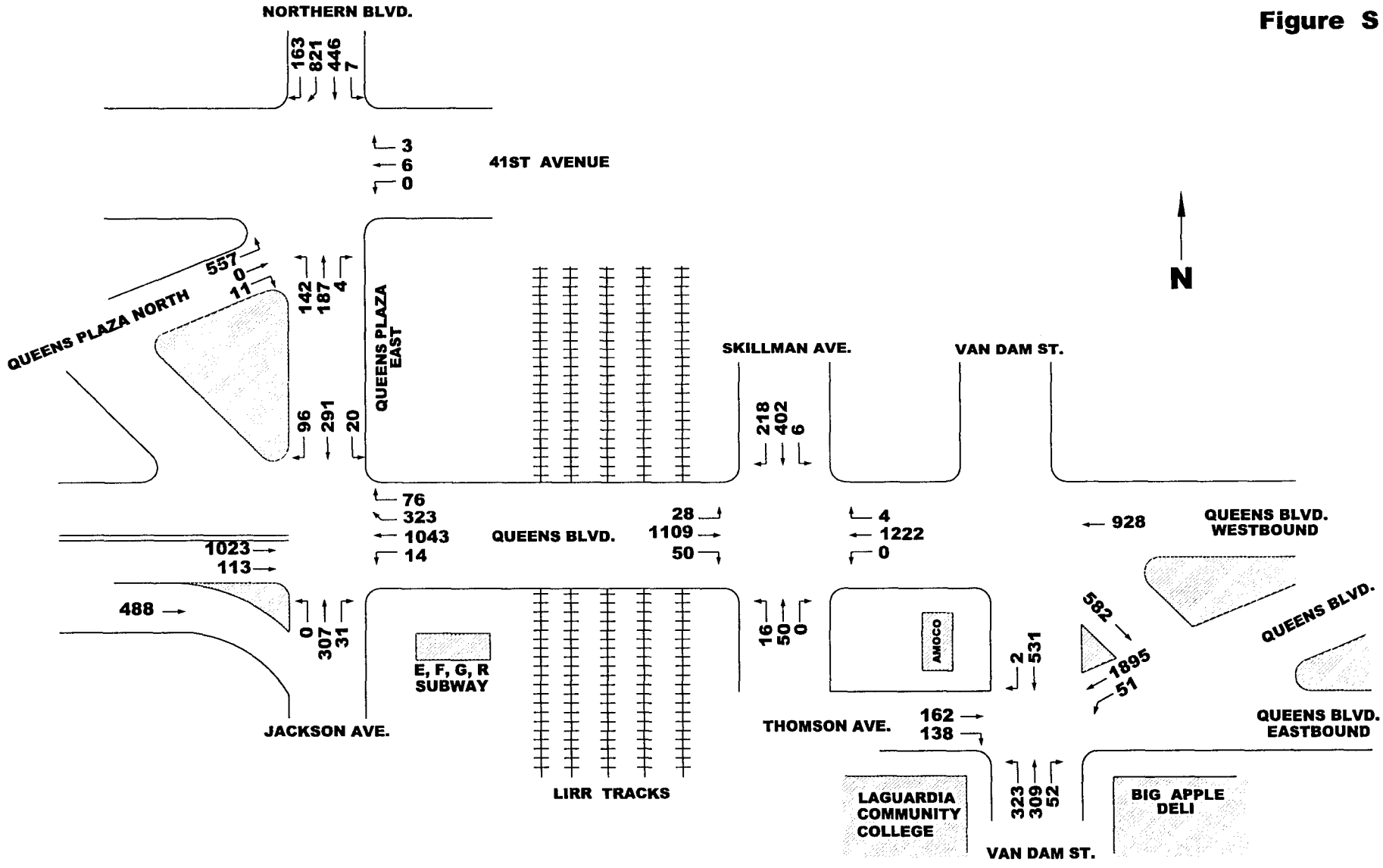


FIGURE S-1

EXISTING SUNNYSIDE AREA TRAFFIC VOLUMES

Figure S - 1



SUNNYSIDE

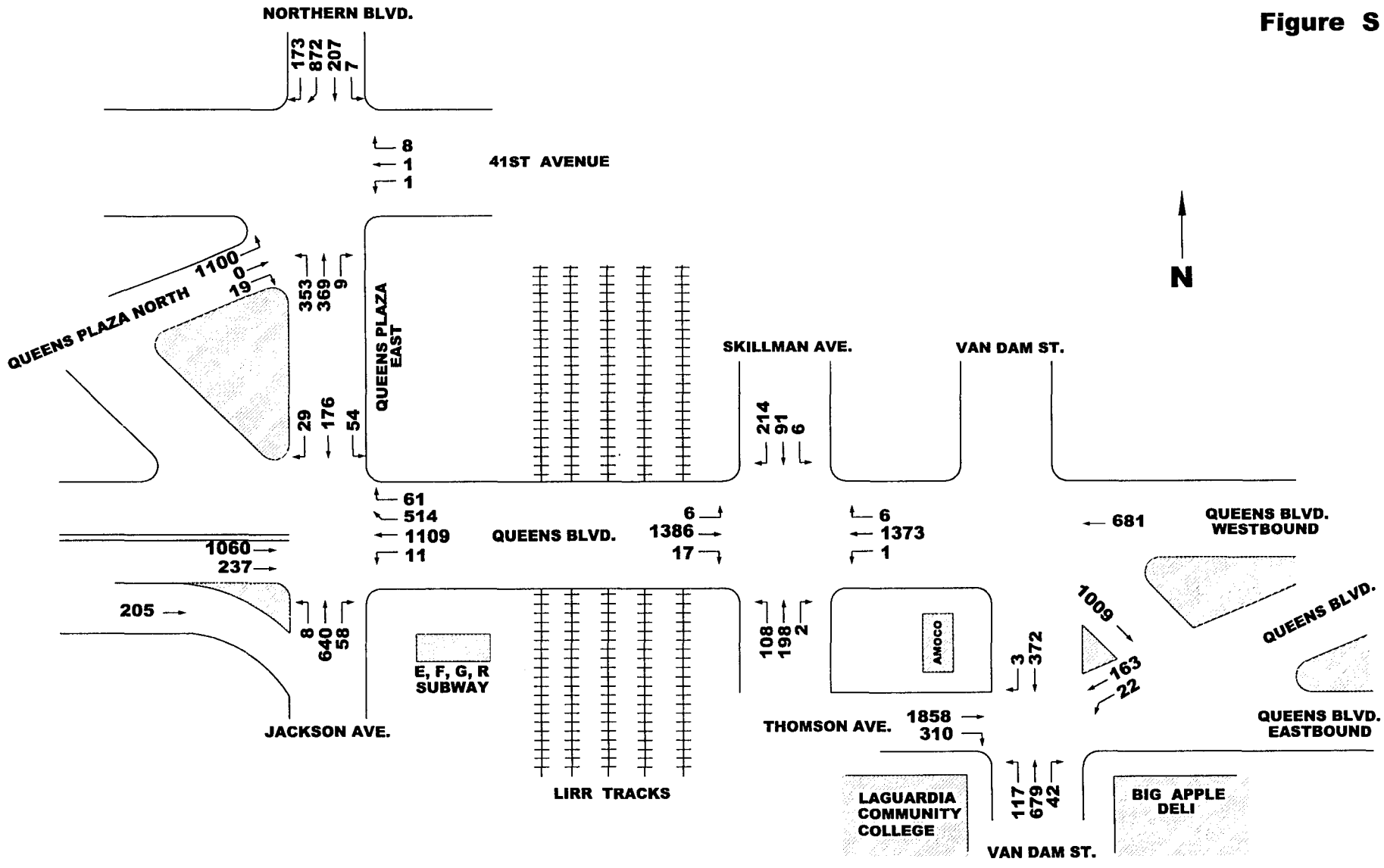
AM Peak Period

1999 Existing Traffic Flows

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

Figure S - 1



SUNNYSIDE

PM Peak Period

1999 Existing Traffic Flows

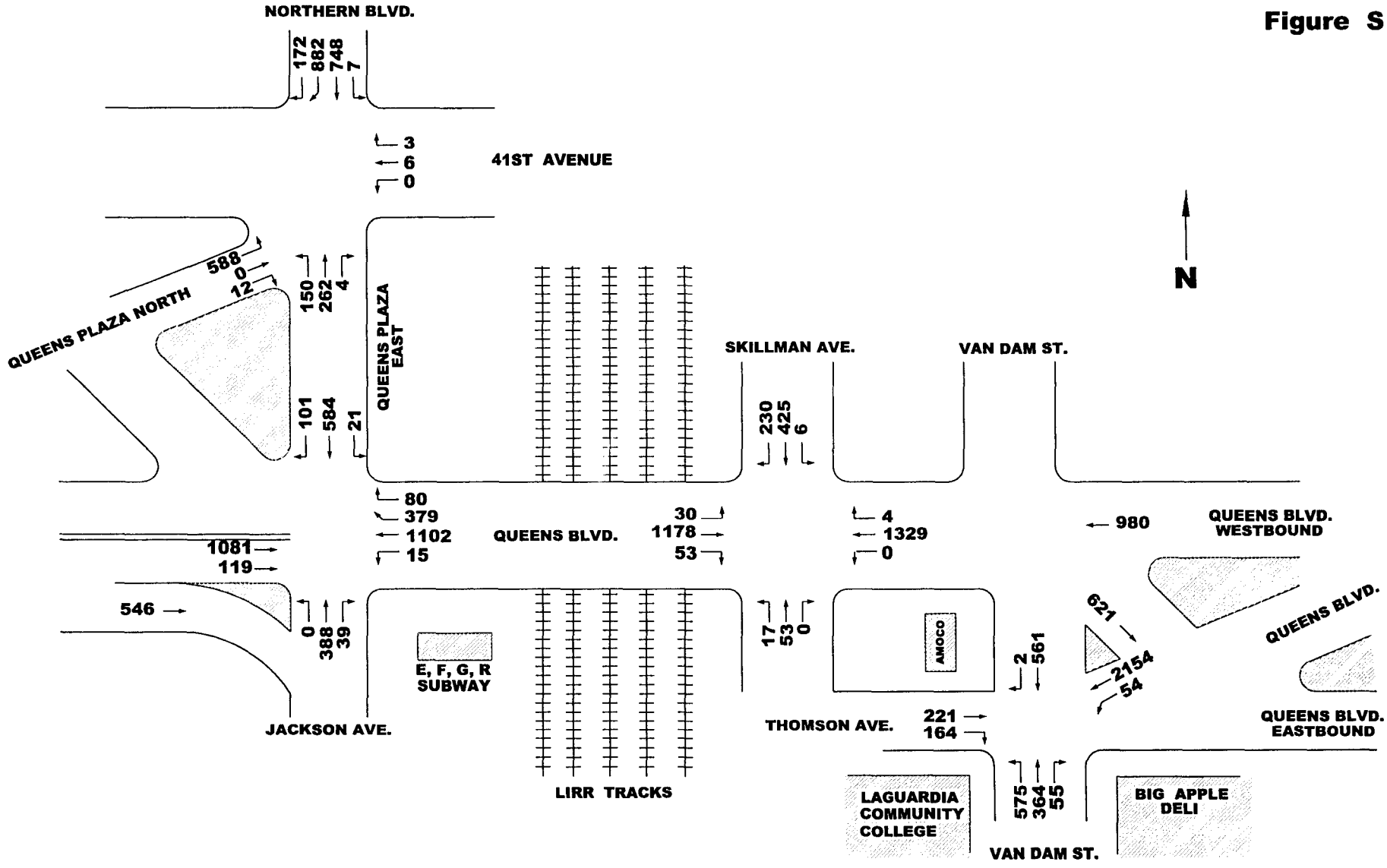
Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

FIGURE S-2

2010 NO BUILD SUNNYSIDE AREA TRAFFIC VOLUMES

Figure S - 2



SUNNYSIDE

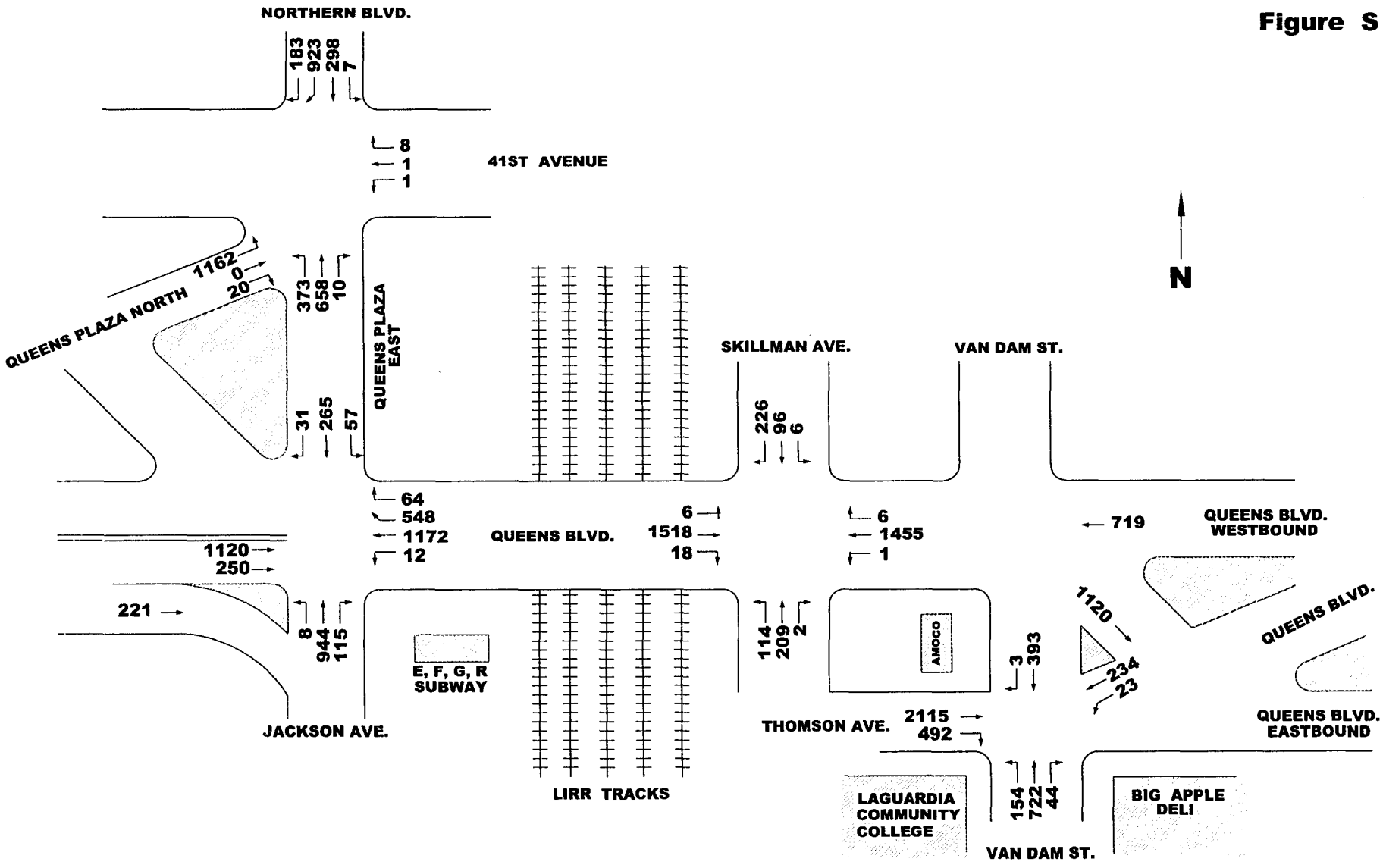
AM Peak Period

2010 No Build Traffic Flows

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

Figure S - 2



SUNNYSIDE

PM Peak Period

2010 No Build Traffic Flows

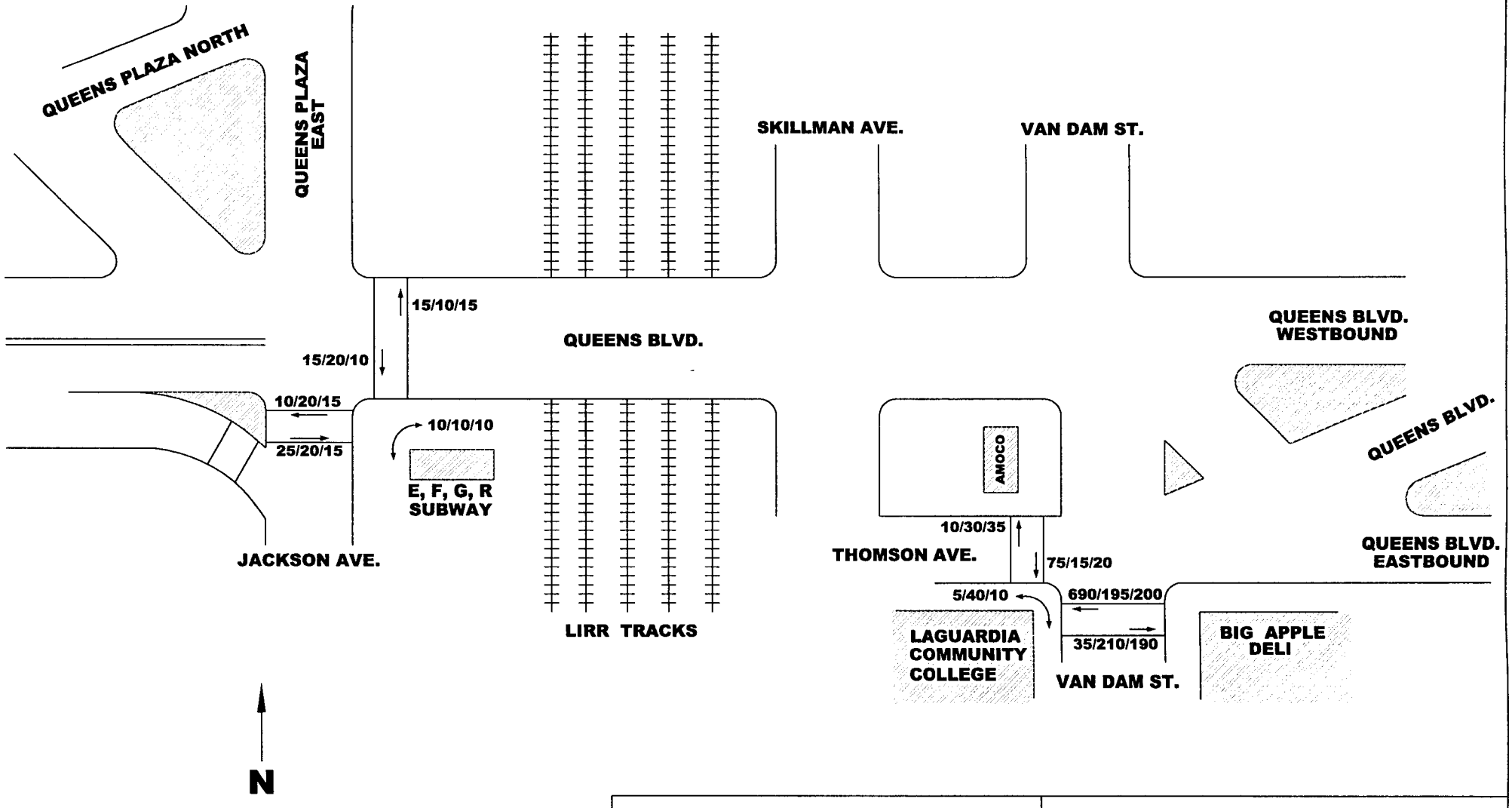
Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

FIGURE S-3

SUNNYSIDE
PEDESTRIAN VOLUMES

Figure S - 3



XX/XX/XX = (AM/MD/PM)

SUNNYSIDE

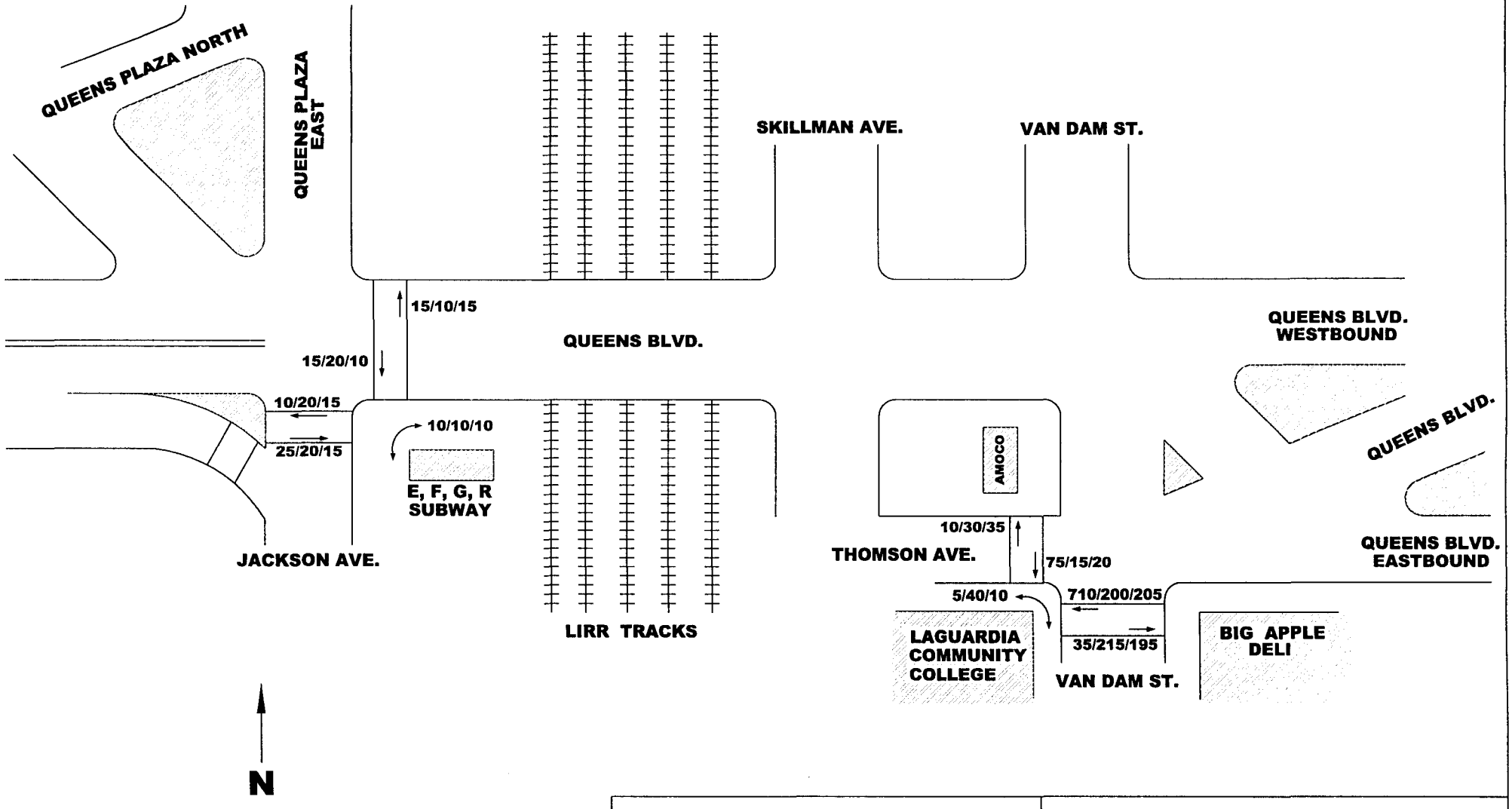
AM, MIDDAY, PM Peak Period

Existing Pedestrian Flows

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

Figure S - 3



XX/XX/XX = (AM/MD/PM)

SUNNYSIDE

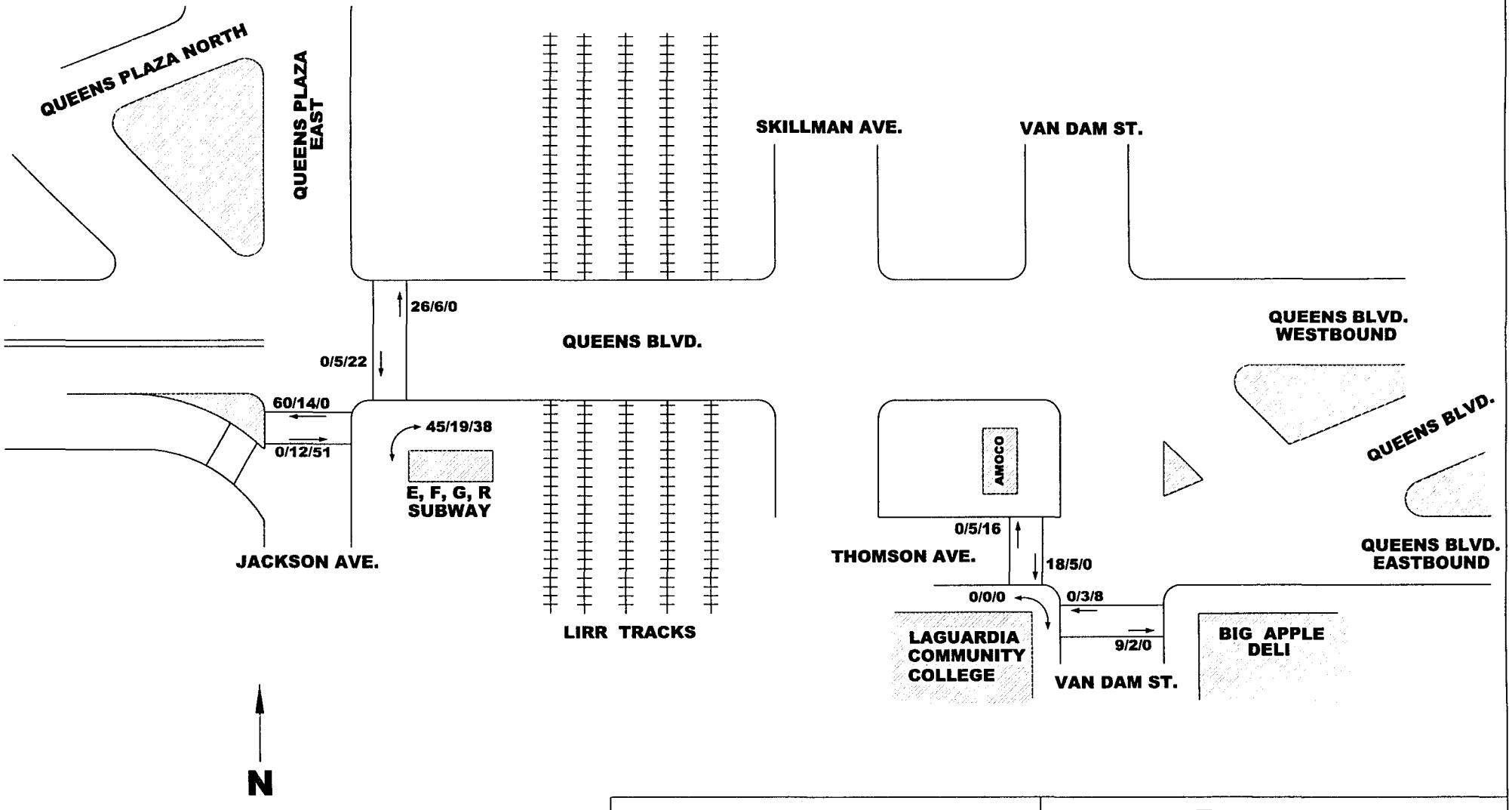
AM, MIDDAY, PM Peak Period

2010 No Build Pedestrian Flows

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

Figure S - 3



XX/XX/XX = (AM/MD/PM)

SUNNYSIDE

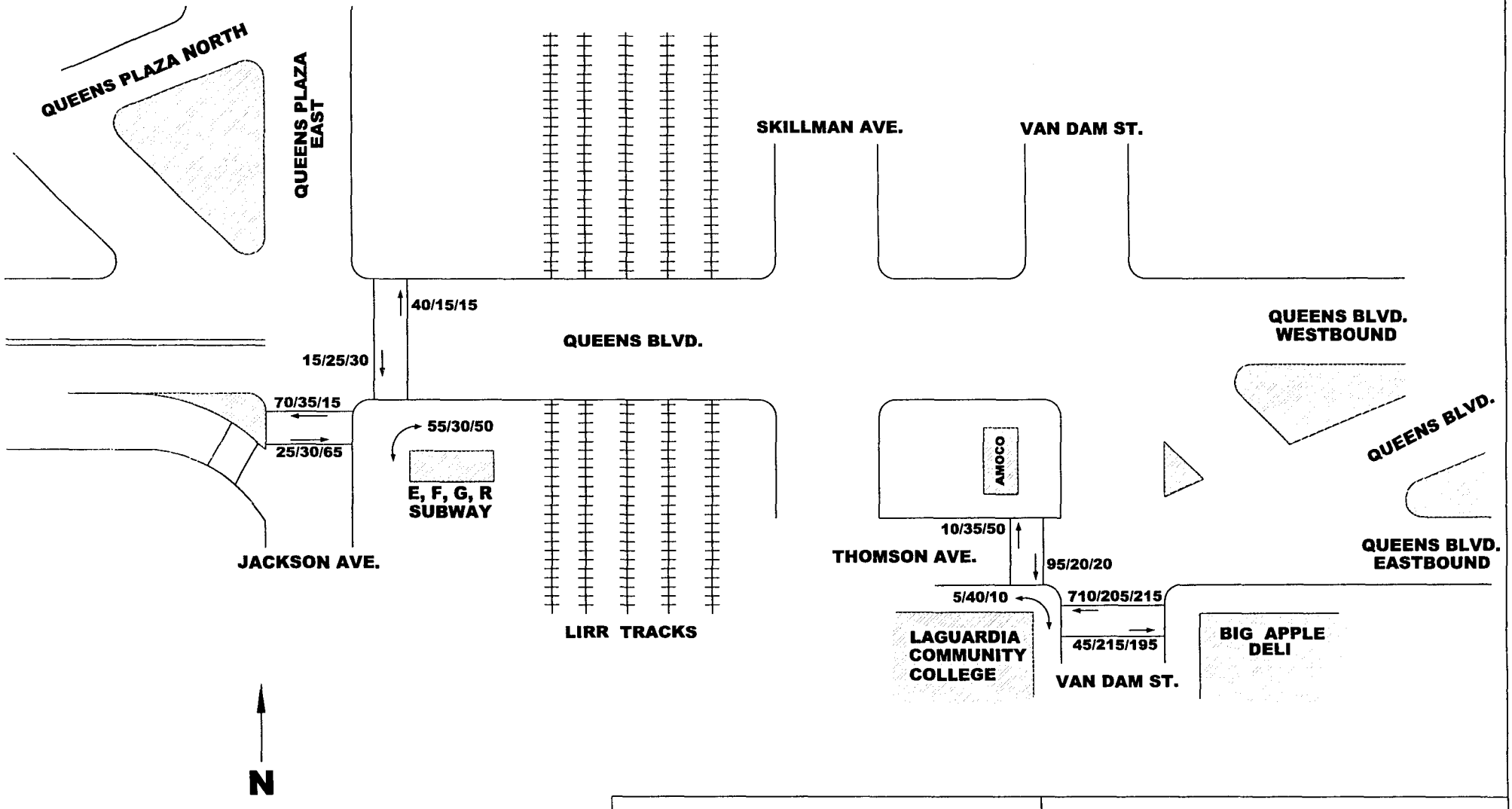
AM, MIDDAY, PM Peak Period

2010 Build Increment

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

Figure S - 3



XX/XX/XX = (AM/MD/PM)

SUNNYSIDE

AM, MIDDAY, PM Peak Period

2010 Build Pedestrian Flows

Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

TABLE S-1

EXISTING SUNNYSIDE TRAFFIC LEVELS OF SERVICE

Table S - 1

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
SUNNYSIDE									
1 Queens Boulevard & Van Dam Street / Thomson Avenue									
Van Dam Street	NB	L	1.04	*	F*	L	0.63	25.7	D
		TR	0.99	66.2	F	TR	1.04	*	F*
Van Dam Street (from viaduct)	SB	TR	1.03	*	F*	TR	0.58	32.3	D
Thomson Avenue	EB	TR	0.18	8.8	B	TR	1.04	42.1	E
Queens Boulevard	EB	T	1.00	64.9	F	T	0.89	29.3	D
Queens Boulevard (to Thomson Avenue)	WB	LT	1.01	40.2	E	DfL	0.37	28.9	D
						T	0.20	25.9	D
Queens Boulevard (to lower level)	WB	R	0.57	7.2	B	R	1.04	*	F*
Overall Intersection		-	*	*	F*	-	*	*	F*
2 Queens Boulevard & Skillman Avenue									
Skillman Avenue	NB	LTR	0.78	50.8	E	LTR	1.03	*	F*
	SB	LTR	1.07	83.1	F	LTR	0.72	36.0	D
Queens Boulevard	EB	LTR	1.04	46.1	E	LTR	1.03	*	F*
	WB	LTR	1.04	*	F*	LTR	1.02	*	F*
Overall Intersection		-	*	*	F*	-	*	*	F*
3 Queens Boulevard & Jackson Avenue / Queens Plaza East									
Jackson Avenue	NB	LT	0.80	41.7	E	LT	0.99	58.6	E
		R	0.18	30.9	D	R	0.21	29.9	D
Queens Plaza East	SB	LTR	0.50	27.1	D	LTR	0.34	24.5	C
Queens Plaza South (2 lane approach)	EB	T	0.80	23.0	C	T	0.92	25.1	D
Queens Plaza South (1 lane approach)		T	0.18	14.2	B	T	0.53	12.3	B
Queens Boulevard	WB	LT	1.06	*	F*	LT	1.03	*	F*
		R	1.00	53.6	E	R	0.85	19.9	C
Overall Intersection		-	*	*	F*	-	*	*	F*
4 Northern Boulevard & Queens Plaza North / 41st Avenue									
Queens Plaza East	NB	LTR	0.96	44.2	E	LTR	0.88	34.0	D
Northern Boulevard	SB	LT	0.94	42.9	E	LT	0.64	32.2	D
		R	1.03	*	F*	R	0.96	21.7	C
Queens Plaza North	EB	LTR	0.86	40.9	E	LTR	0.92	30.5	D
41st Avenue	WB	LTR	0.08	32.7	D	LTR	0.10	36.7	D
Overall Intersection		-	*	*	F*	-	**0.81**	**28.4**	**D**

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF.

TABLE S-2

2010 NO BUILD SUNNYSIDE LEVELS OF SERVICE

Table S - 2

2010 NO BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
SUNNYSIDE									
1 Queens Boulevard & Van Dam Street / Thomson Avenue									
Van Dam Street	NB	L	1.20+	120.0+	F *	L	0.83	39.1	D
		TR	1.15	120.0+	F *	TR	1.11	120.0+	F *
Van Dam Street (from viaduct)	SB	TR	1.09	120.0+	F *	TR	0.61	32.8	D
Thomson Avenue	EB	TR	0.22	9.1	B	TR	1.26	120.0+	F *
Queens Boulevard	EB	T	1.07	120.0+	F *	T	0.99	42.1	E
Queens Boulevard (to Thomson Avenue)	WB	LT	1.16	120.0+	F *	DfL	0.38	29.3	D
						T	0.29	26.6	D
Queens Boulevard (to lower level)	WB	R	0.60	7.5	B	R	1.09	120.0+	F *
Overall Intersection		-	**1.20+**	**120.0+**	**F ***	-	**1.20+**	**120.0+**	**F ***
2 Queens Boulevard & Skillman Avenue									
Skillman Avenue	NB	LTR	0.90	72.0	F	LTR	1.09	120.0+	F *
	SB	LTR	1.13	120.0+	F *	LTR	0.77	38.2	D
Queens Boulevard	EB	DfL	0.32	8.0	B	DfL	-	-	-
		TR	1.16	120.0+	F *	TR	1.13	120.0+	
	WB	TR	1.13	120.0+	F*	TR	1.08	120.0+	F *
Overall Intersection		-	**1.20+**	**120.0+**	**F ***	-	**1.20+**	**120.0+**	**F ***
3 Queens Boulevard & Jackson Avenue / Queens Plaza East									
Jackson Avenue	NB	T	1.01	71.3	F	LT	1.20+	120.0+	F *
		R	0.22	31.2	D	R	0.41	31.8	D
Queens Plaza East	SB	LTR	0.83	34.6	D	LTR	0.54	26.8	D
Queens Plaza South (2 lane approach)	EB	T	0.84	24.8	C	T	0.97	32.7	D
Queens Plaza South (1 lane approach)		T	0.19	14.2	B	T	0.55	12.8	B
Queens Boulevard	WB	LT	1.14	120.0+	F *	LT	1.08	120.0+	F *
		R	1.15	120.0+	F *	R	0.91	25.0	C
Overall Intersection		-	**1.20+**	**120.0+**	**F ***	-	**1.20+**	**120.0+**	**F ***
4 Northern Boulevard & Queens Plaza North / 41st Avenue									
Queens Plaza East	NB	LTR	1.05	68.7	F	LTR	1.20+	120.0+	F *
Northern Boulevard	SB	LT	1.20+	120.0+	F *	LT	0.97	64.2	F
		R	1.11	120.0+	F *	R	1.01	33.5	D
Queens Plaza North	EB	LTR	0.91	45.4	E	LTR	0.97	37.2	D
41st Avenue	WB	LTR	0.08	32.7	D	LTR	0.10	36.7	D
Overall Intersection		-	**1.20+**	**120.0+**	**F ***	-	**1.20+**	**120.0+**	**F ***

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF.

TABLE S-3

SUNNYSIDE

PEDESTRIAN ANALYSES

Table S - 3
LIRR EAST SIDE ACCESS ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS OF SUNNYSIDE
1999 EXISTING CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
JACKSON AVENUE @ QUEENS PLAZA EAST												
Southeast Corner	585.9	A			550.6	A			675.5	A		
South Crosswalk	633	A	361	A	646	A	332	A	862	A	443	A
East Crosswalk	414	A	326	A	442	A	332	A	531	A	398	A
THOMSON AVENUE @ QUEENS BOULEVARD												
Southwest Corner	67.5	B			92.1	B			102.4	B		
South Crosswalk	35	C	16	D	19	D	21	D	27	C	22	D
West Crosswalk	91	B	126	B	324	A	257	A	242	A	199	A

LIRR EAST SIDE ACCESS ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS OF SUNNYSIDE
2010 NO BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
JACKSON AVENUE @ QUEENS PLAZA EAST												
Southeast Corner	585.9	A			550.6	A			675.5	A		
South Crosswalk	627	A	361	A	641	A	332	A	854	A	443	A
East Crosswalk	414	A	326	A	442	A	332	A	531	A	398	A
THOMSON AVENUE @ QUEENS BOULEVARD												
Southwest Corner	65.9	B			89.8	B			99.8	B		
South Crosswalk	34	C	16	D	18	D	20	D	25	C	22	D
West Crosswalk	86	B	126	B	316	A	257	A	242	A	199	A

LIRR EAST SIDE ACCESS ANALYSIS OF CRITICAL PEDESTRIAN ELEMENTS OF SUNNYSIDE
2010 BUILD CONDITIONS AM, MIDDAY, PM PEAK PERIODS

INTERSECTION and ELEMENT	8 - 9 AM Peak Period				12 - 1 Mid-Day Peak Period				5 - 6 PM Peak Period			
	Average		Maximum Surge		Average		Maximum Surge		Average		Maximum Surge	
	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS	Space (sf/ped)	LOS
JACKSON AVENUE @ QUEENS PLAZA EAST												
Southeast Corner	202.6	A			322.7	A			250.9	A		
South Crosswalk	231	A	133	A	394	A	204	A	320	A	166	A
East Crosswalk	226	A	178	A	332	A	249	A	295	A	221	A
THOMSON AVENUE @ QUEENS BOULEVARD												
Southwest Corner	63.4	B			86.8	B			93.2	B		
South Crosswalk	34	C	15	D	18	D	20	D	25	C	21	D
West Crosswalk	70	B	102	B	258	A	210	A	190	A	157	A

FIGURES L - 1 to L - 15

EXISTING LONG ISLAND RAIL ROAD STATION AREA TRAFFIC VOLUMES

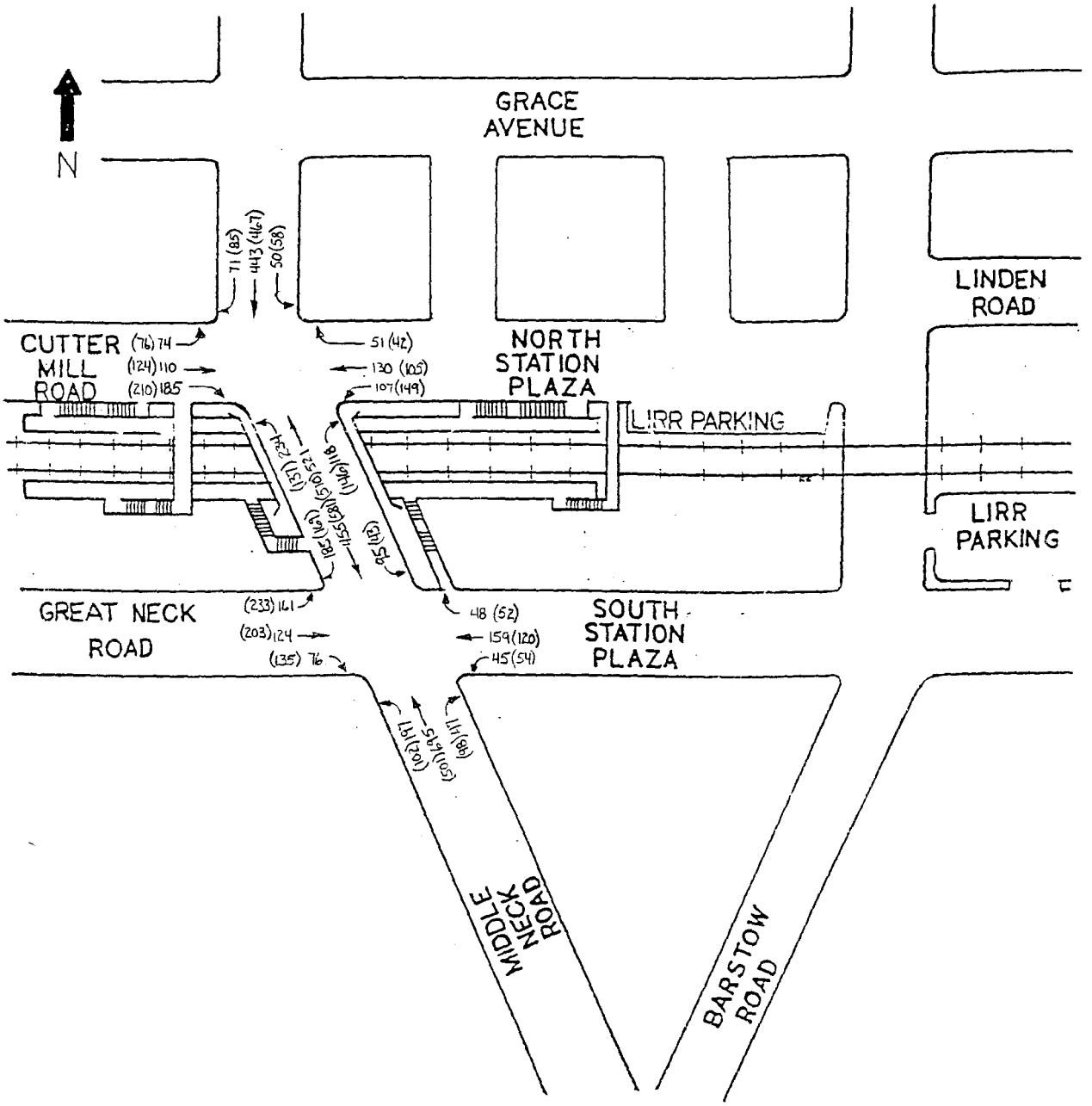


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FIGURE L1
EXISTING LIRR TRAFFIC VOLUMES
AM AND (PM) PEAK HOURS
GREAT NECK LIRR STATION
GREAT NECK NY 11021

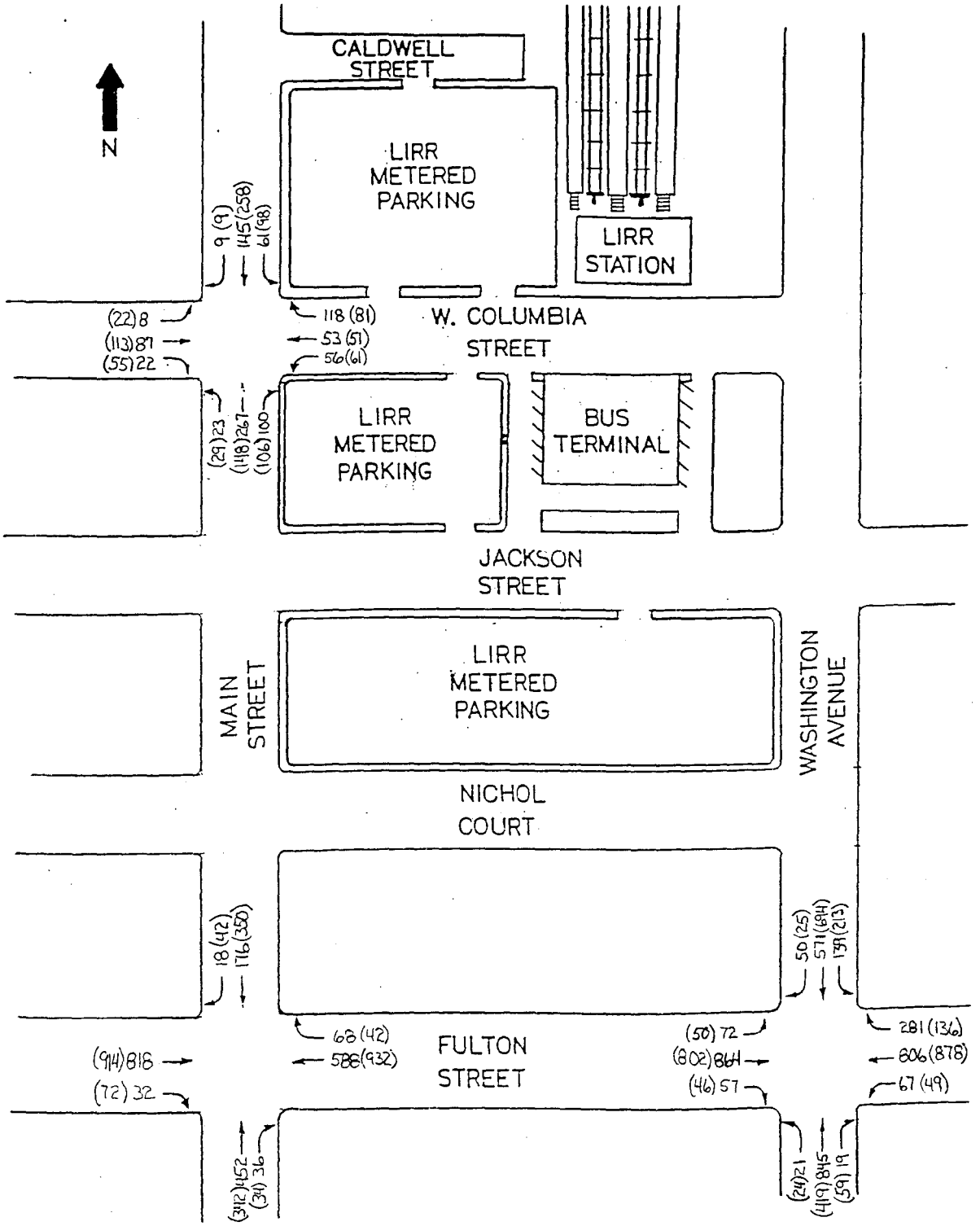

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FIGURE L2
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

HEMPSTEAD LIRR STATION
HEMPSTEAD NY 11550

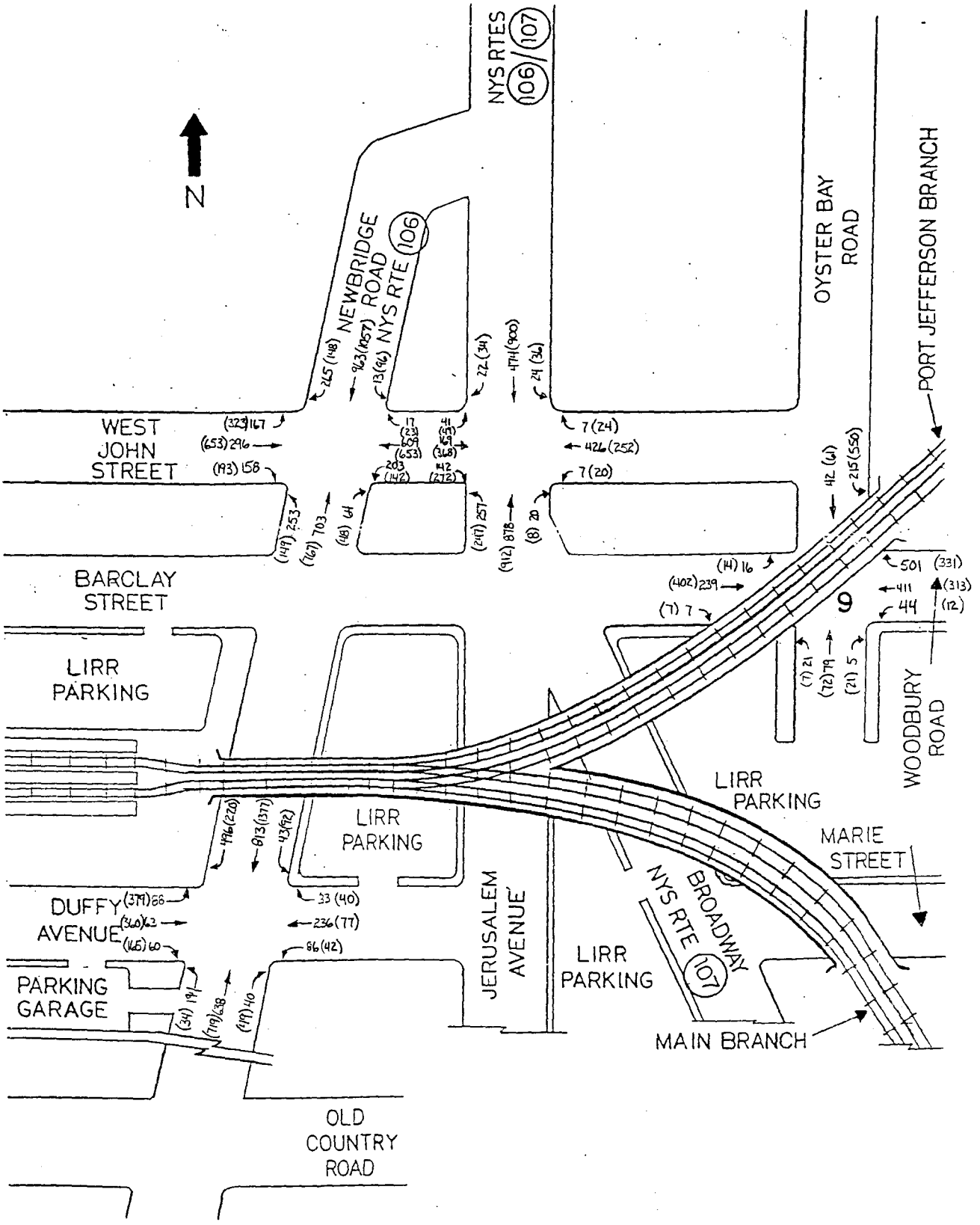

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FIGURE L3
EXISTING LIRR TRAFFIC VOLUMES
AM AND (PM) PEAK HOURS

HICKSVILLE LIRR STATION
HICKSVILLE NY 11803

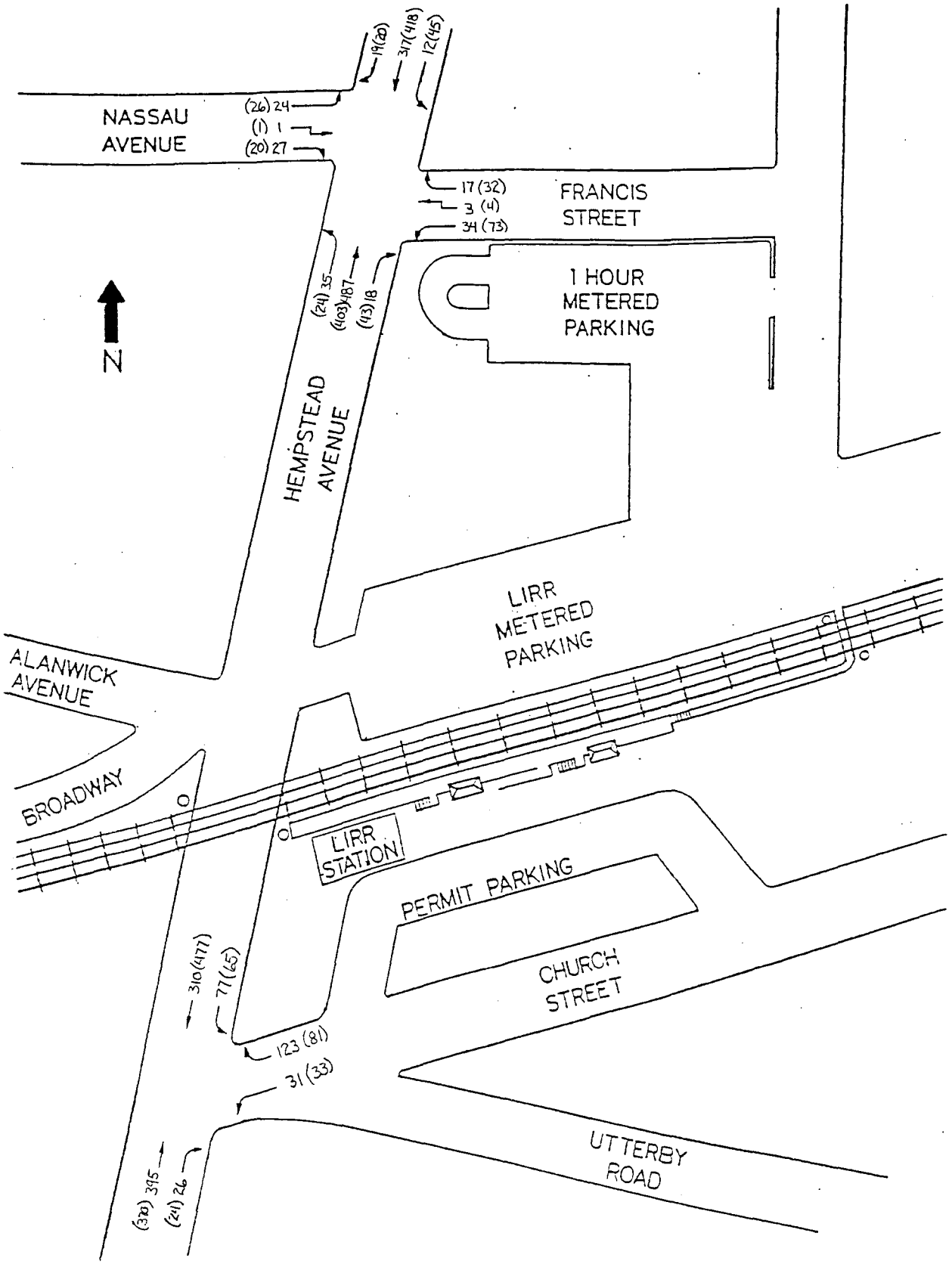

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FIGURE L4
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MALVERNE LIRR STATION
MALVERNE NY 11565

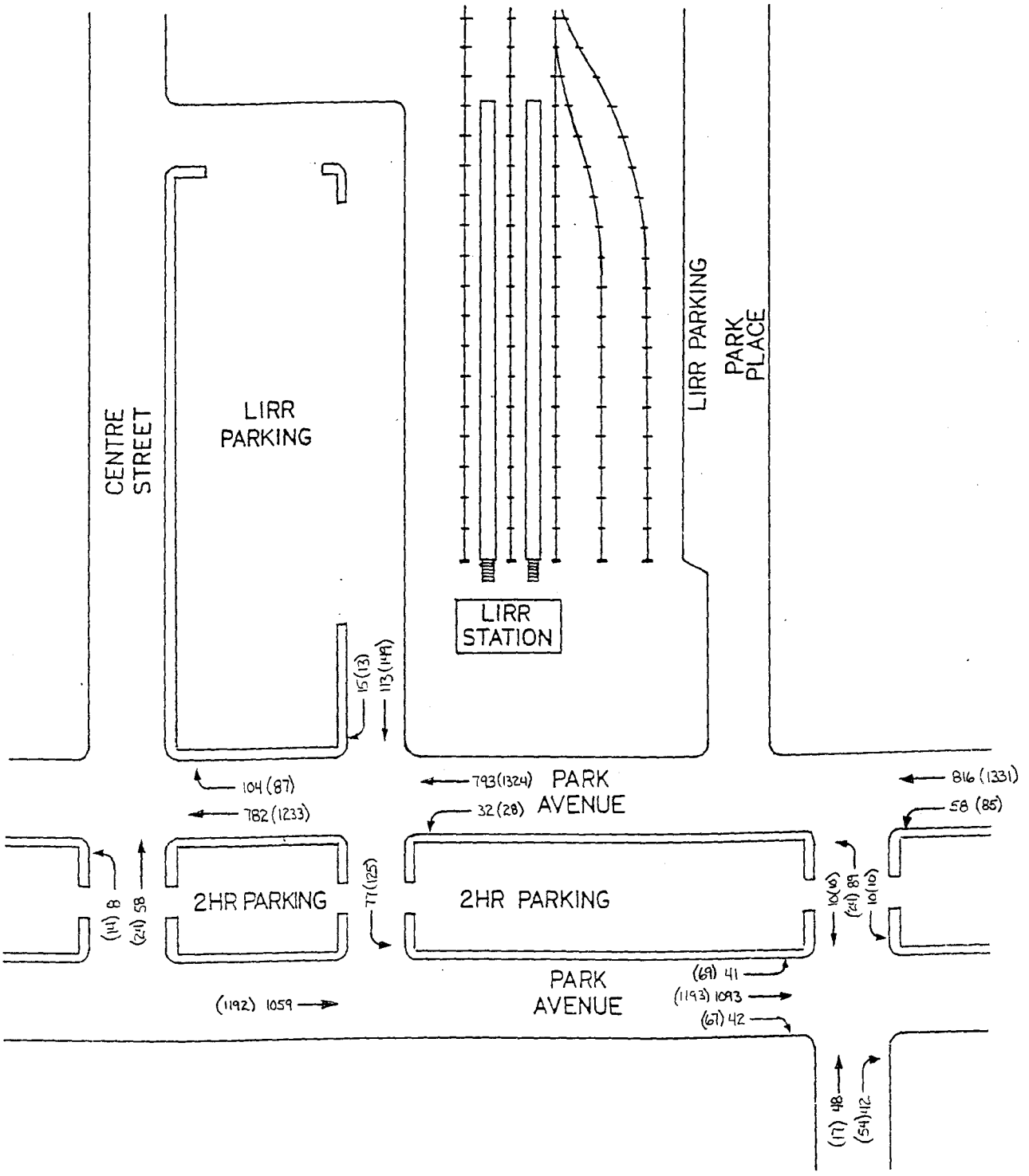

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FIGURE L5
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

LONG BEACH LIRR STATION
LONG BEACH NY 11561

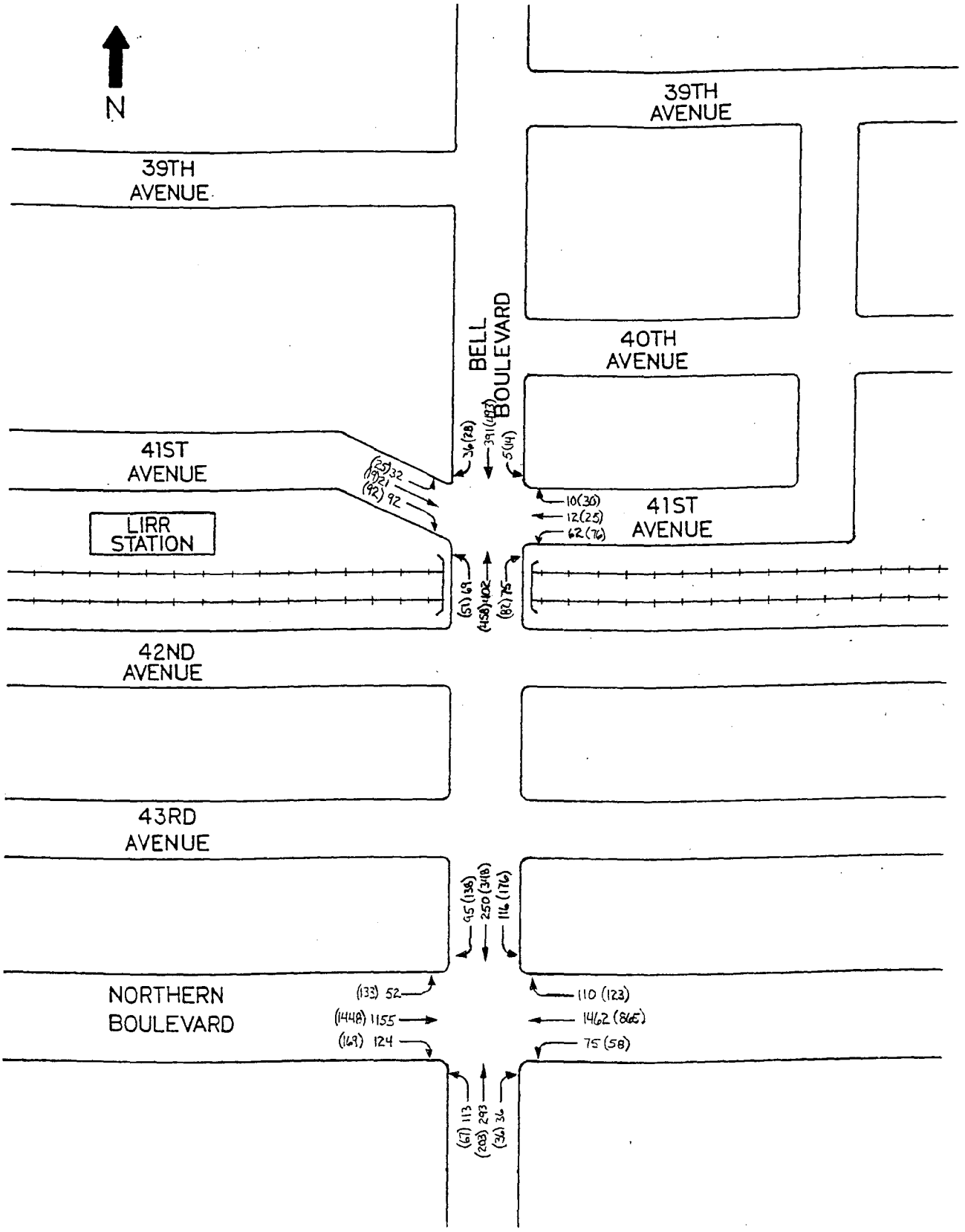

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FIGURE L6
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
BAYSIDE LIRR STATION
BAYSIDE NY 11361

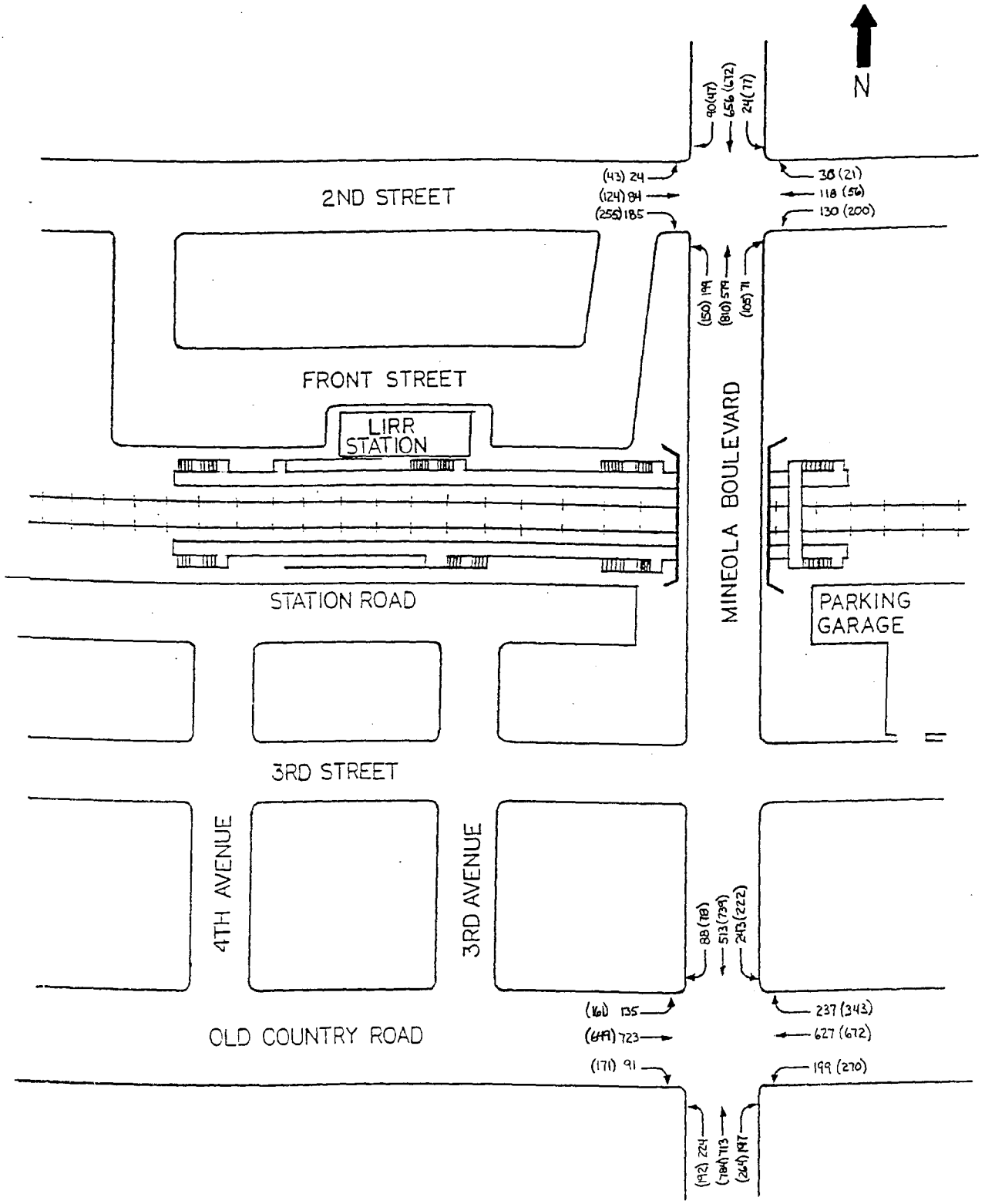

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FIGURE L7
EXISTING LIRR TRAFFIC VOLUMES
AM AND (PM) PEAK HOURS
MINEOLA LIRR STATION
MINEOLA NY 11501

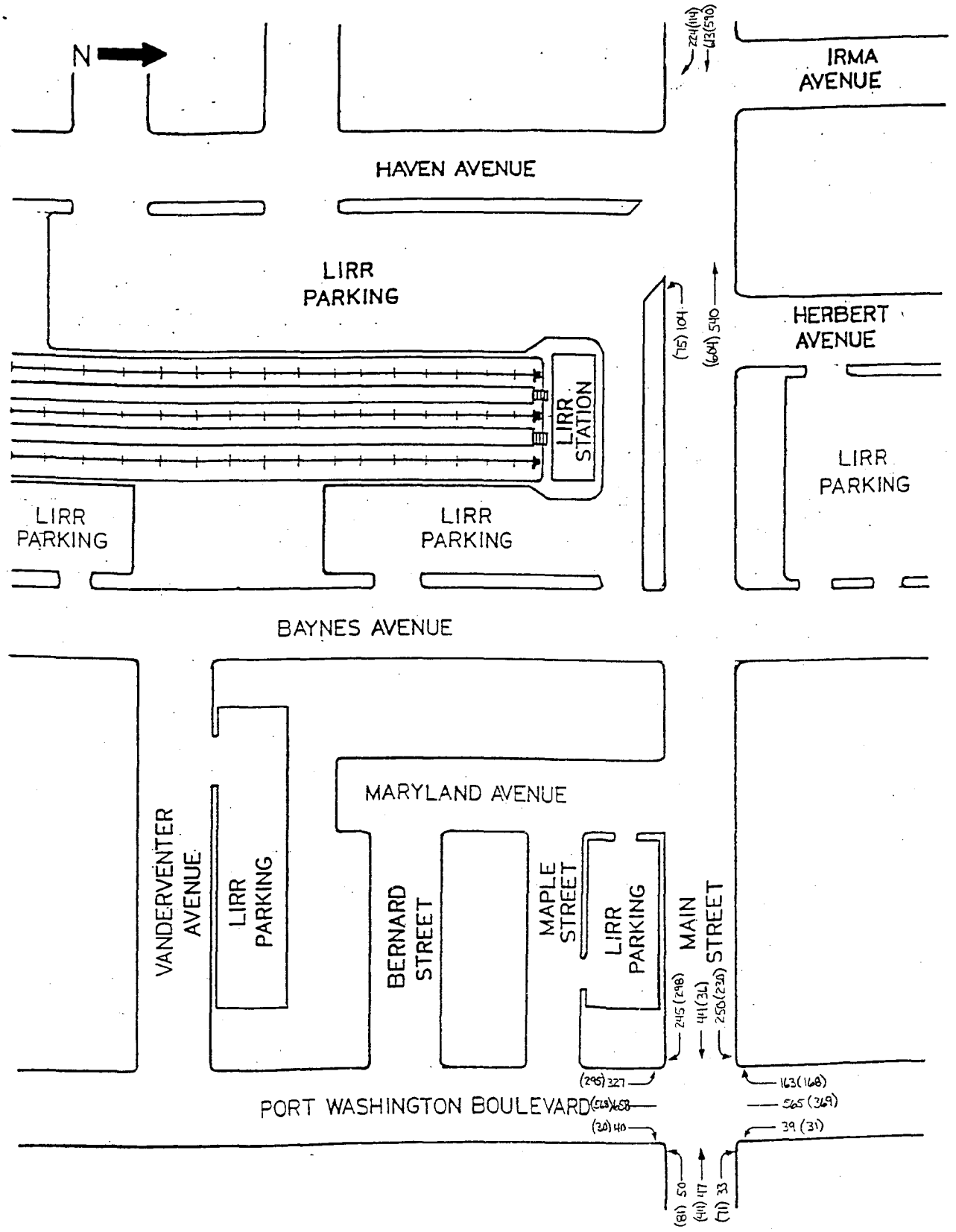

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FIGURE L8
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

PORT WASHINGTON LIRR STATION
PORT WASHINGTON NY 11050

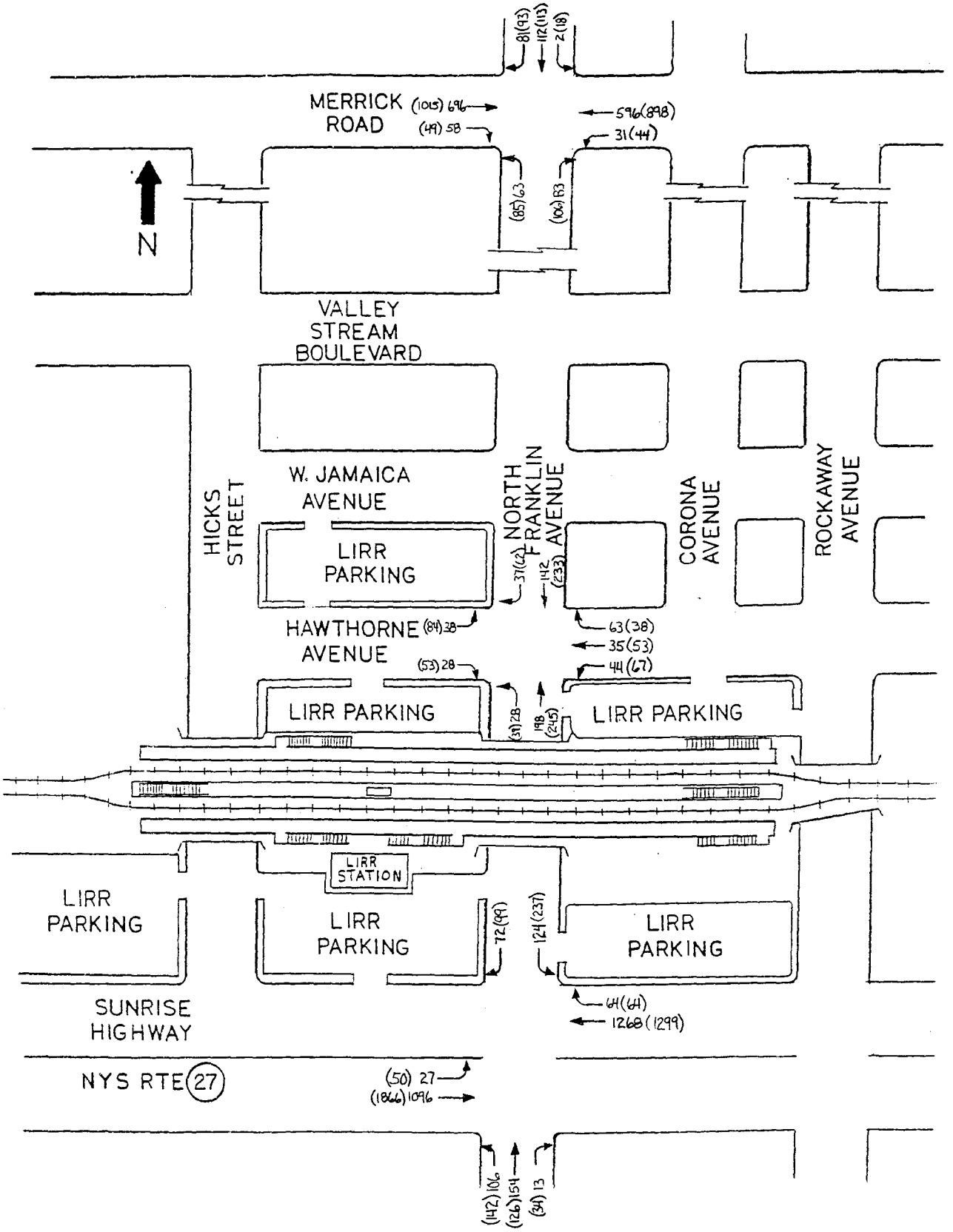

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FIGURE L9
EXISTING LIRR TRAFFIC VOLUMES
AM AND (PM) PEAK HOURS

VALLEY STREAM LIRR STATION
VALLEY STREAM NY 11580

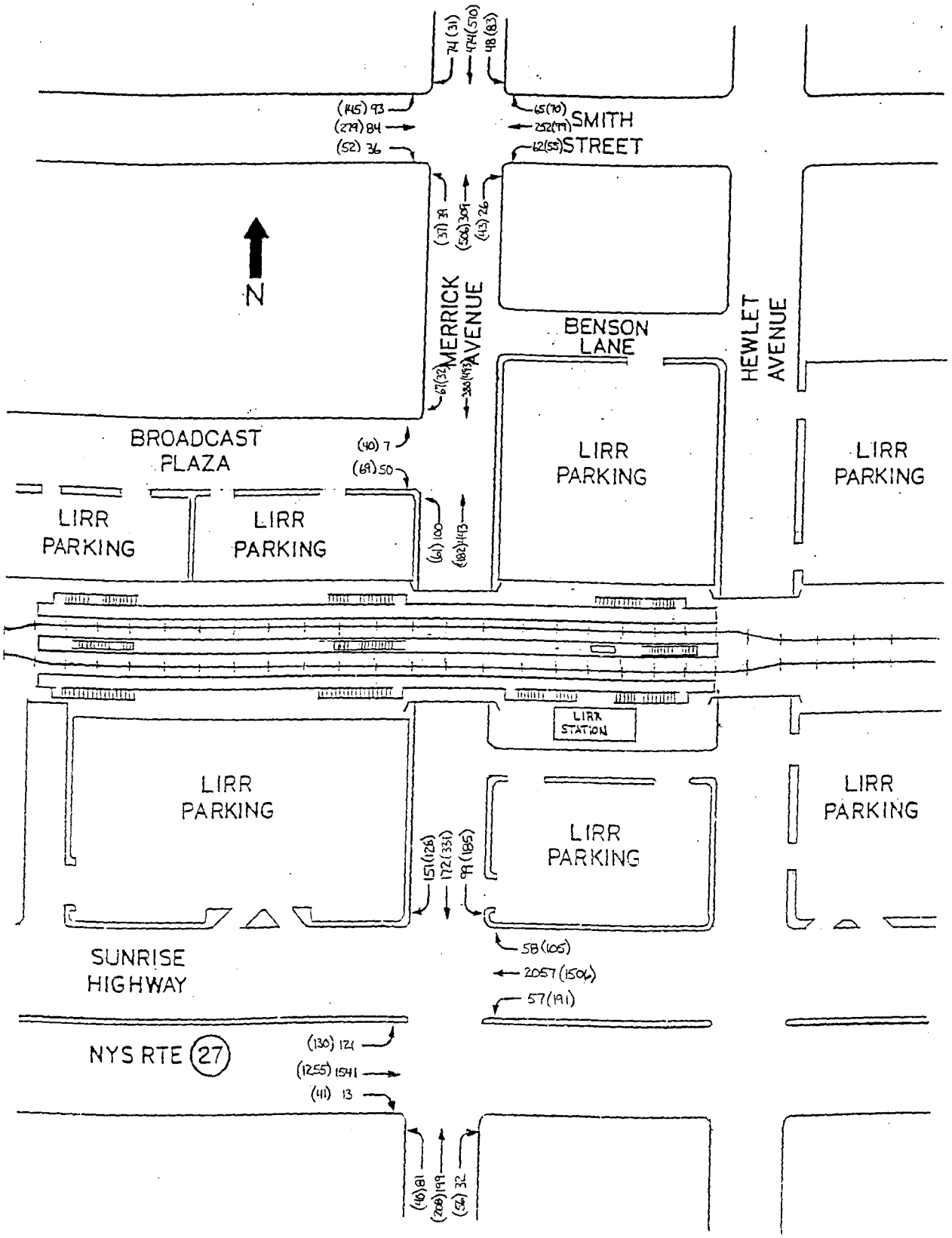

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FIGURE L10
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MERRICK LIRR STATION
MERRICK NY 11566

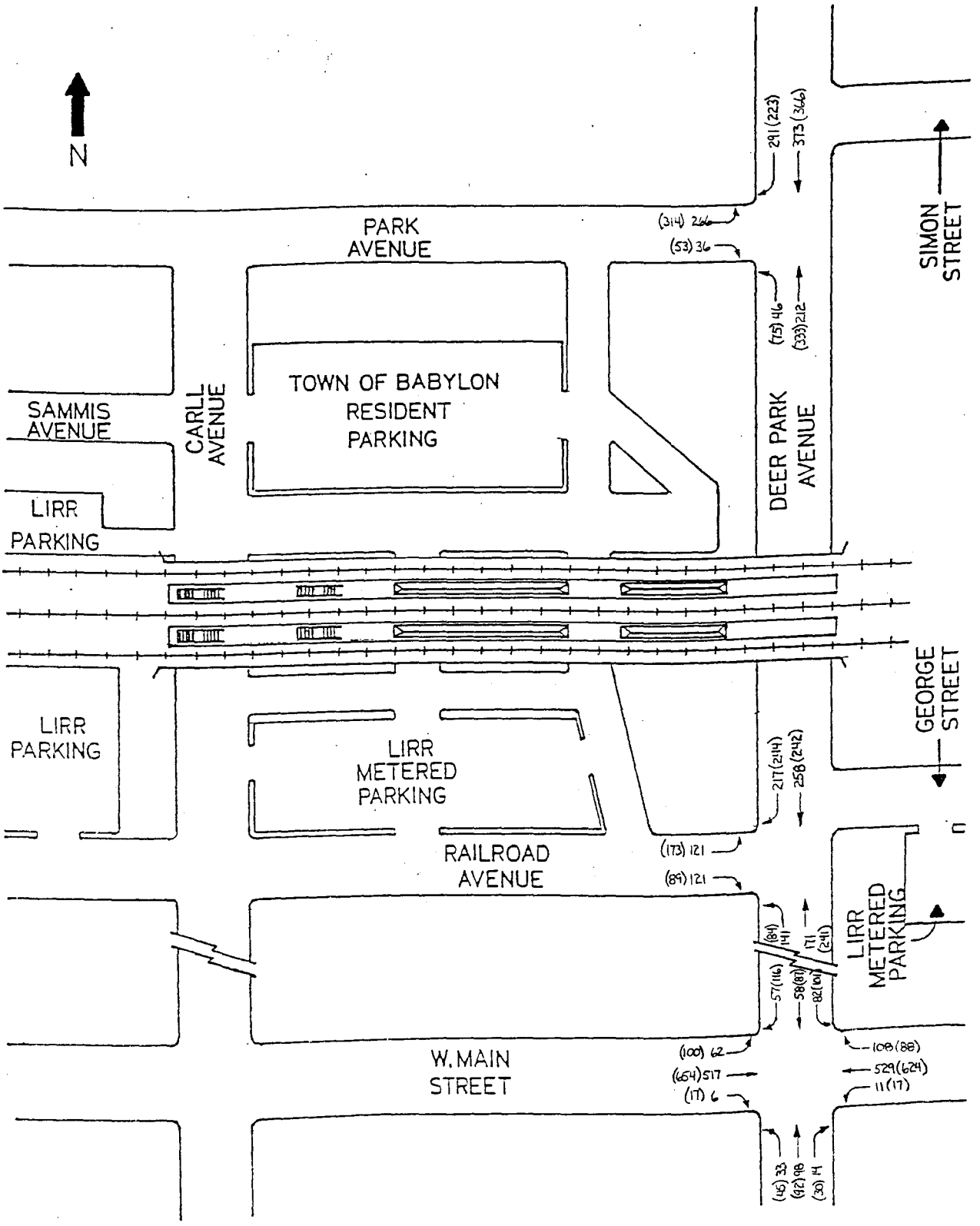

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FIGURE L11
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
BABYLON LIRR STATION
BABYLON NY 11702

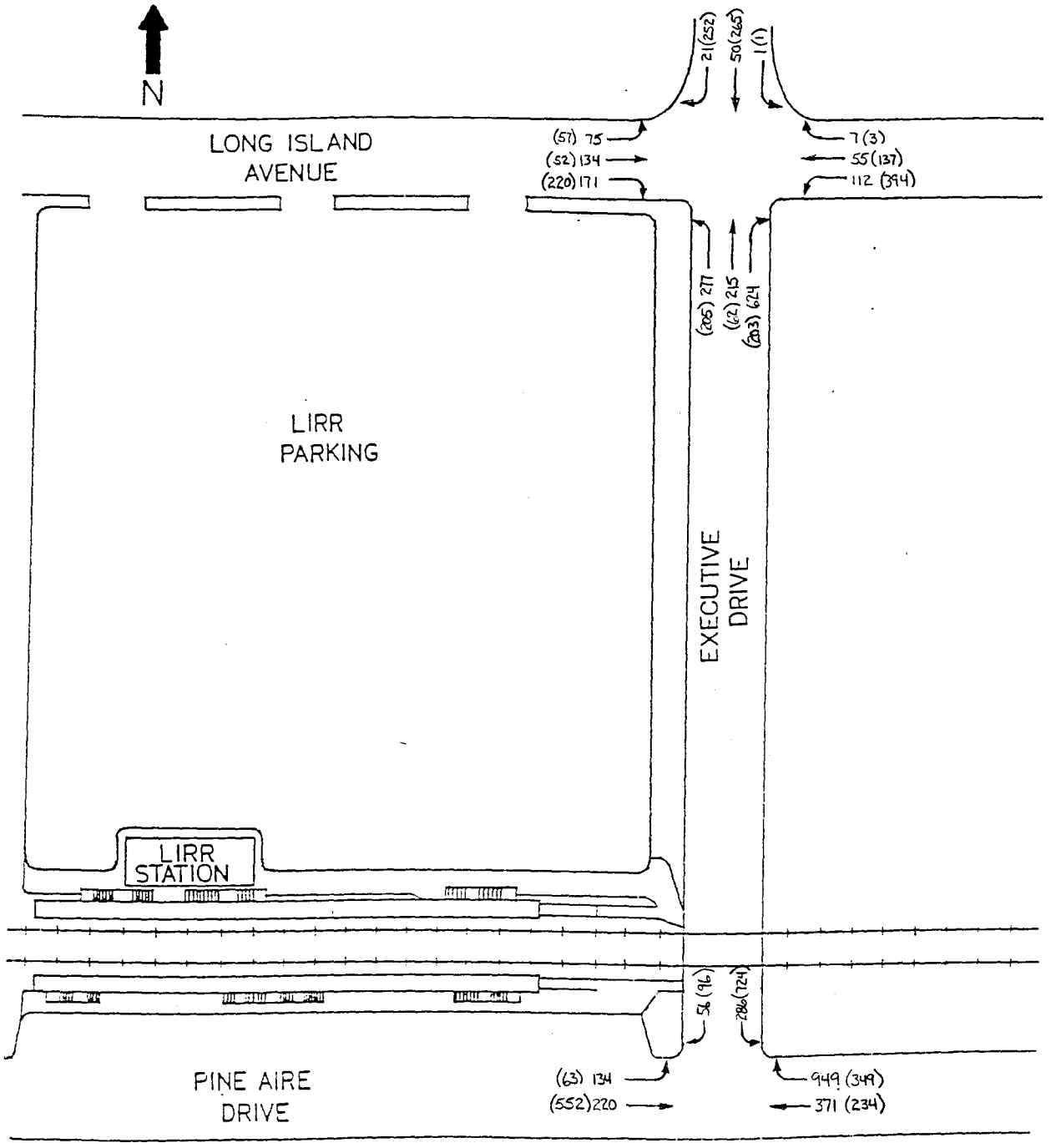

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FIGURE L12
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

DEER PARK LIRR STATION
EDGEWOOD NY 11717

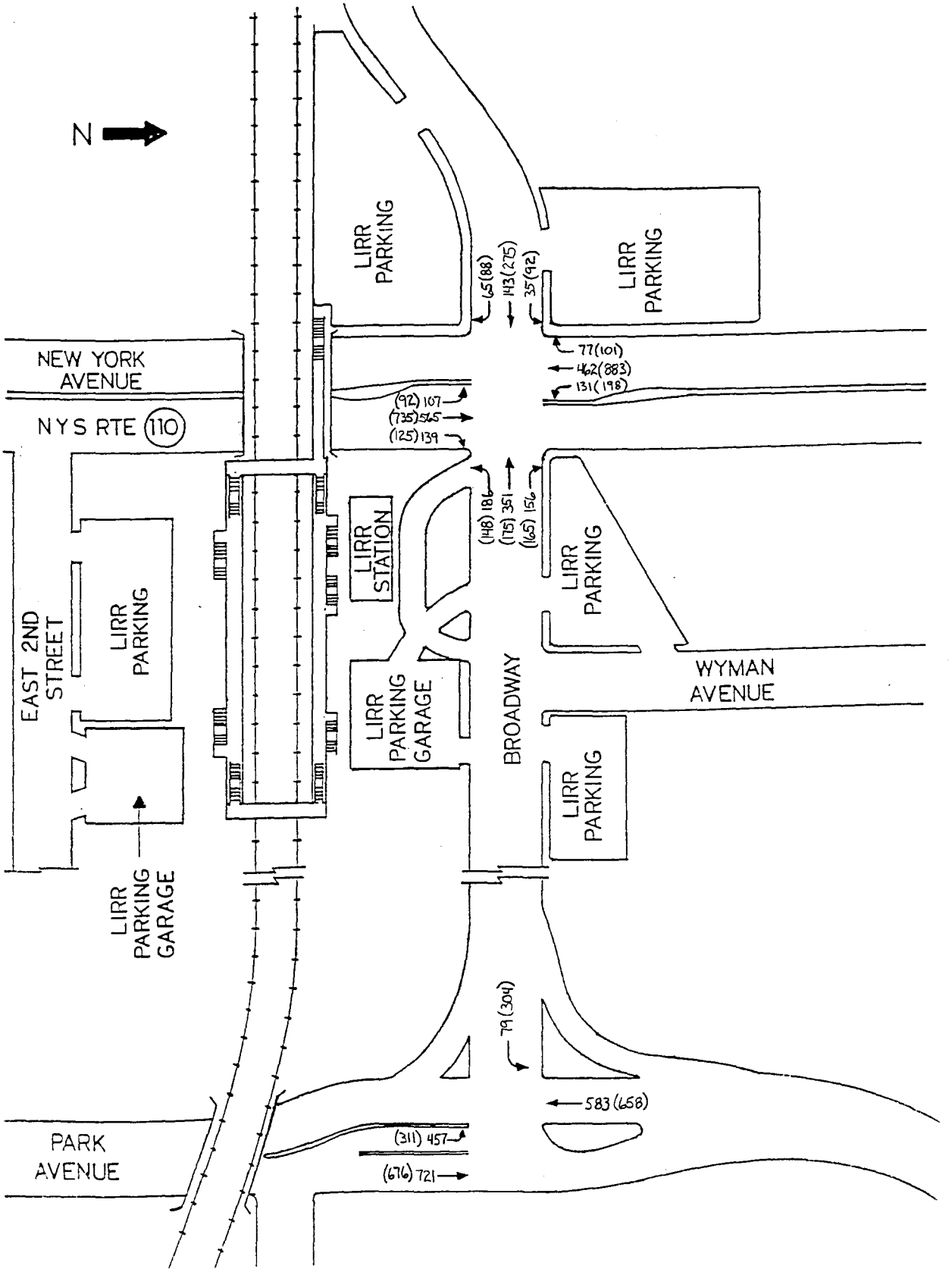

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FIGURE L13
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

HUNTINGTON LIRR STATION
HUNTINGTON MANOR NY 11746

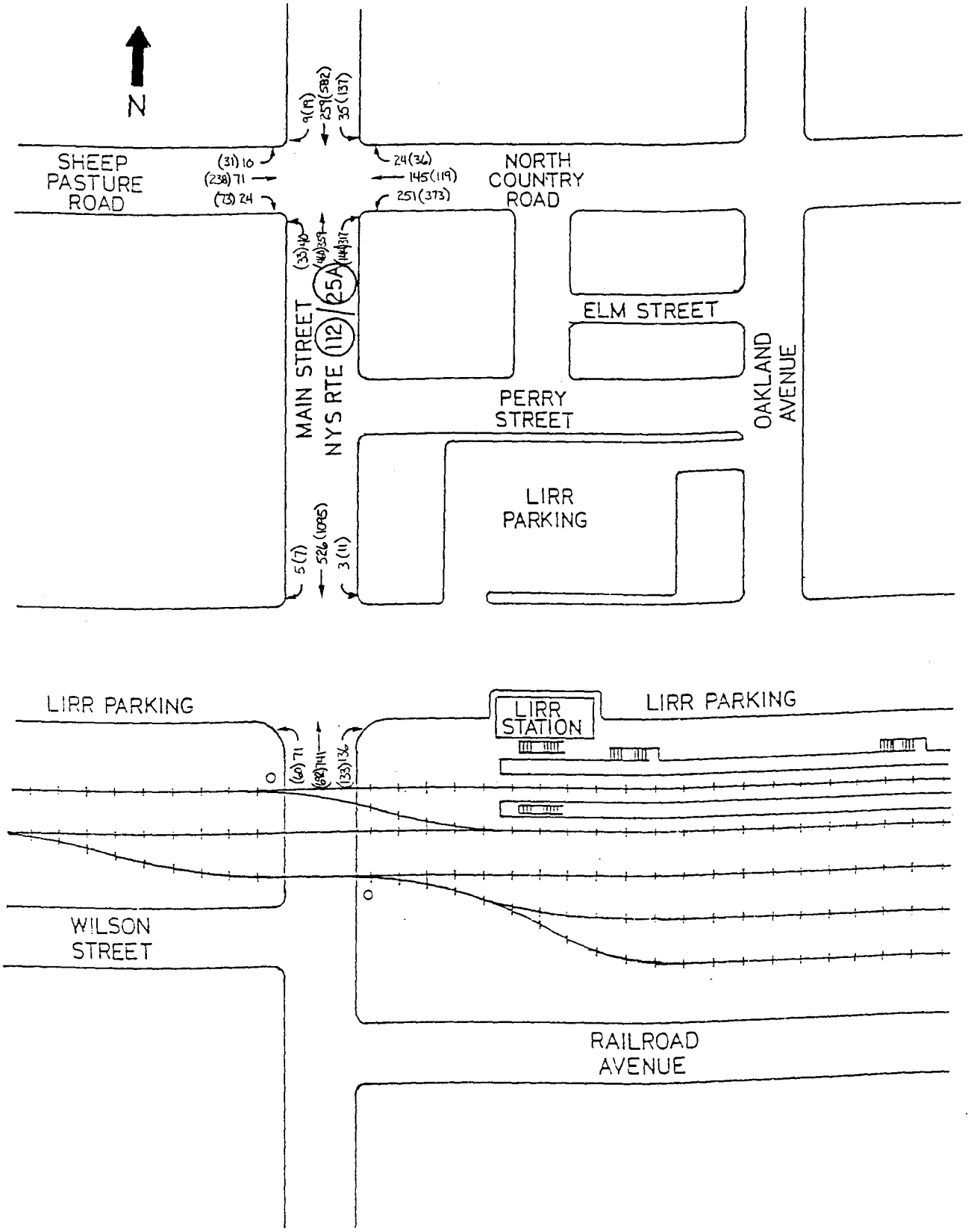

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FIGURE L14
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
PORT JEFFERSON LIRR STATION
PORT JEFFERSON STATION NY 11776

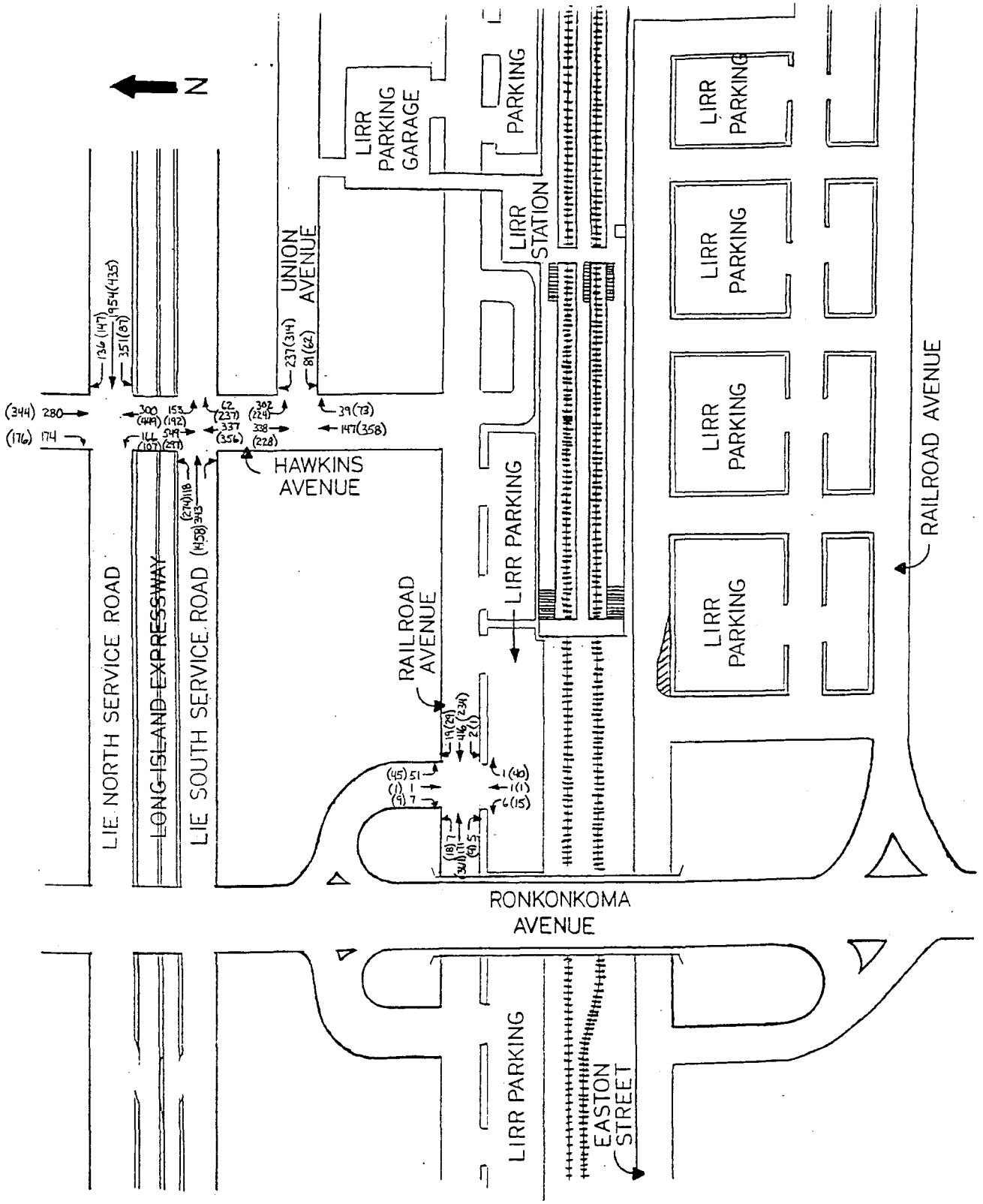

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FIGURE L15
EXISTING LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

RONKONKOMA LIRR STATION
RONKONKOMA NY 11779

FIGURES L - 16 to L - 30

NO BUILD LONG ISLAND RAIL ROAD STATION AREA TRAFFIC VOLUMES

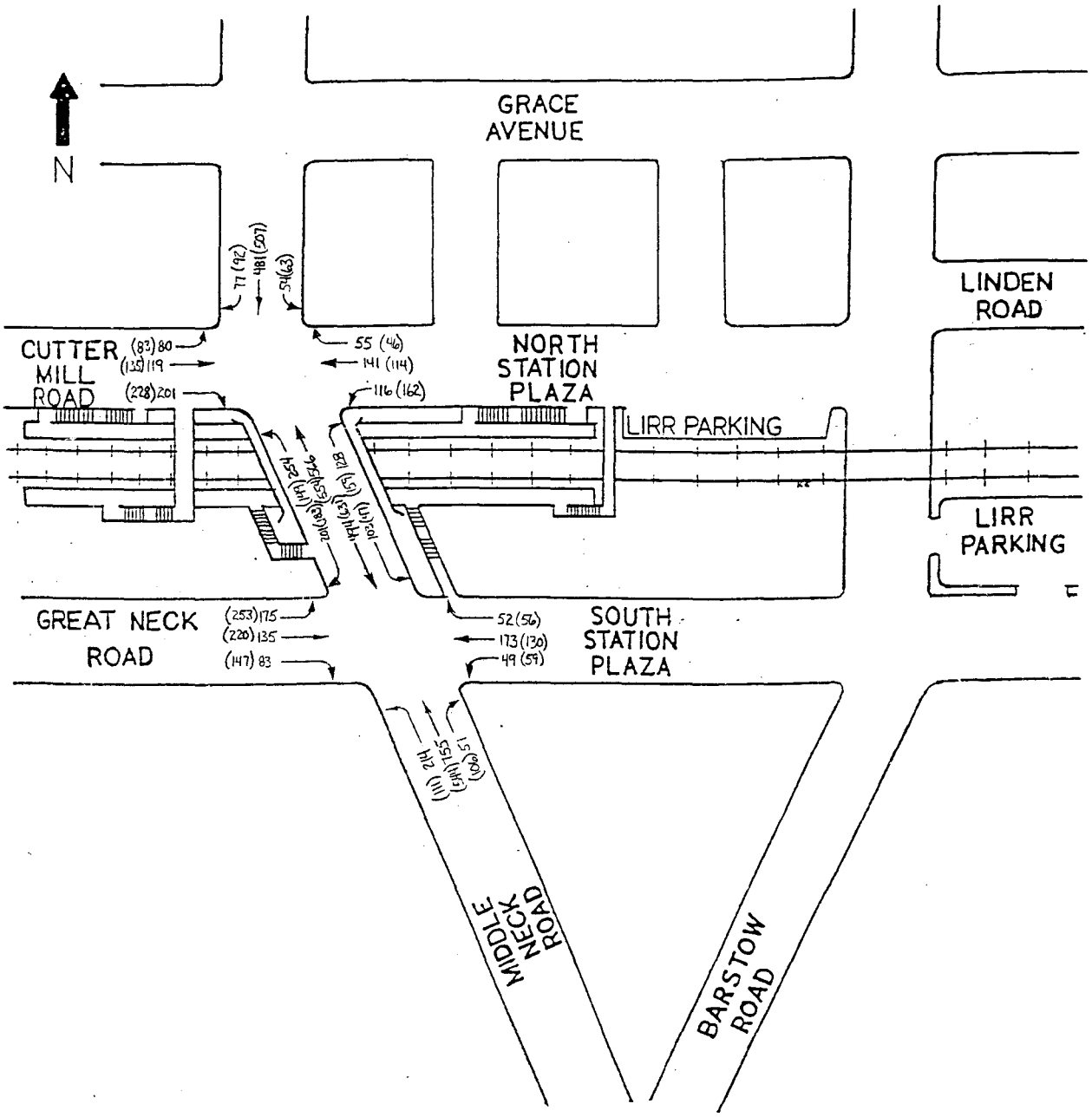

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FIGURE L16
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND PM PEAK HOURS
GREAT NECK LIRR STATION
GREAT NECK NY 11021

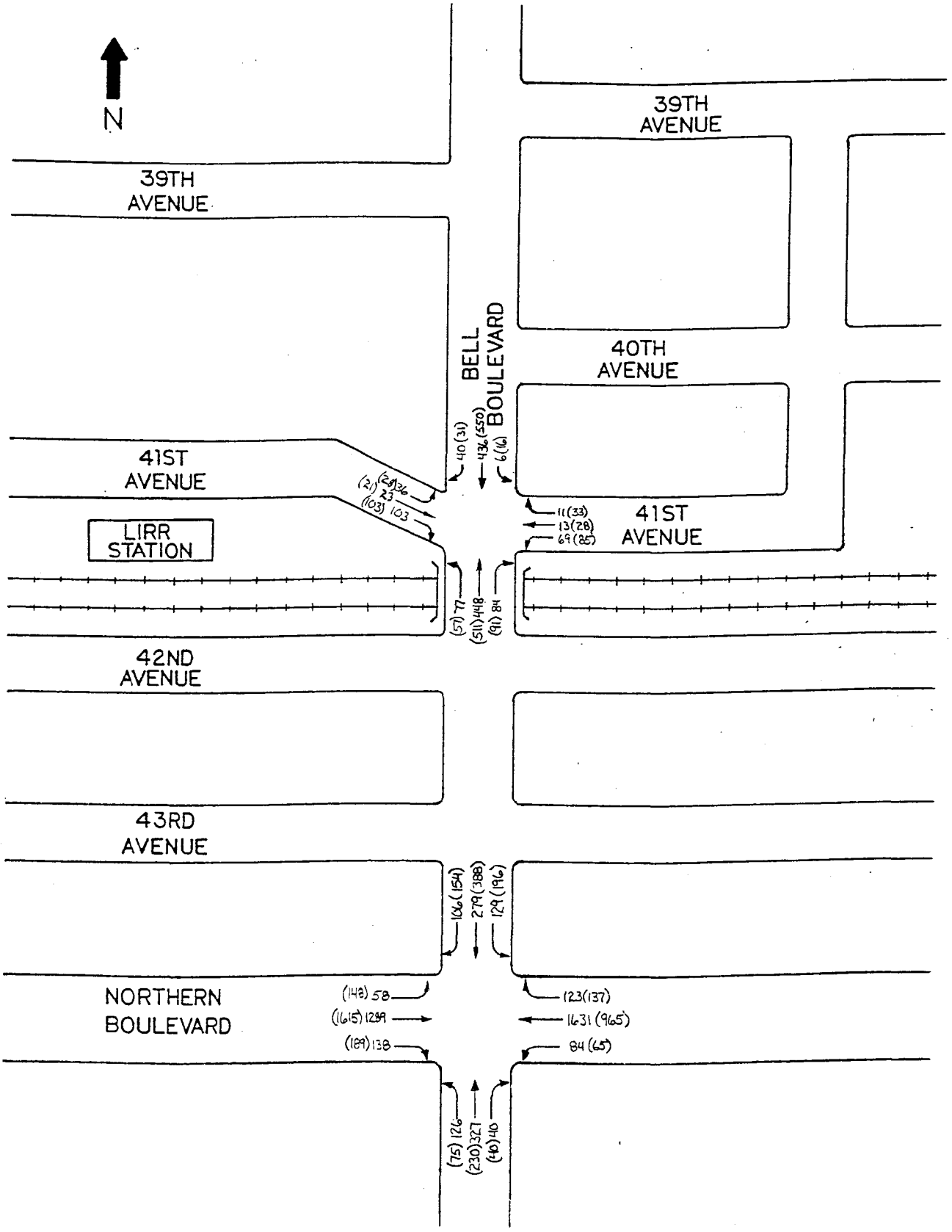

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FIGURE L21
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
BAYSIDE LIRR STATION
BAYSIDE NY 11361

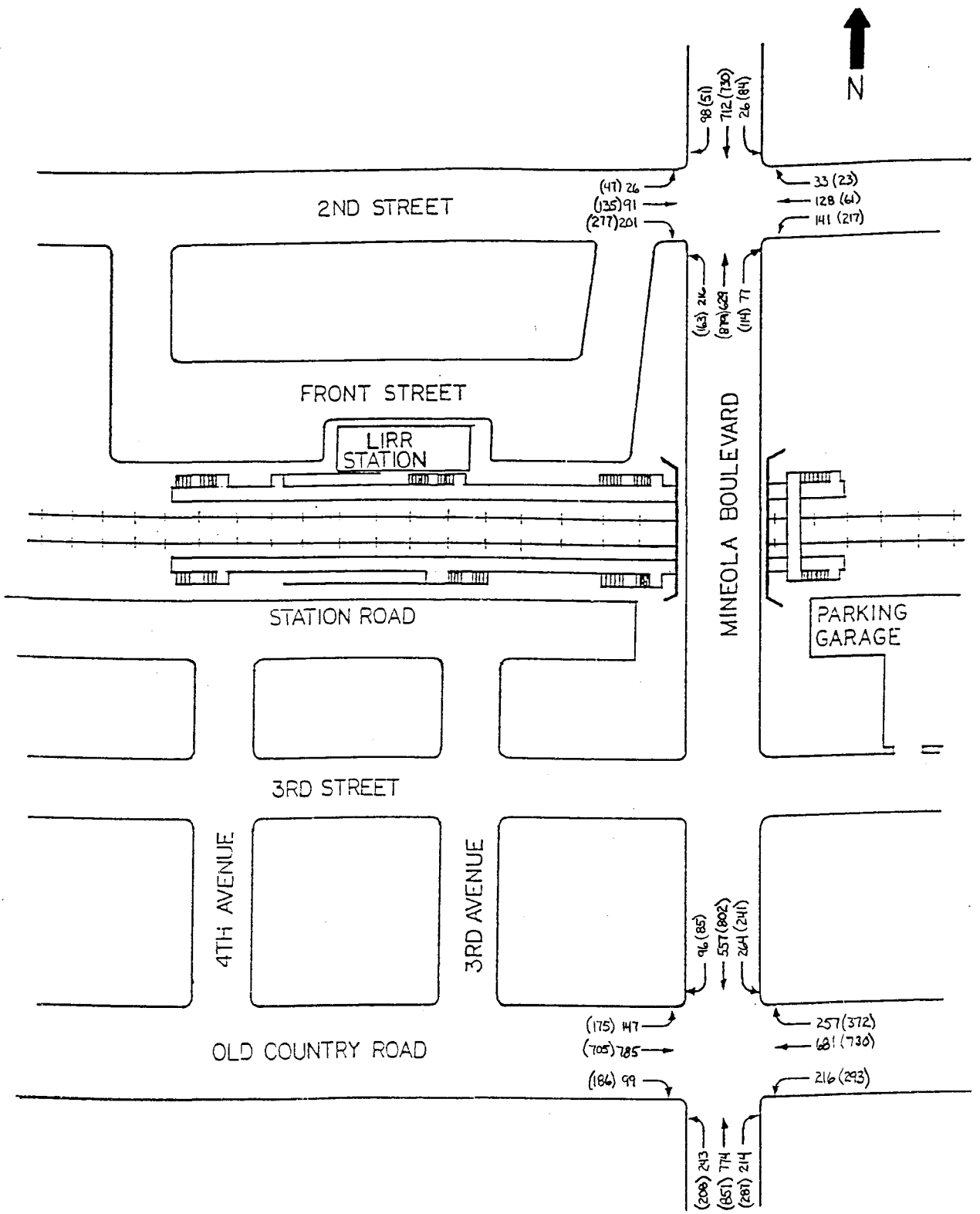

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FIGURE L22
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MINEOLA LIRR STATION
MINEOLA NY 11501

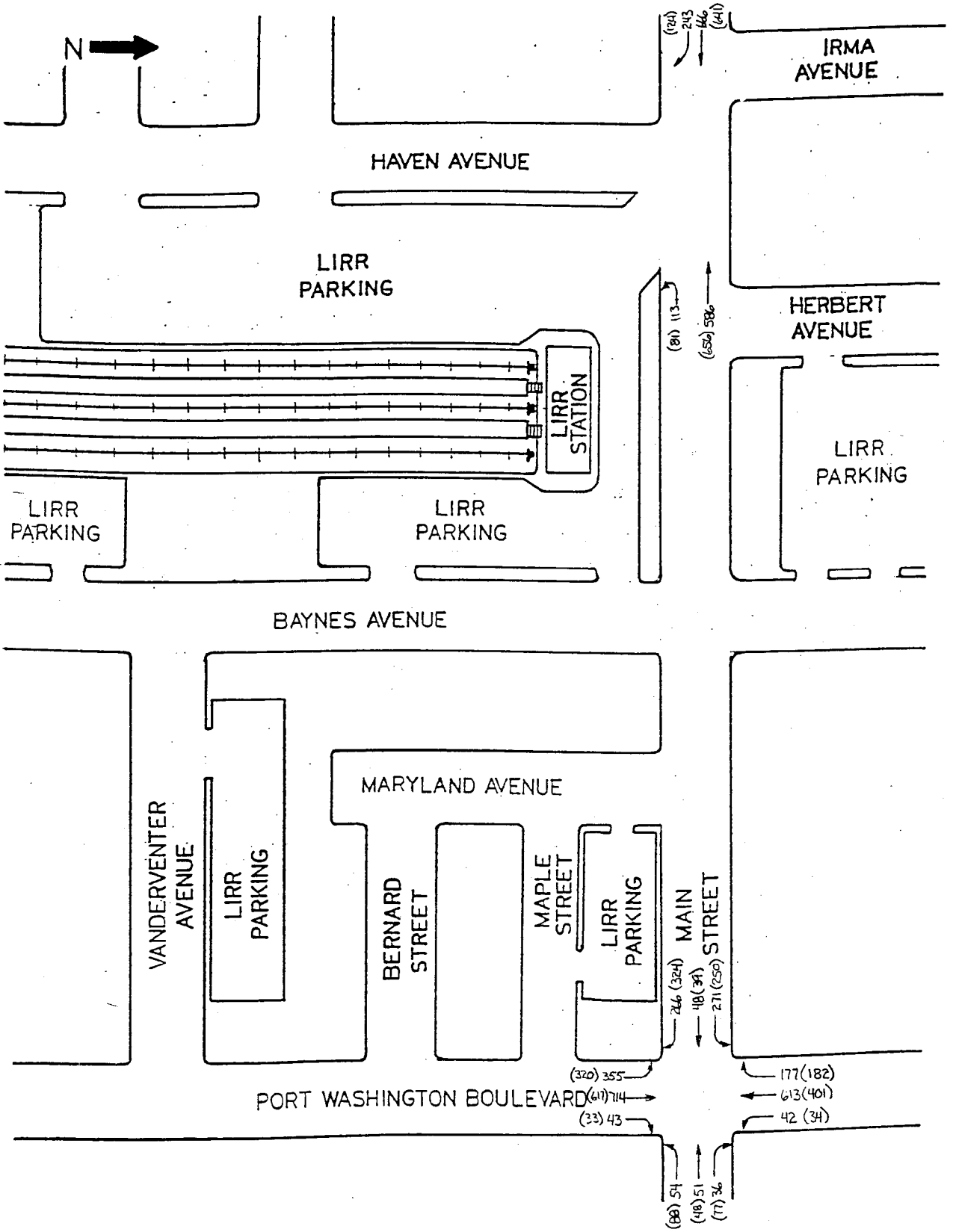

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FIGURE L23
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

PORT WASHINGTON LIRR STATION
PORT WASHINGTON NY 11050

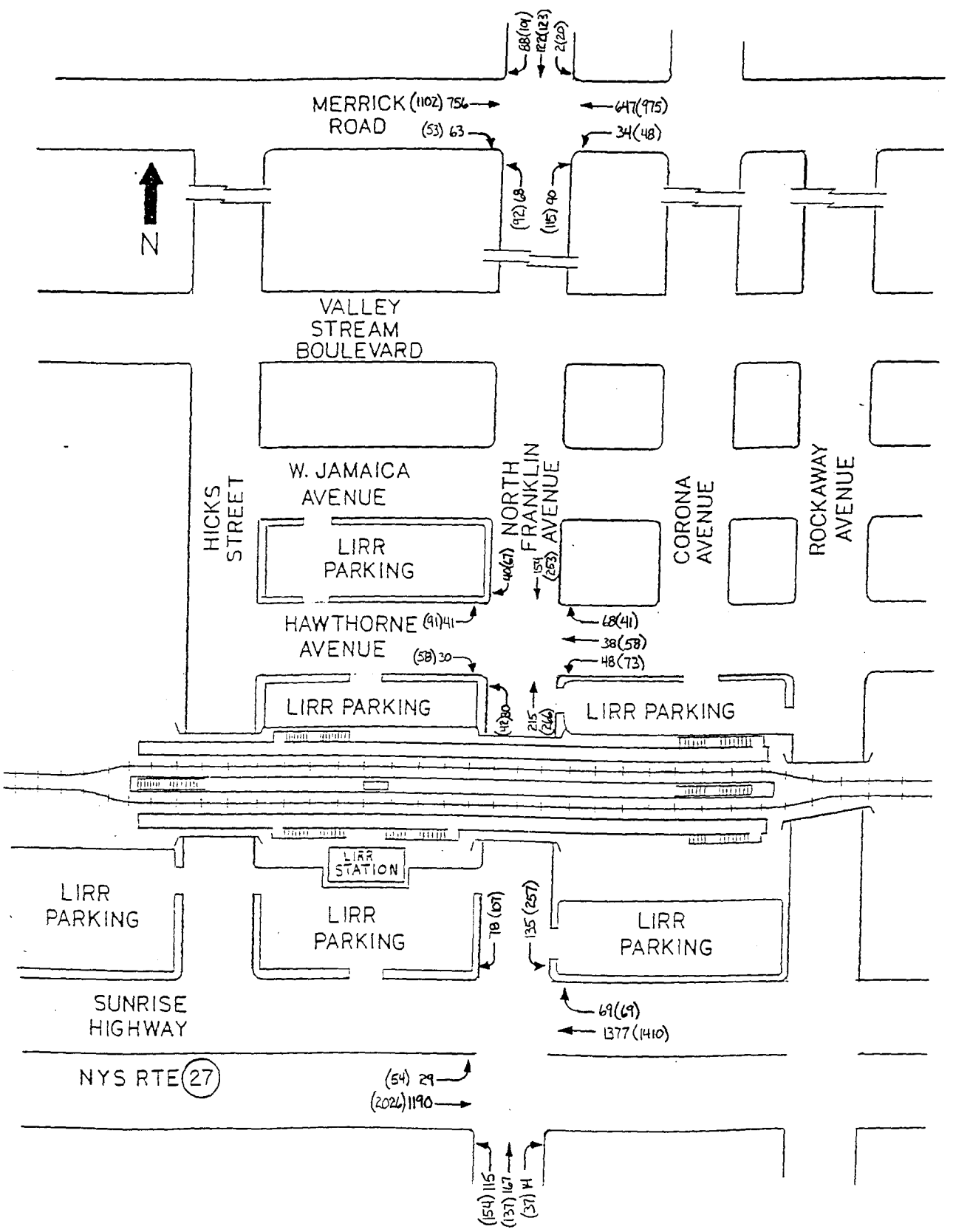

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FIGURE L24
NO BUILD LIRR TRAFFIC VOLUMES: AM AND (PM) PEAK HOURS

VALLEY STREAM LIRR STATION
VALLEY STREAM NY 11580

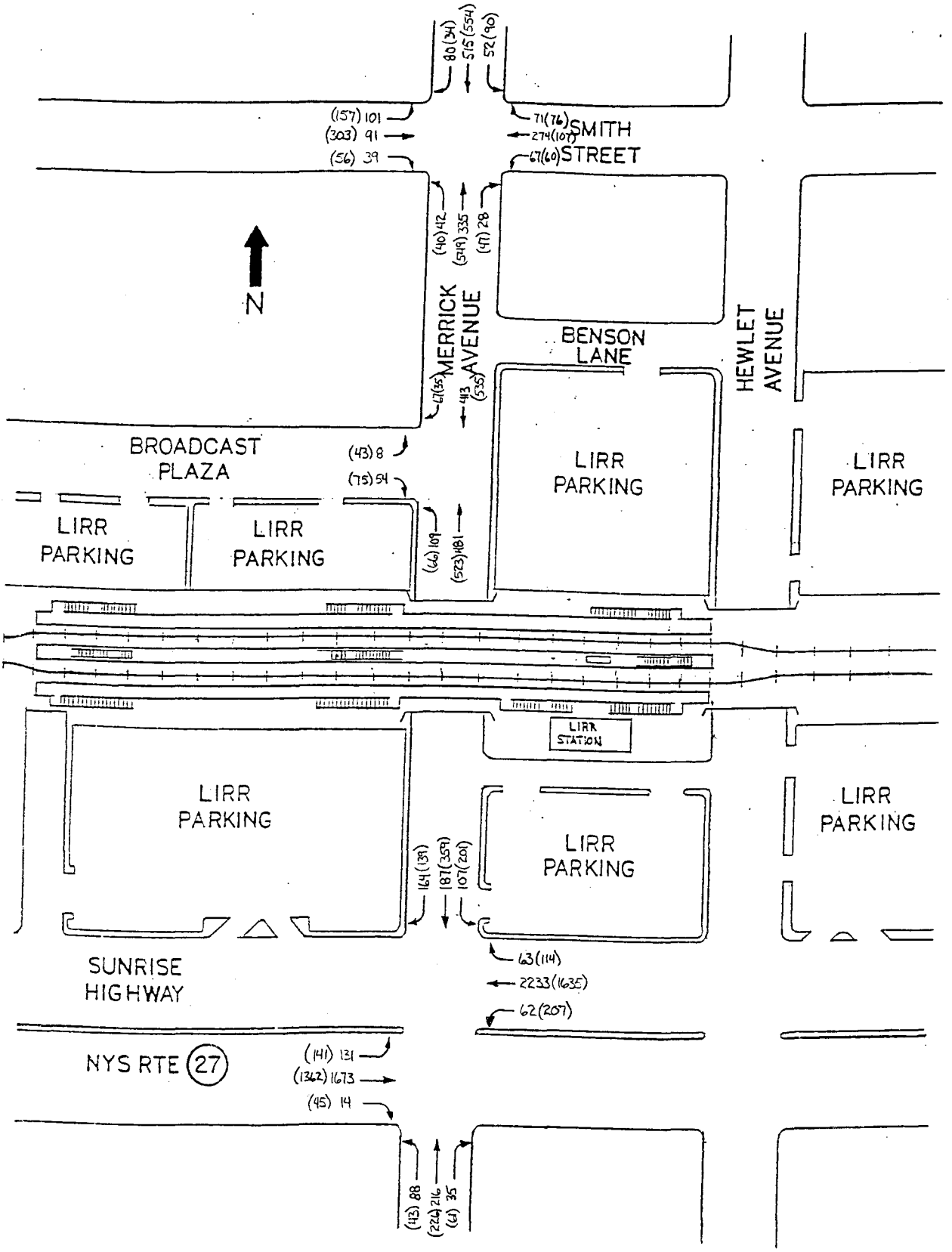

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FIGURE L25
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND(PM)PEAK HOURS
MERRICK LIRR STATION
MERRICK NY 11566

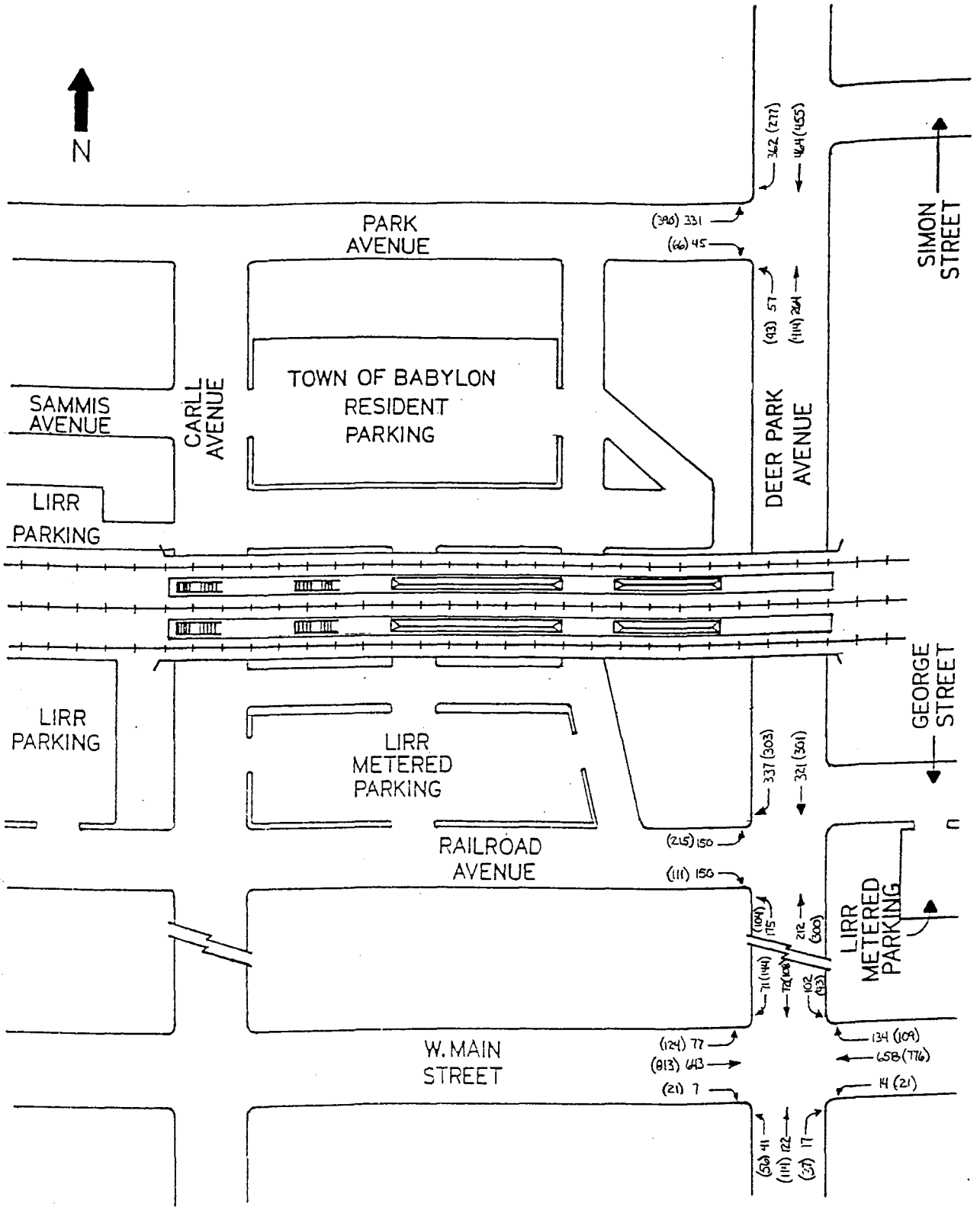

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FIGURE L26
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

BABYLON LIRR STATION
BABYLON NY 11702

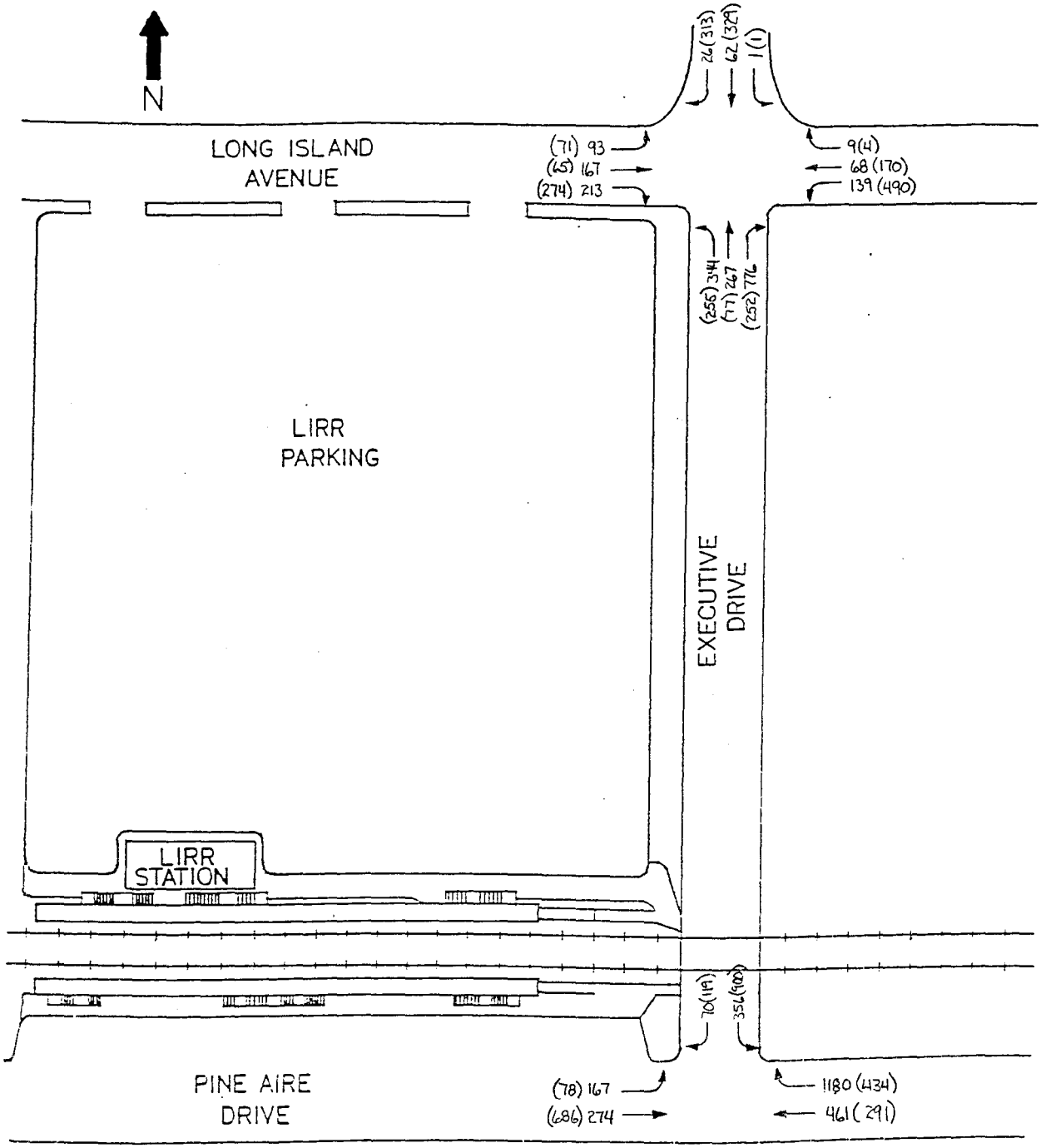

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FIGURE L27
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

DEER PARK LIRR STATION
EDGEWOOD NY 11717

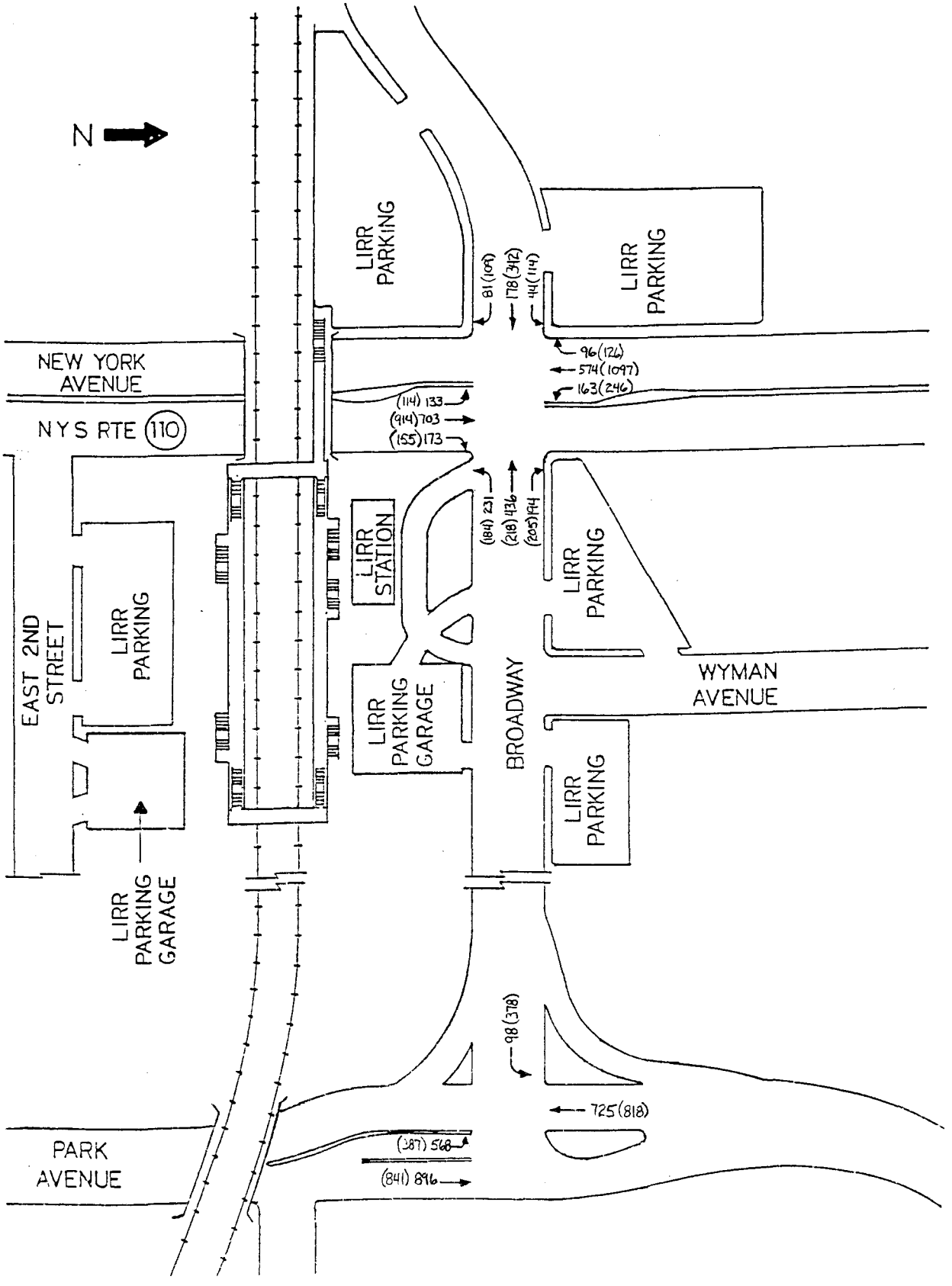

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FIGURE L28
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

HUNTINGTON LIRR STATION
HUNTINGTON MANOR NY 11746

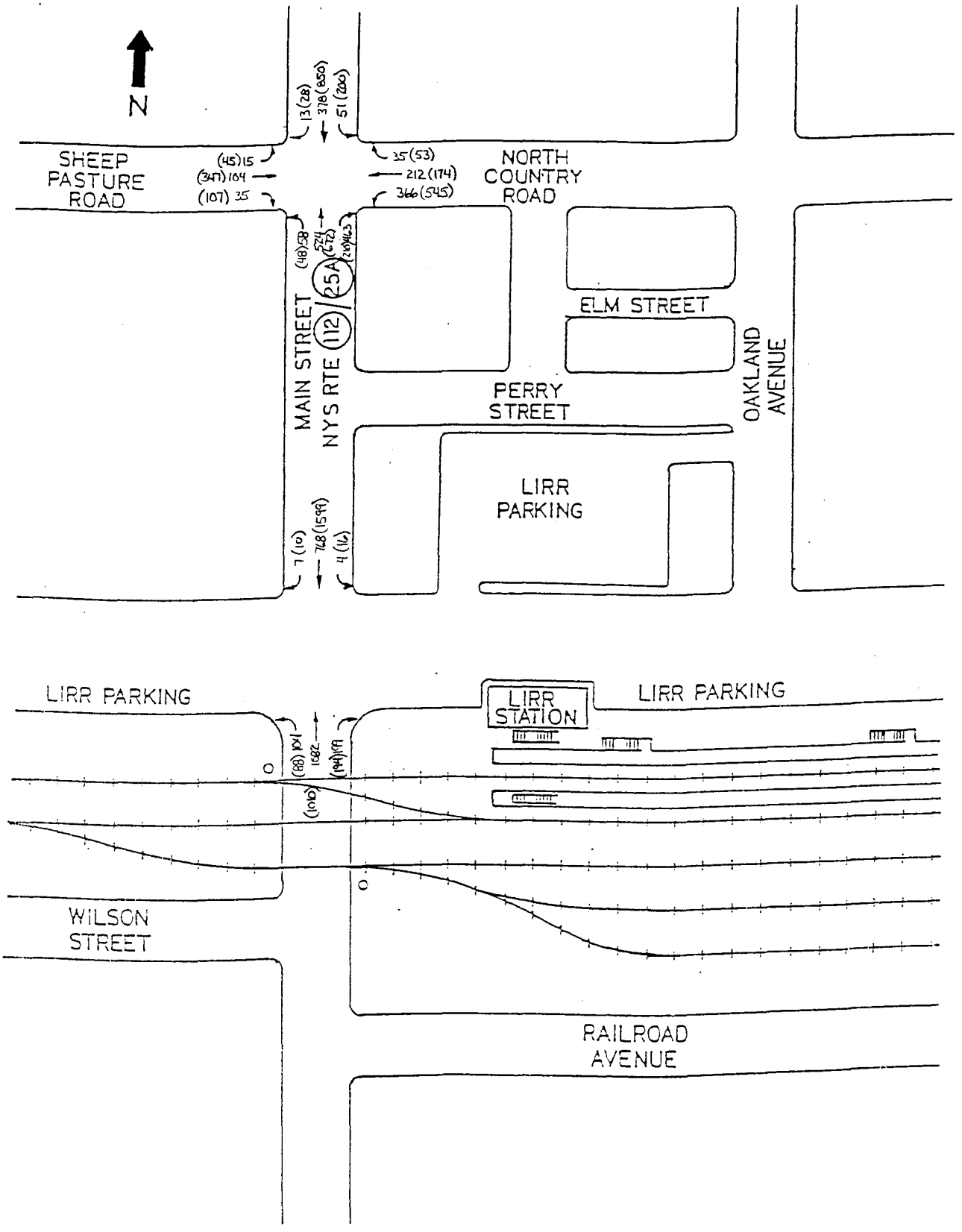

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FIGURE L29
NO BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
PORT JEFFERSON LIRR STATION
PORT JEFFERSON STATION, NY 11776

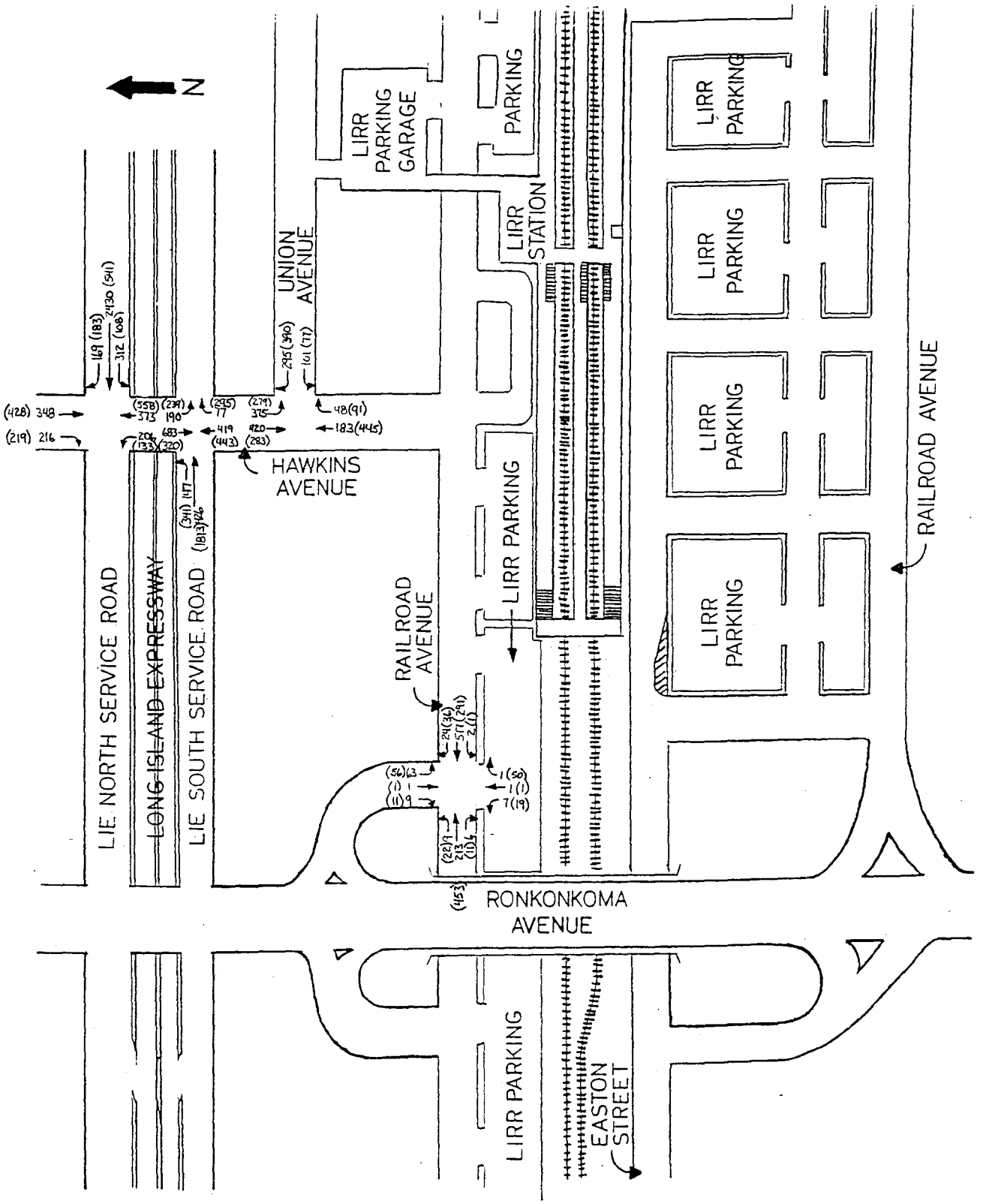

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FIGURE L30
NO BUILD LIRR TRAFFIC VOLUMES
AM AND (PM) PEAK HOURS

RONKONKOMA LIRR STATION
RONKONKOMA NY 11779

FIGURES L - 31 to L - 45

BUILD LONG ISLAND RAIL ROAD STATION AREA TRAFFIC VOLUMES

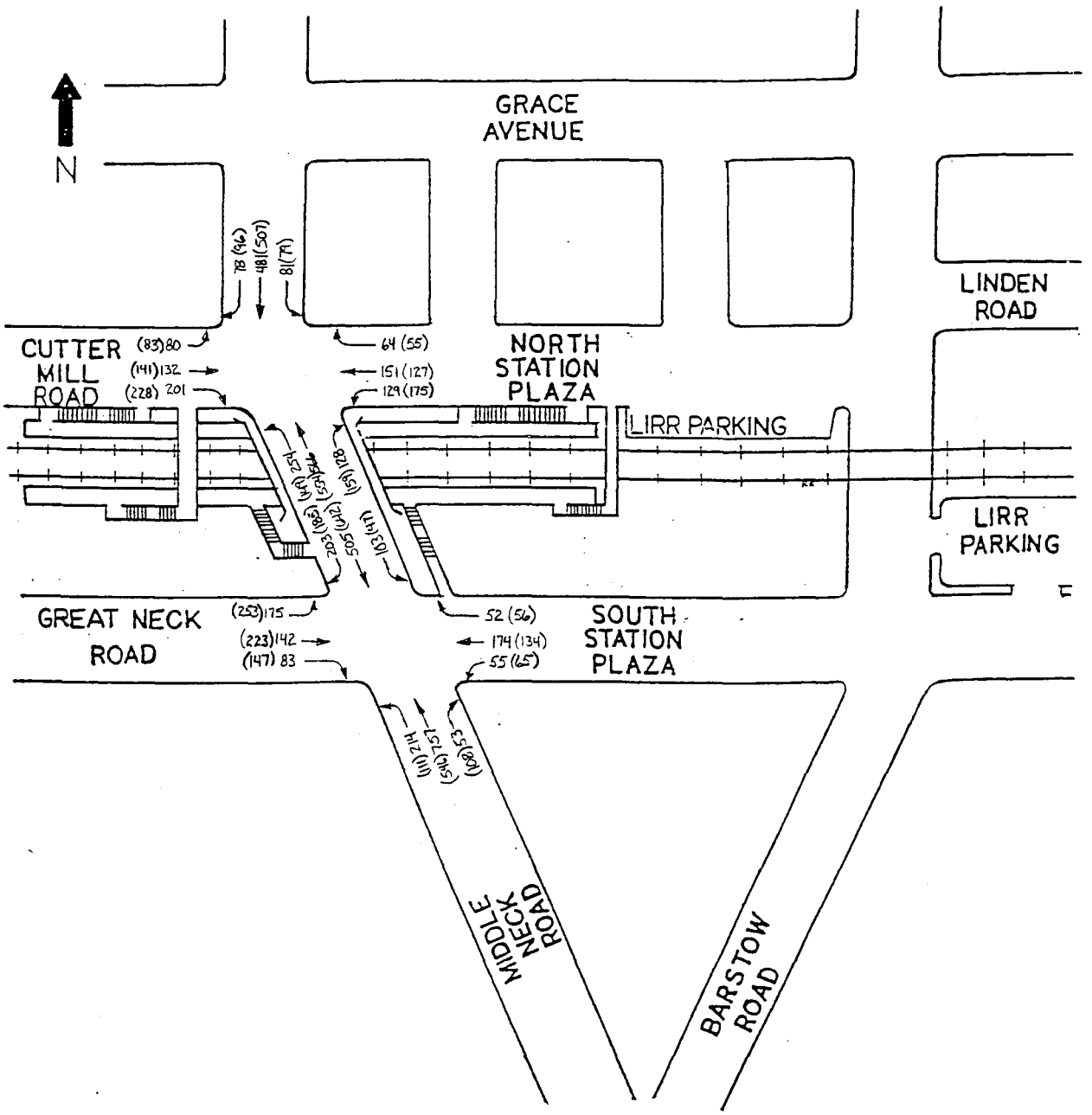

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FIGURE L31
BUILD L'IRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

GREAT NECK LIRR STATION
GREAT NECK NY 11021

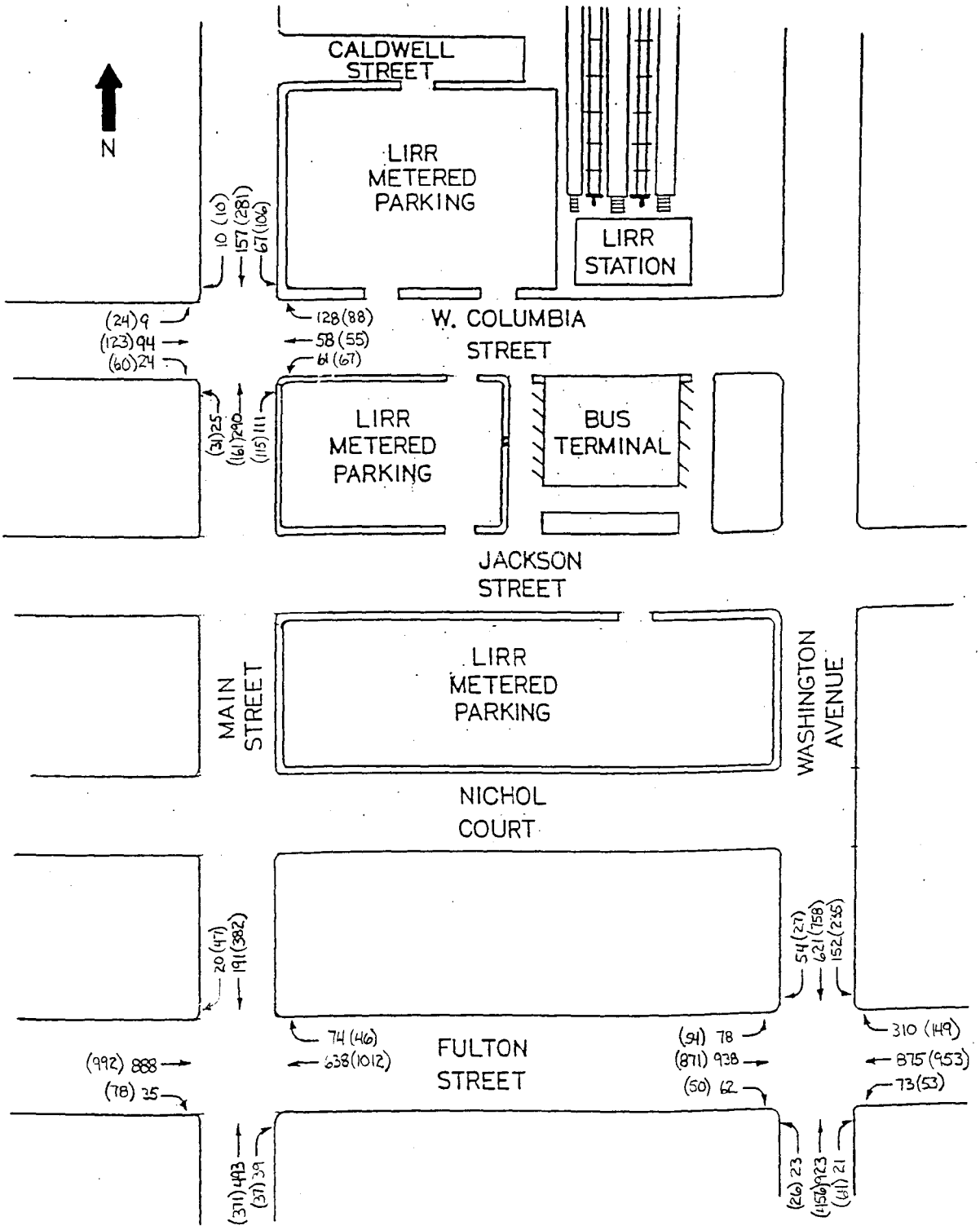

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FIGURE L32
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

HEMPSTEAD LIRR STATION
HEMPSTEAD NY 11550

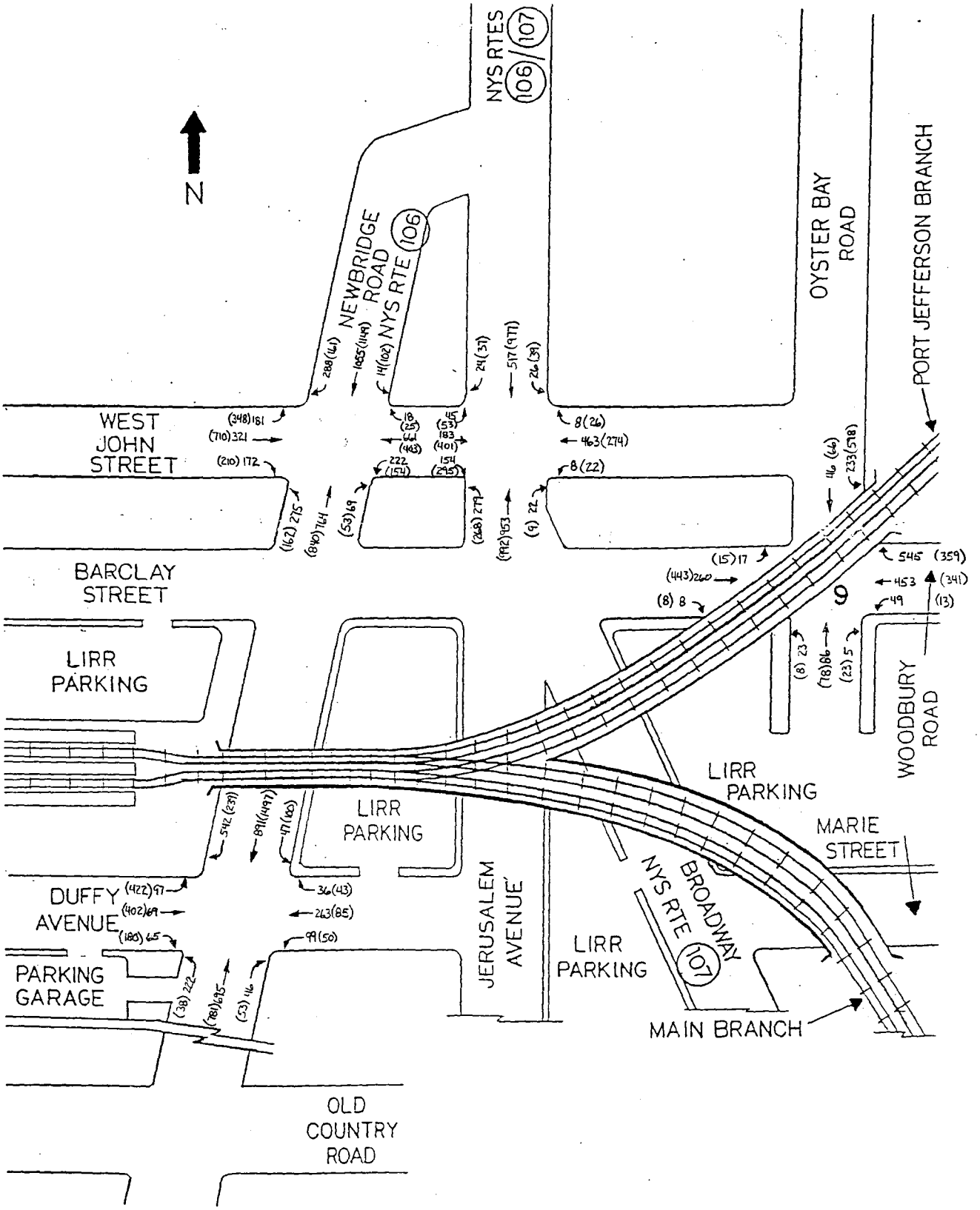

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FIGURE L33
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

HICKSVILLE LIRR STATION

HICKSVILLE NY 11803

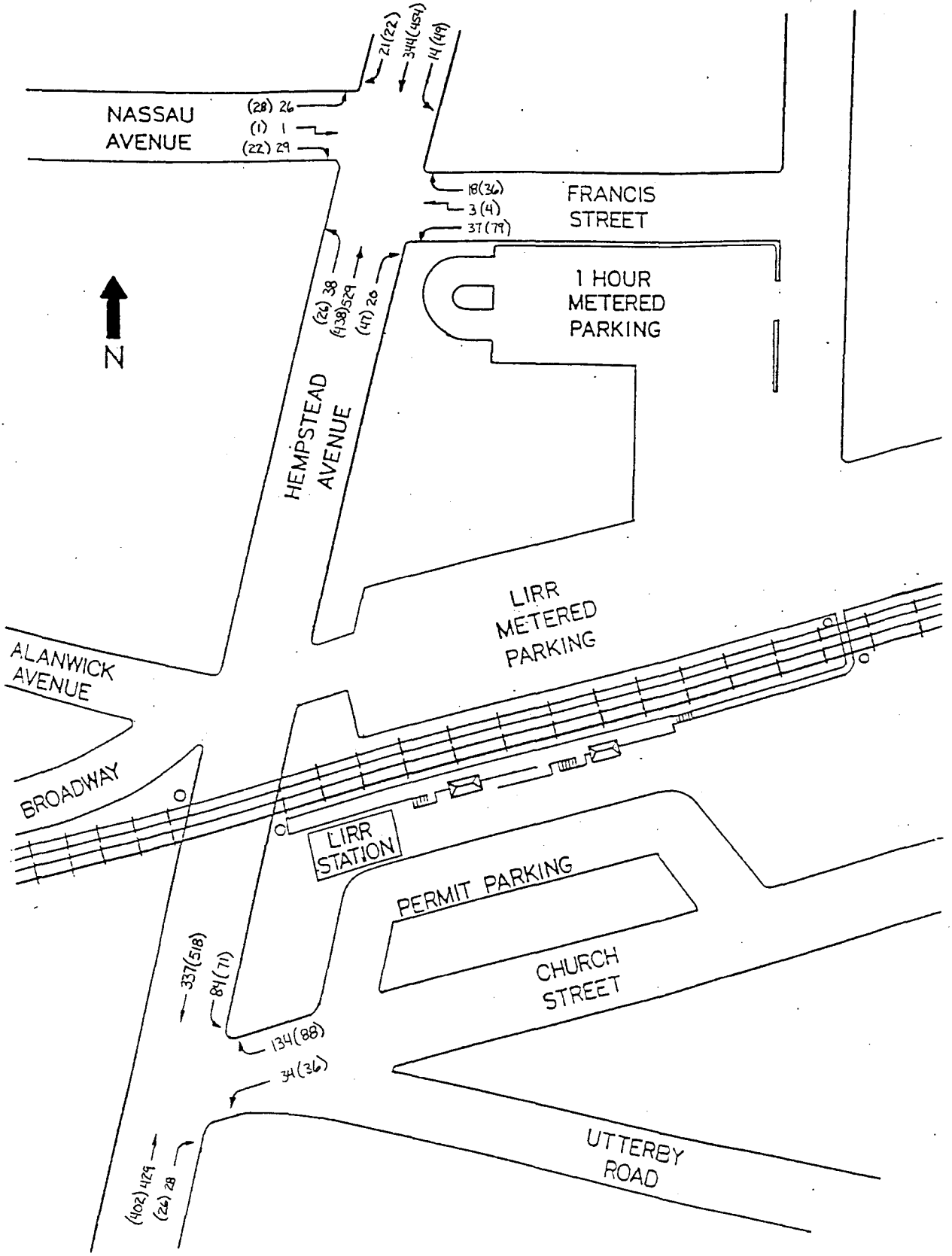

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FIGURE L34
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MALVERNE LIRR STATION
MALVERNE NY 11565

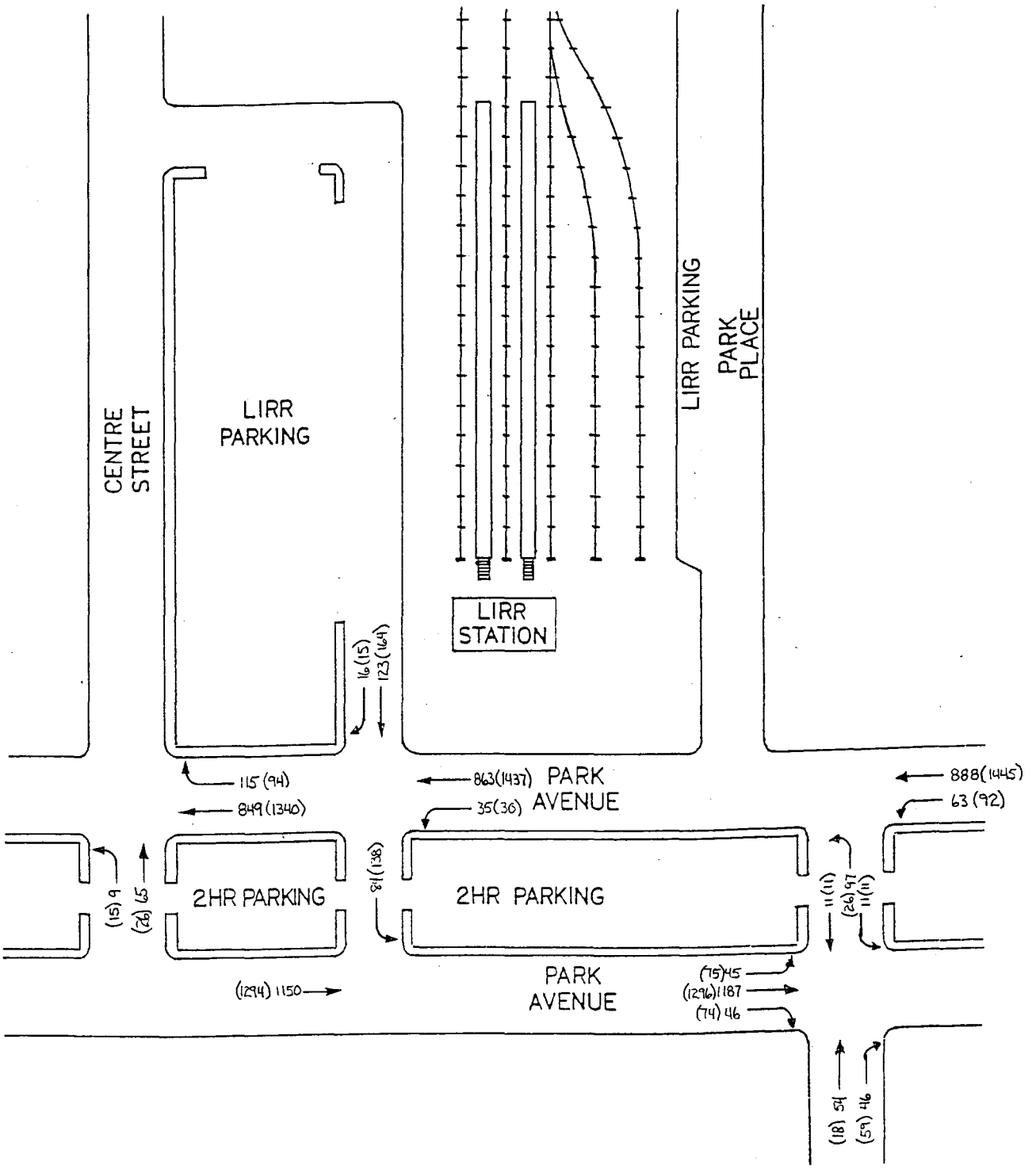

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FIGURE L35
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

LONG BEACH LIRR STATION
LONG BEACH NY 11561

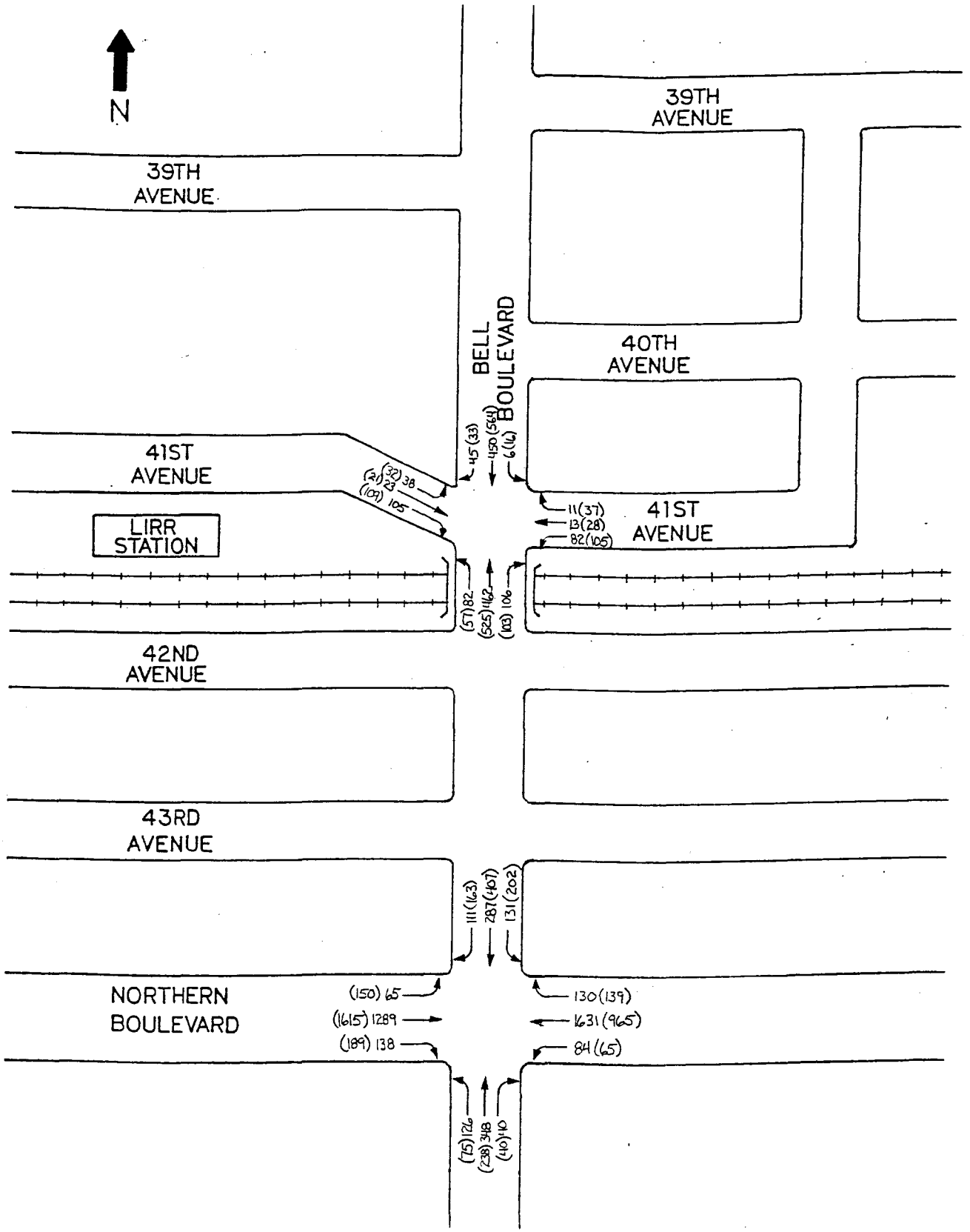

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FIGURE L36
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
BAYSIDE LIRR STATION
BAYSIDE NY 11361

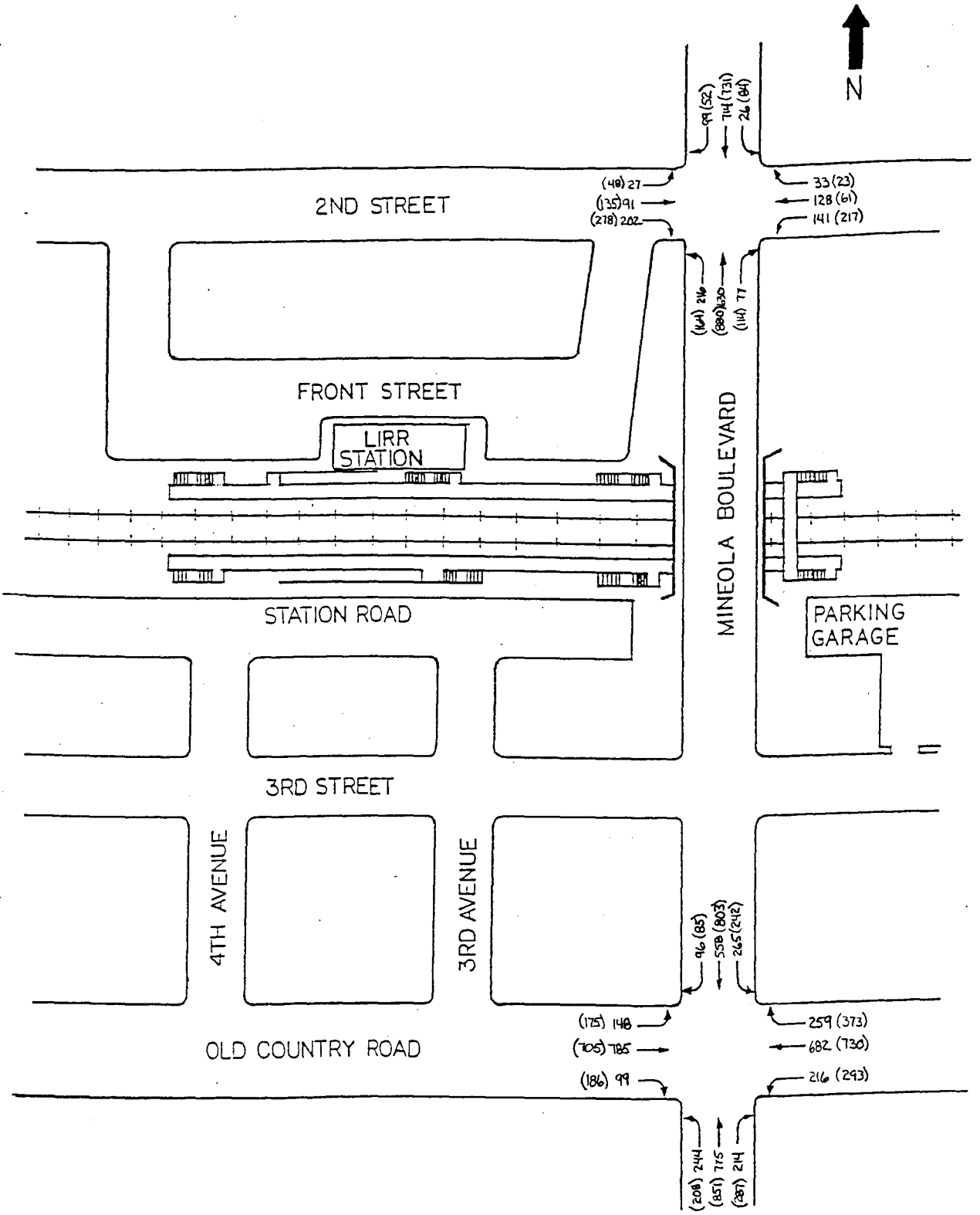

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FIGURE L37
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MINEOLA LIRR STATION
MINEOLA NY 11501

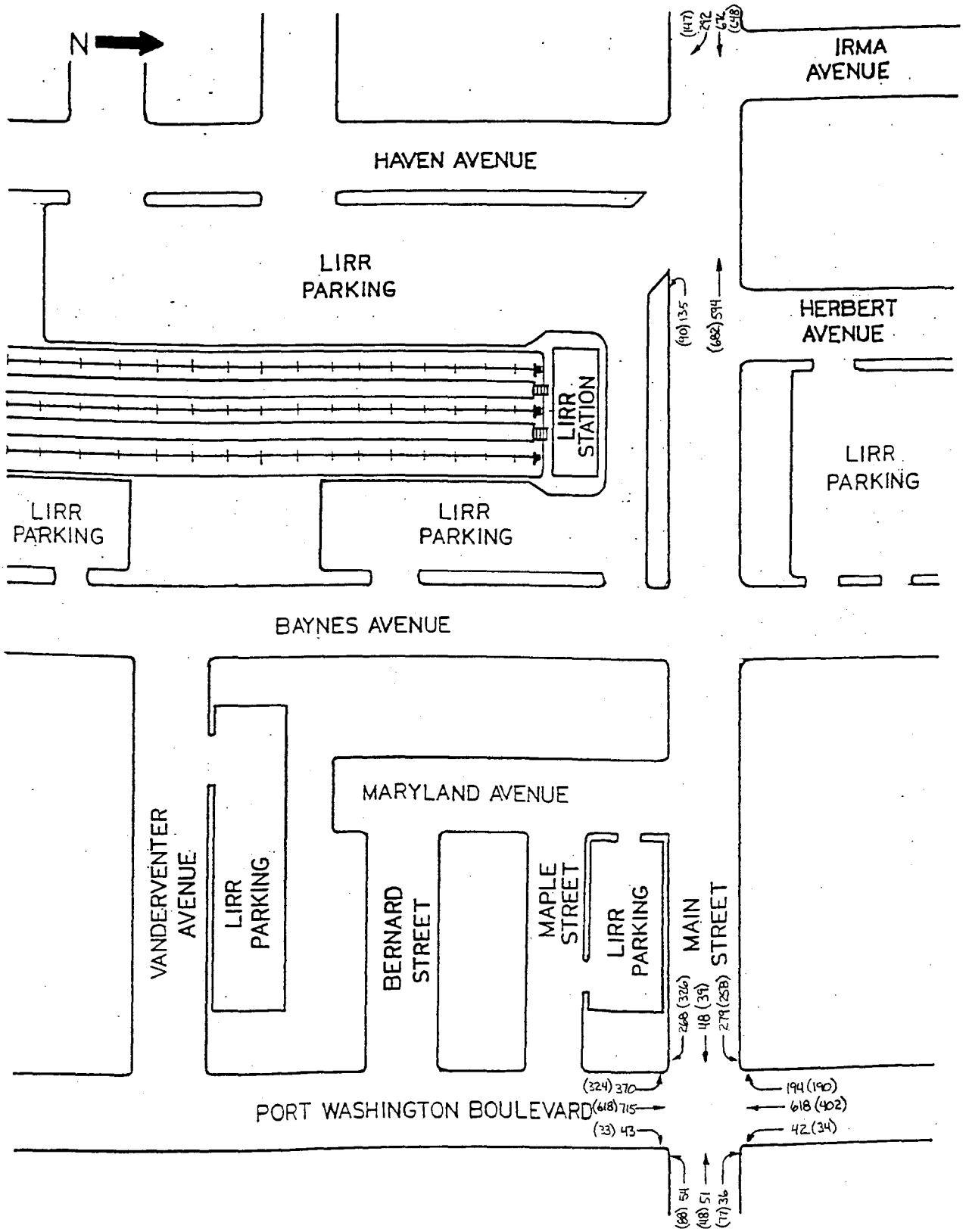

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FIGURE L38
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

PORT WASHINGTON LIRR STATION
PORT WASHINGTON NY 11050

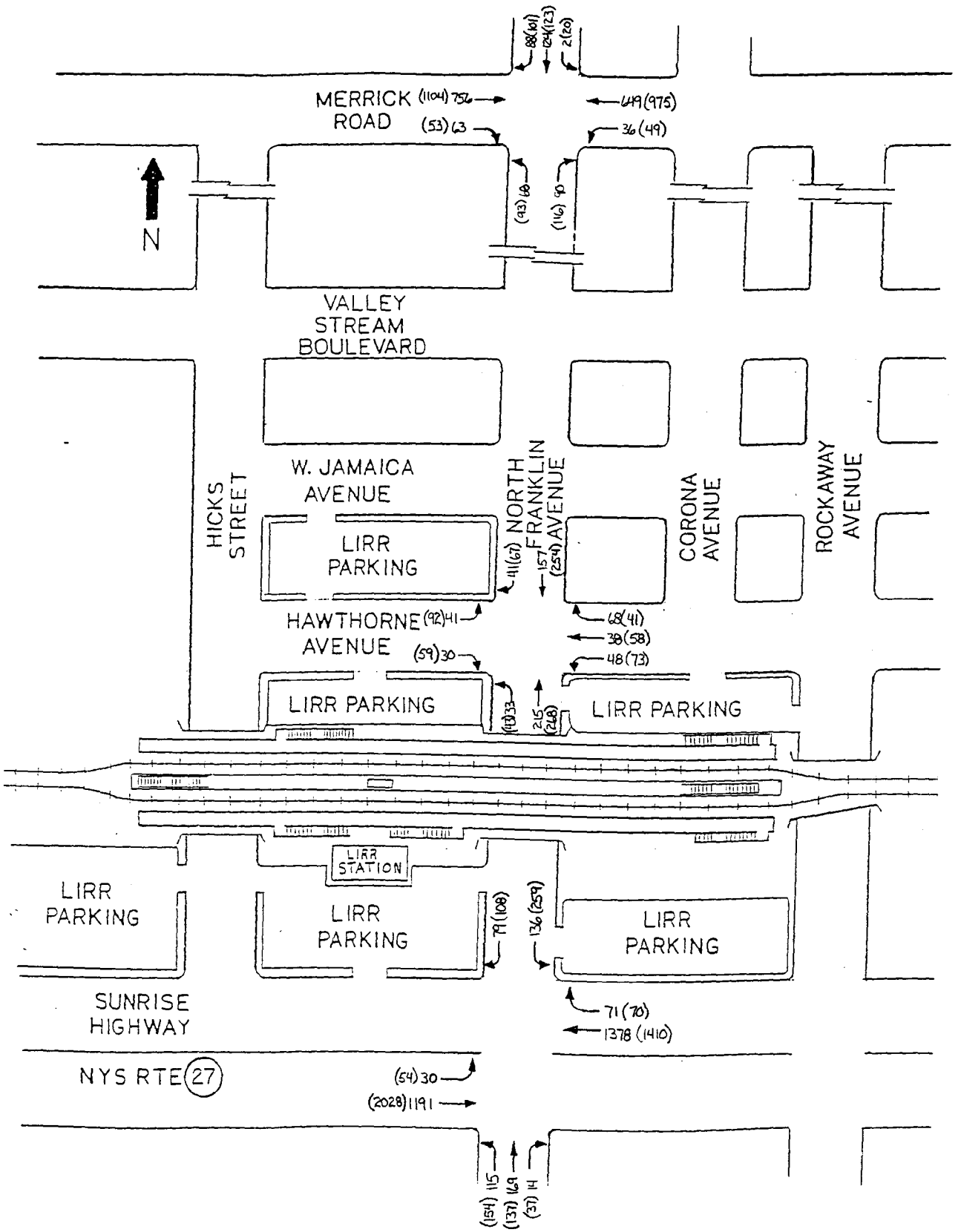

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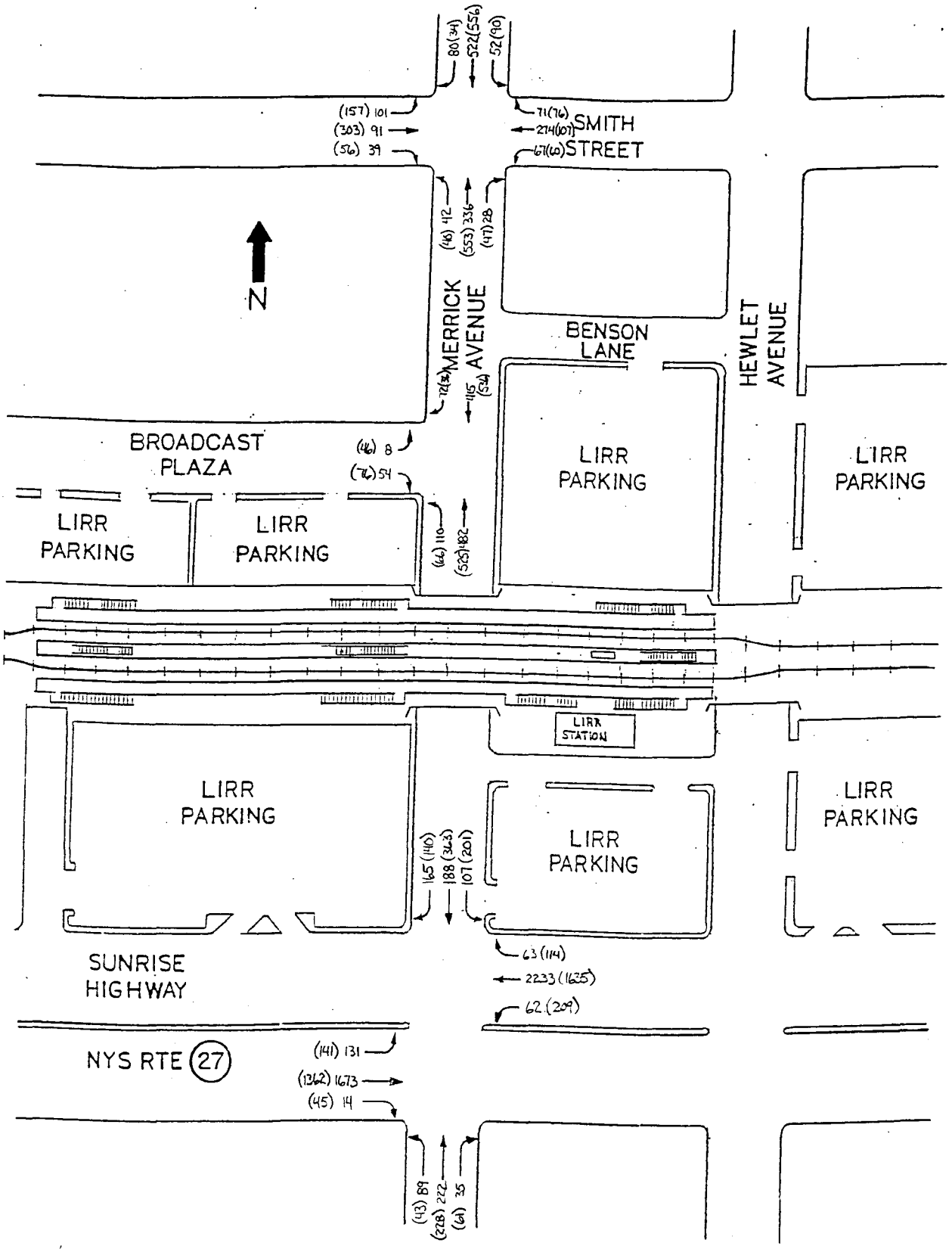
FIGURE L39
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

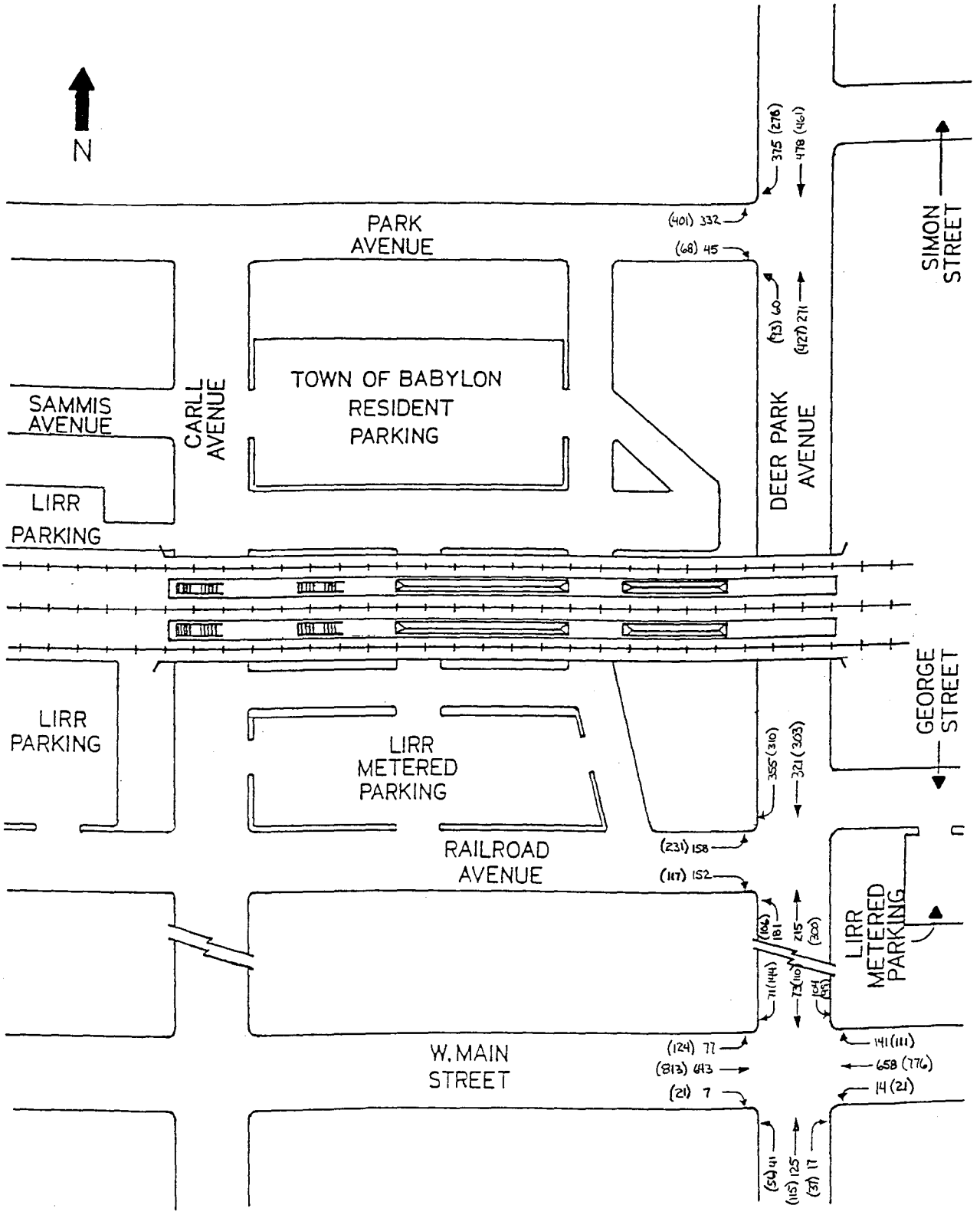
VALLEY STREAM LIRR STATION
VALLEY STREAM NY 11580



Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

FIGURE L40
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
MERRICK LIRR STATION
MERRICK NY 11566



Eng-Wong, Taub & Associates
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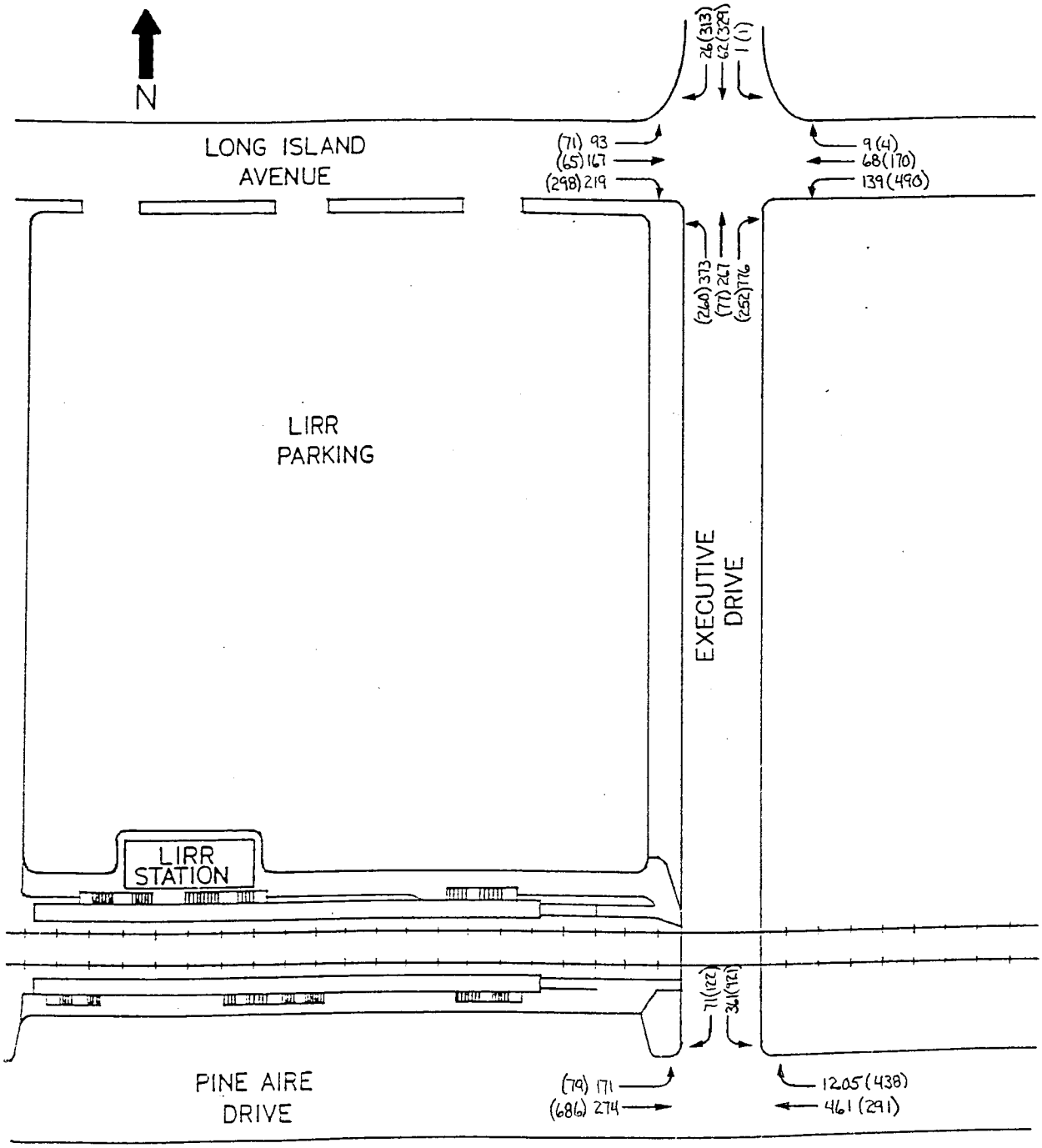
FIGURE L41
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
BABYLON LIRR. STATION
BABYLON NY 11702



Eng-Wong, Taub & Associates
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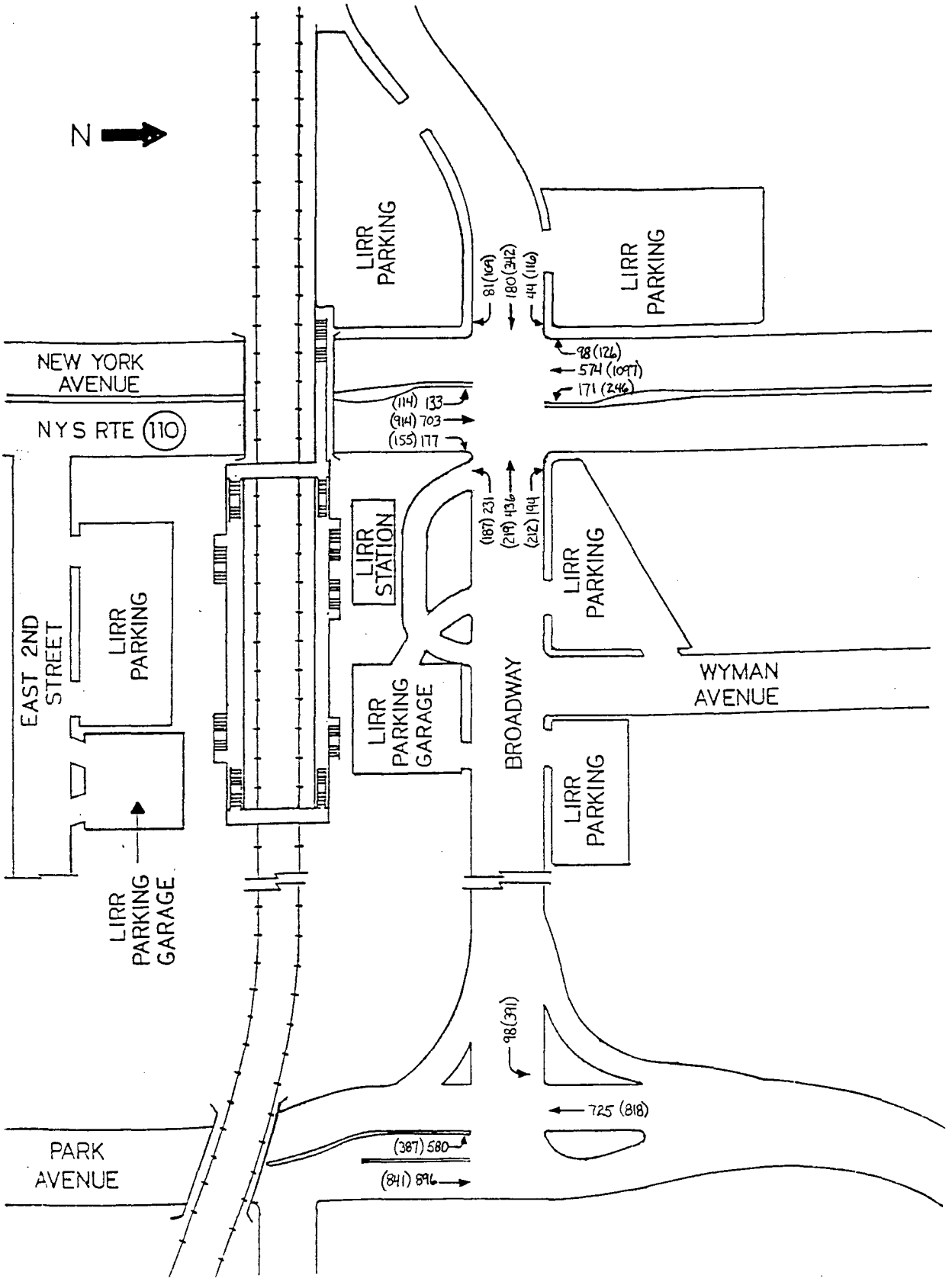
FIGURE L42
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

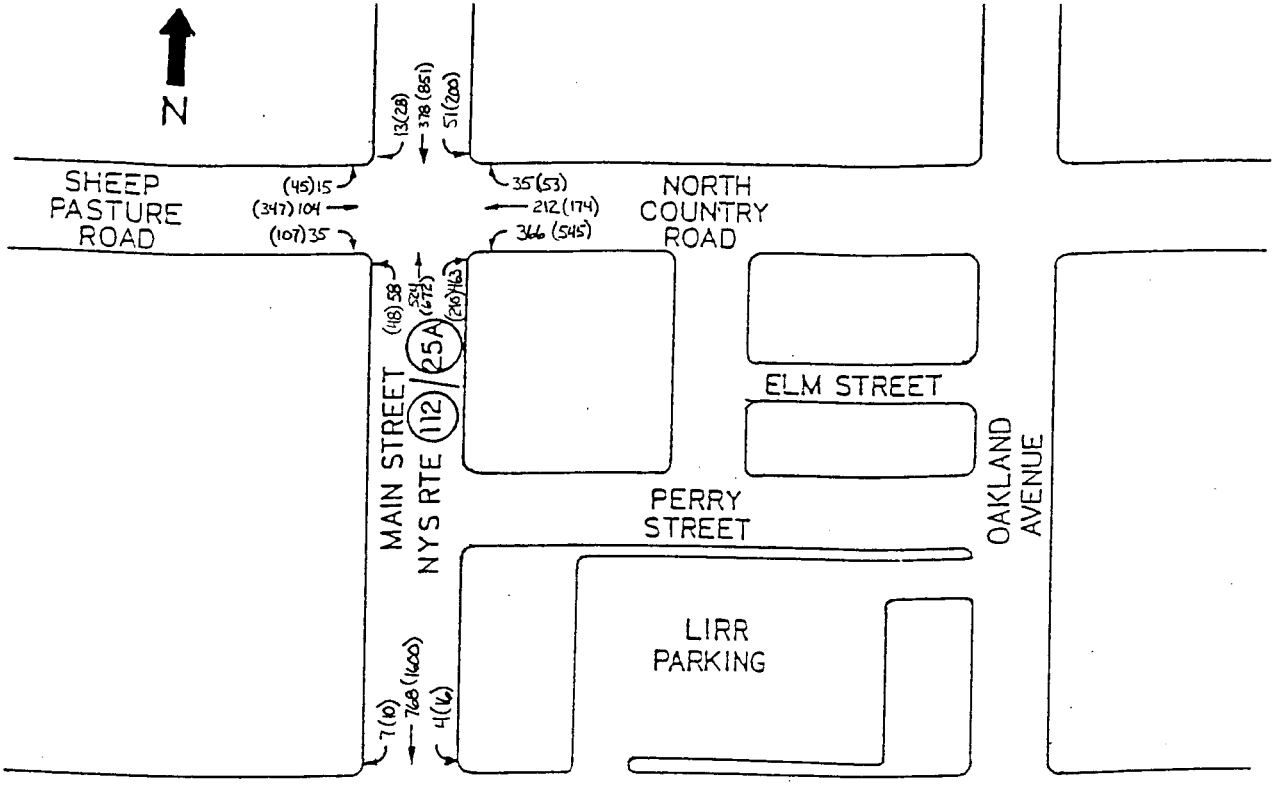
DEER PARK LIRR STATION
EDGEWOOD NY 11717

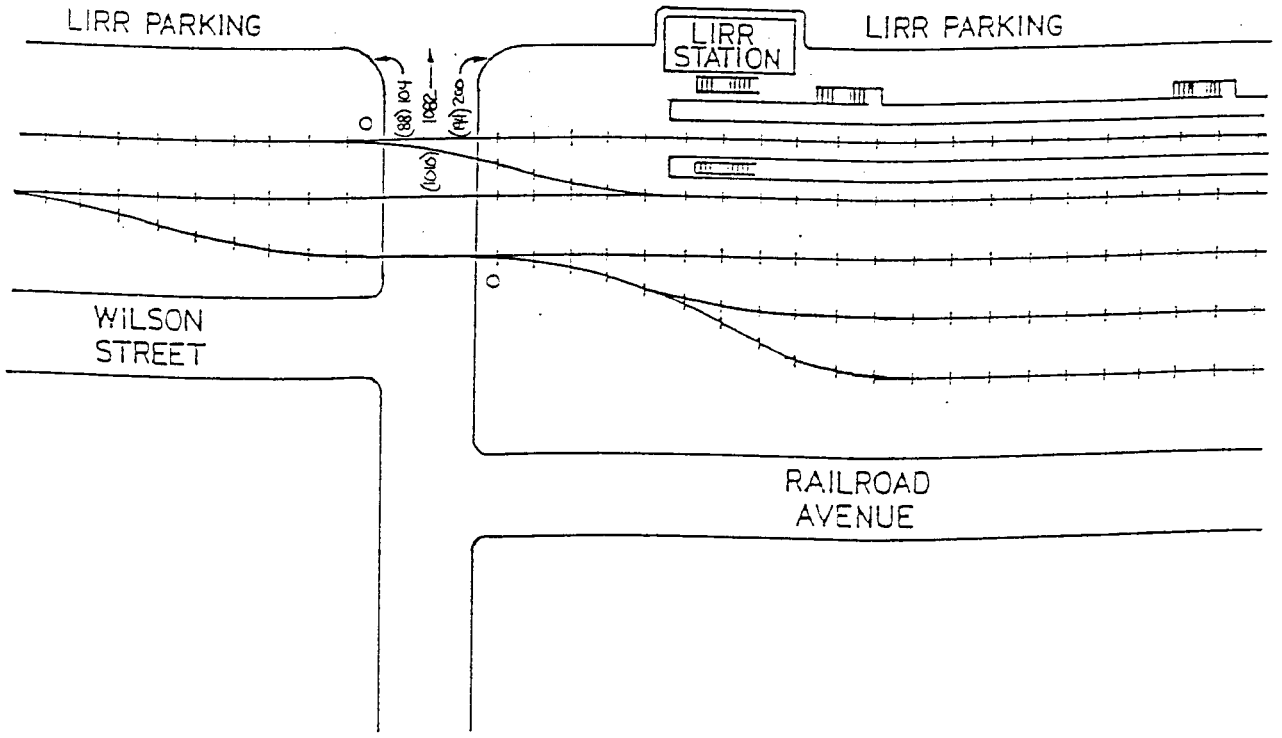


Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L43
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

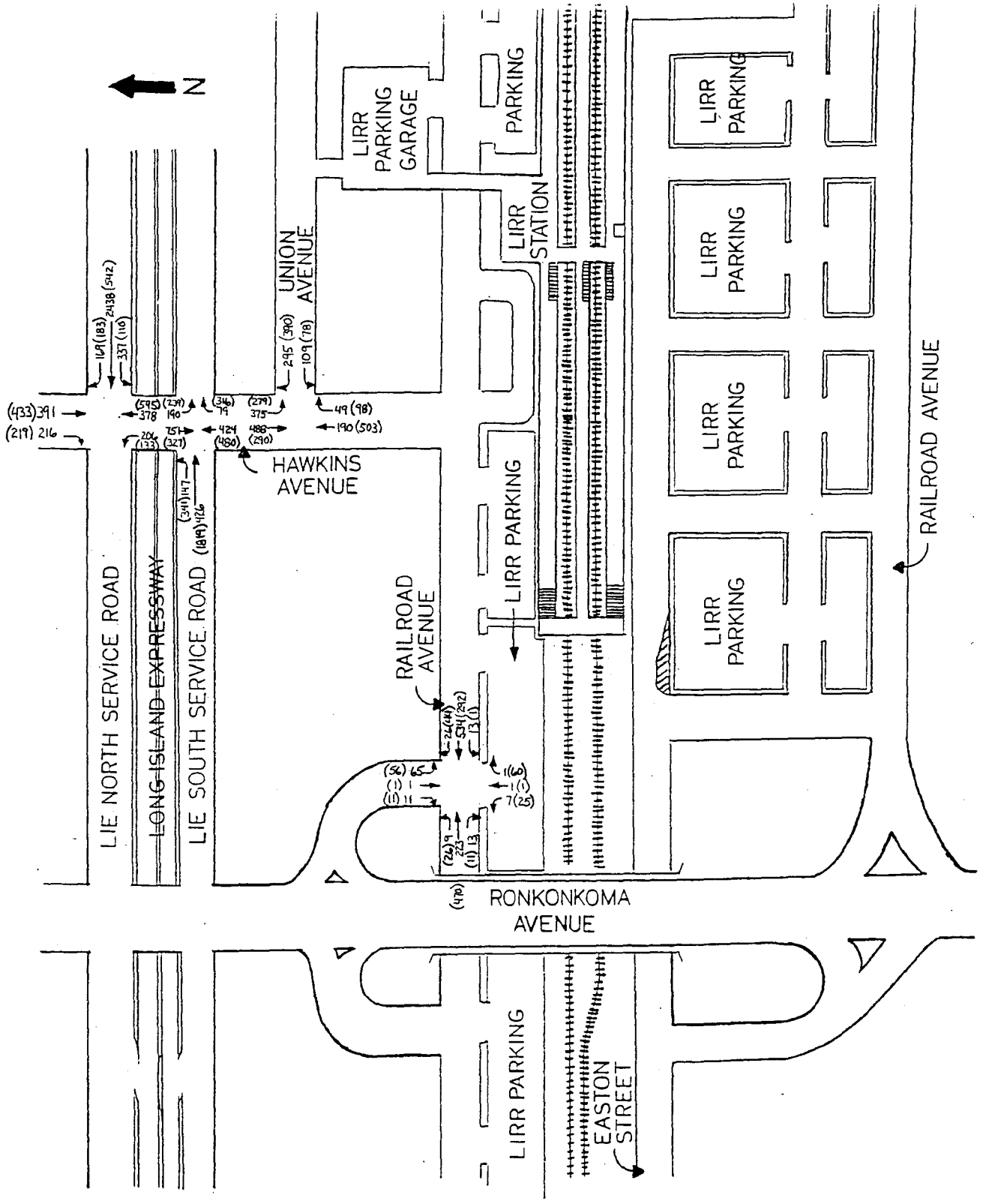
HUNTINGTON LIRR STATION
HUNTINGTON MANOR NY 11746





Eng-Wong, Taub & Associates
Traffic and Transportation Consultants

FIGURE L44
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS
PORT JEFFERSON LIRR STATION
PORT JEFFERSON STATION NY 11776



Eng-Wong, Taub & Associates

Traffic and Transportation Consultants

FIGURE L45
BUILD LIRR TRAFFIC VOLUMES:
AM AND (PM) PEAK HOURS

RONKONKOMA LIRR STATION
RONKONKOMA NY 11779

TABLE L-1

EXISTING
LIRR STATIONS TRAFFIC
LEVELS OF SERVICE

Table L - 1

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
GREAT NECK									
1 Middle Neck Road & North Station Plaza									
Middle Neck Road	NB	L	0.86	34.1	D	L	0.56	16.9	C
		TR	0.40	8.2	B	TR	0.42	8.3	B
	SB	LTR	0.66	13.5	B	LTR	0.73	15.0	B
North Station Plaza	EB	L	0.23	11.5	B	L	0.24	11.6	B
		TR	0.46	13.1	B	TR	0.59	14.6	B
	WB	L	0.56	16.1	C	L	0.91	59.3	E
		TR	0.23	11.5	B	TR	0.19	11.3	B
Overall Intersection		-	**0.79**	**13.9**	**B**	-	**0.89**	**14.3**	**B**
2 Middle Neck Road & South Station Plaza									
Middle Neck Road	NB	L	0.89	35.9	D	L	0.66	15.2	C
		TR	0.45	7.5	B	TR	0.35	6.8	B
	SB	L	0.63	13.3	B	L	0.18	6.1	B
		TR	0.42	7.2	B	TR	0.45	7.4	B
South Station Plaza	EB	DfL	0.76	24.6	C	LTR	0.88	25.4	D
		TR	0.47	14.6	B				
	WB	L	0.23	12.8	B	L	0.59	20.2	C
		TR	0.47	14.6	B	TR	0.43	14.2	B
Overall Intersection		-	**0.84**	**12.2**	**B**	-	**0.75**	**13.0**	**B**
HEMPSTEAD									
3 Main Street & West Columbia Street									
Main Street	NB	LT	0.28	4.3	A	LT	0.22	4.1	A
		R	0.09	3.7	A	R	0.10	3.7	A
	SB	LTR	0.38	4.8	A	LTR	0.65	7.5	B
West Columbia Street	EB	LTR	0.33	18.3	C	LTR	0.50	19.8	C
	WB	LTR	0.76	27.3	D	LTR	0.74	27.2	D
Overall Intersection		-	**0.49**	**11.9**	**B**	-	**0.67**	**12.4**	**B**
4 Main Street & Fulton Street (NYS Rt. 24)									
Main Street	NB	TR	0.54	17.6	C	TR	0.44	16.8	C
	SB	TR	0.51	17.9	C	TR	0.94	40.0	D
Fulton Street (NYS Rt.24)	EB	TR	0.53	3.9	A	TR	0.57	4.1	A
	WB	TR	0.39	3.4	A	TR	0.53	3.9	A
Overall Intersection		-	**0.53**	**8.0**	**B**	-	**0.70**	**10.7**	**B**
5 Fulton Street (NYS Rt. 24) & Washington Ave.									
Washington Avenue	NB	L	0.07	10.9	B	L	0.09	12.4	B
		TR	0.86	20.7	C	TR	0.49	14.1	B
	SB	L	0.46	18.5	C	L	0.66	19.8	C
		TR	0.62	15.4	C	TR	0.69	16.3	C
Fulton Street (NYS Rt. 24)	EB	LTR	0.92	20.0	C	LTR	0.89	18.0	C
	WB	LT	0.98	28.8	D	LT	1.04	43.5	E
		R	0.54	11.0	B	R	0.25	9.0	B
Overall Intersection		-	**0.86**	**20.6**	**C**	-	**0.94**	**23.4**	**C**
HICKSVILLE									
6 Newbridge Road (NYS Rt. 106) & West John Street									
Newbridge Road (NYS Rt. 106)	NB	L	0.86	38.4	D	L	0.75	26.9	D
		T	0.38	9.6	B	T	0.47	10.3	B
		R	0.07	7.9	B	R	0.06	7.8	B
	SB	L	0.10	13.0	B	L	0.68	29.0	D
		T	0.78	20.6	C	T	0.73	19.5	C
		R	0.44	15.8	C	R	0.23	13.8	B
West John Street	EB	L	0.74	25.7	D	L	0.91	39.3	D
		T	0.37	23.7	C	T	0.83	32.9	D
		R	0.39	24.0	C	R	0.50	26.3	D
	WB	L	0.62	19.0	C	L	0.59	19.9	C
		TR	0.79	29.9	D	TR	0.55	26.2	D
Overall Intersection		-	**0.83**	**21.0**	**C**	-	**0.83**	**22.0**	**C**

Table L - 1 (continued)

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue									
Newbridge Road (NYS Rt. 106)	NB	L	0.80	29.4	D	L	0.19	14.8	B
		T	0.52	17.5	C	T	0.62	18.0	C
		R	0.05	13.9	B	R	0.07	13.4	B
	SB	L	0.16	9.2	B	L	0.45	12.4	B
		T	0.68	19.6	C	T	1.01	41.8	E
		R	0.92	35.5	D	R	0.34	15.2	C
Duffy Avenue	EB	L	0.35	16.1	C	L	0.91	35.6	D
		T	0.11	13.9	B	T	0.53	16.4	C
		R	0.12	14.0	B	R	0.31	14.2	B
	WB	LTR	0.86	36.3	D	LTR	0.73	31.4	D
Overall Intersection		-	**0.89**	**23.8**	**C**	-	**0.91**	**28.8**	**D**
8 Broadway (NYS Rt 107) & East John Street									
Broadway (NYS Rt 107)	NB	L	0.76	45.1	E	L	0.60	37.0	D
		TR	0.45	7.6	B	TR	0.47	8.7	B
	SB	L	0.28	12.4	B	L	0.49	19.6	C
		TR	0.32	12.4	B	TR	0.68	18.6	C
East John Street	EB	L	0.29	24.2	C	L	0.23	20.6	C
		T	0.24	28.8	D	T	0.51	29.0	D
		R	0.33	25.1	D	R	0.60	25.8	D
	WB	LTR	0.70	34.3	D	LTR	0.55	29.6	D
Overall Intersection		-	**0.51**	**20.0**	**C**	-	**0.64**	**20.2**	**C**
9 Bay Avenue & East Barclay Street/Woodbury Road									
Bay Avenue	NB	LTR	0.26	20.0	C	LTR	0.31	20.2	C
	SB	L	0.34	17.0	C	L	0.76	24.1	C
		LT	0.38	17.3	C	LT	0.82	27.6	D
East Barclay Street	EB	LTR	0.21	6.6	B	LTR	0.35	7.2	B
Woodbury Road	WB	LT	0.34	7.1	B	LT	0.24	6.7	B
		R	0.43	1.9	A	R	0.28	1.5	A
Overall Intersection		-	**0.40**	**8.2**	**B**	-	**0.46**	**12.9**	**B**
MALVERNE									
10 Hempstead Avenue & Nassau Avenue/Francis Street -- LIRR Entrance									
Hempstead Avenue	NB	LTR	0.85	15.2	C	LTR	0.74	10.8	B
	SB	LTR	0.48	6.8	B	LTR	0.80	12.9	B
Nassau Avenue	EB	LTR	0.17	10.0	B	LTR	0.19	10.1	B
Francis Street - LIRR Entrance	WB	LTR	0.19	10.1	B	LTR	0.35	10.9	B
Overall Intersection		-	**0.59**	**11.7**	**B**	-	**0.62**	**11.7**	**B**
11 Hempstead Avenue & Utterby Road									
Hempstead Avenue	NB	TR	0.83	20.3	C	TR	0.71	15.5	C
	SB	LT	0.52	6.2	B	LT	0.57	6.7	B
Utterby Road	WB	L	0.18	20.1	C	L	0.24	20.3	C
		R	0.71	29.1	D	R	0.58	24.2	C
Overall Intersection		-	**0.46**	**15.1**	**C**	-	**0.48**	**12.0**	**B**
LONG BEACH									
12a LIRR Parking Lot Exit & West Park Avenue									
LIRR Parking Lot Exit	SB	L	0.11	14.5	B	L	0.15	14.7	B
West Park Avenue	EB	T	0.40	6.3	B	T	0.47	6.8	B
Overall Intersection		-	**0.30**	**7.0**	**B**	-	**0.36**	**7.5**	**B**
12b LIRR Parking Lot Exit & West Park Avenue									
LIRR Parking Lot Exit	SB	TR	0.16	14.7	B	TR	0.17	14.8	B
West Park Avenue	WB	LT	0.41	6.4	B	LT	0.50	6.9	B
Overall Intersection		-	**0.32**	**7.4**	**B**	-	**0.38**	**7.8**	**B**

Table L - 1 (continued)

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
13 Center Street & West Park Avenue									
Center Street	NB	LT	0.09	14.4	B	LT	0.04	14.1	B
West Park Avenue	WB	TR	0.39	6.3	B	TR	0.46	6.7	B
Overall Intersection		-	**0.29**	**6.9**	**B**	-	**0.32**	**7.0**	**B**
14a Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	TR	0.13	14.6	B	TR	0.10	14.4	B
	SB	DfL	0.03	14.1	B	DfL	0.02	14.1	B
		T	0.02	14.0	B	T	0.02	14.0	B
West Park Avenue	EB	LTR	0.47	6.8	B	LTR	0.54	7.3	B
Overall Intersection		-	**0.35**	**7.6**	**B**	-	**0.39**	**7.8**	**B**
14b Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	L	0.10	14.4	B	L	0.03	14.1	B
West Park Avenue	WB	LT	0.44	6.7	B	LT	0.51	7.0	B
Overall Intersection		-	**0.33**	**7.6**	**B**	-	**0.34**	**7.2**	**B**
BAYSIDE									
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard									
Bell Boulevard	NB	LTR	0.90	44.9	E	LTR	0.83	40.6	E
	SB	LTR	0.53	25.5	D	LTR	0.76	29.4	D
Northern Boulevard (NYS Rt. 25A)	EB	DfL	0.54	14.1	B		-	-	-
		T	0.58	5.3	B	LT	0.83	8.3	B
		R	0.17	3.7	A	R	0.23	3.8	A
	WB	L	0.67	12.5	B	L	0.52	7.2	B
		T	0.74	6.9	B	T	0.45	4.6	A
		R	0.14	3.6	A	R	0.16	3.7	A
Overall Intersection		-	**0.67**	**12.8**	**B**	-	**0.81**	**13.6**	**B**
16 Bell Boulevard & 41st Avenue									
Bell Boulevard	NB	LTR	0.93	24.0	C	LTR	0.88	17.9	C
	SB	LTR	0.58	7.9	B	LTR	0.68	9.2	B
41st Avenue	EB	LTR	0.47	11.7	B	LTR	0.48	11.8	B
	WB	LTR	0.28	10.3	B	LTR	0.53	12.5	B
Overall Intersection		-	**0.74**	**15.7**	**C**	-	**0.74**	**13.4**	**B**
MINEOLA									
17 Mineola Boulevard & Old Country Boulevard									
Mineola Boulevard	NB	L	0.90	34.2	D	L	0.70	16.5	C
		TR	0.96	32.7	D	TR	0.98	36.3	D
	SB	L	0.90	34.7	D	L	0.84	26.8	D
		TR	0.68	18.5	C	TR	0.78	20.6	C
Old Country Road	EB	L	0.64	14.3	B	L	0.66	14.8	B
		TR	0.97	35.4	D	TR	0.84	22.7	C
	WB	L	0.83	26.3	D	L	0.89	32.4	D
		T	0.68	18.6	C	T	0.67	18.4	C
		R	0.50	16.8	C	R	0.68	19.9	C
Overall Intersection		-	**0.98**	**27.2**	**D**		**0.93**	**24.7**	**C**
18 Mineola Boulevard & 2nd Street									
Mineola Boulevard	NB	L	0.92	52.3	E	L	0.55	11.7	B
		TR	0.33	4.6	A	TR	0.44	5.7	B
	SB	L	0.11	3.9	A	L	0.81	38.0	D
		TR	0.87	14.0	B	TR	0.97	33.8	D
2nd Street	EB	L	0.10	10.9	B	L	0.14	14.6	B
		TR	0.63	15.0	B	TR	0.79	24.1	C
	WB	LTR	0.95	45.7	E	LTR	0.94	51.2	E
Overall Intersection		-	**0.93**	**16.1**	**C**		**0.94**	**21.5**	**C**

Table L - 1 (continued)

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
PORT WASHINGTON									
19 Main Street & LIRR Parking Entrance[3]									
Main Street	WB	L		7.9	B	L		5.5	B
Overall Intersection		-		**0.6**	**A**	-		**0.3**	**A**
20 Main Street & Port Washington Boulevard (NYS Rte. 101)									
Port Washington Boulevard (NYS Rt. 101)	NB	L	1.05	55.5	E	L	0.81	10.1	B
		TR	0.36	2.6	A	TR	0.33	3.8	A
	SB	L	0.27	8.4	B	L	0.17	9.6	B
		TR	0.48	9.6	B	TR	0.35	10.7	B
Main Street	EB	LT	1.02	75.9	F	LT	0.87	43.8	E
		R	0.41	18.5	C	R	0.45	17.5	C
	WB	LTR	0.50	28.3	D	LTR	0.67	30.1	D
Overall Intersection		-	**1.07**	**21.1**	**C**		**0.76**	**14.0**	**B**
VALLEY STREAM									
21 South Franklin Avenue & Merrick Road									
South Franklin Avenue	NB	LR	0.44	14.7	B	LR	0.65	18.2	C
	SB	LTR	0.23	13.2	B	LTR	0.24	13.2	B
Merrick Road	EB	TR	0.39	5.1	B	TR	0.49	5.7	B
	WB	LT	0.53	6.0	B	LT	0.87	13.1	B
Overall Intersection		-	**0.50**	**7.3**	**B**	-	**0.79**	**10.4**	**B**
22 South Franklin Avenue & West Hawthorne Avenue									
South Franklin Avenue	NB	LT	0.18	7.1	B	LT	0.27	7.5	B
	SB	TR	0.13	6.9	B	TR	0.23	7.3	B
West Hawthorne Avenue	EB	LR	0.16	10.0	B	LR	0.39	11.4	B
	WB	LTR	0.16	10.0	B	LTR	0.17	10.1	B
Overall Intersection		-	**0.17**	**8.1**	**B**	-	**0.32**	**8.5**	**B**
23 South Franklin Avenue & Sunrise Highway (NYS Rt.27)									
South Franklin Avenue	NB	LTR	0.42	32.3	D	LTR	0.49	33.1	D
	SB	L	0.65	40.1	E	L	0.91	60.0	E
		R	0.20	30.6	D	R	0.28	31.2	D
Sunrise Highway (NYS Rt. 27)	EB	L	0.25	4.3	A	L	0.44	6.6	B
		T	0.35	4.5	A	T	0.55	5.7	B
	WB	T	0.42	4.8	A	T	0.41	4.8	A
		R	0.07	3.5	A	R	0.07	3.5	A
Overall Intersection		-	**0.47**	**8.7**	**B**	-	**0.63**	**10.7**	**B**
MERRICK									
24 Merrick Avenue & Broadcast Plaza[3]									
Merrick Avenue	NB	L		4.3	A	L		4.3	A
Broadcast Plaza	EB	LR		6.7	B	LR		14.1	C
Overall Intersection		-		**0.8**	**A**	-		**1.5**	**A**
25 Merrick Avenue & Smith Street									
Merrick Avenue	NB	L	0.57	20.6	C	L	0.42	16.0	C
		TR	0.79	21.3	C	TR	0.95	36.1	D
	SB	L	0.20	9.1	B	L	0.33	10.6	B
		TR	0.92	26.8	D	TR	0.86	20.6	C
Smith Street	EB	L	0.47	10.4	B	L	0.38	8.8	B
		TR	0.31	13.6	B	TR	0.67	17.8	C
	WB	L	0.16	8.0	B	L	0.24	8.8	B
		TR	0.79	22.0	C	TR	0.42	14.4	B
Overall Intersection		-	**0.85**	**20.9**	**C**	-	**0.80**	**21.8**	**C**

Table L - 1 (continued)

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
26 Merrick Avenue & Sunrise Highway (NYS Rt. 27)									
Merrick Avenue	NB	L	0.40	30.2	D	L	0.36	27.1	D
		TR	0.58	32.5	D	TR	0.64	30.4	D
	SB	L	0.43	22.9	C	L	0.87	39.2	D
		T	0.31	22.4	C	T	0.57	22.4	C
		R	0.29	22.2	C	R	0.23	18.7	C
Sunrise Highway (NYS Rt. 27)	EB	L	0.52	36.7	D	L	0.49	32.6	D
		T	0.82	24.0	C	T	0.69	21.6	C
		R	0.03	14.2	B	R	0.08	15.6	C
	WB	L	0.23	33.4	D	L	0.67	36.6	D
		T	1.03	45.6	E	T	0.77	23.2	C
		R	0.10	14.7	B	R	0.18	16.3	C
Overall Intersection		-	**0.80**	**34.7**	**D**	-	**0.74**	**24.3**	**C**
BABYLON									
27 Deer Park Avenue & Railroad Avenue[3]									
Deer Park Avenue	NB	L		5.0	B	L		4.5	A
Railroad Avenue	EB	L		17.5	C	L		37.8	E
		R		5.3	B	R		5.0	B
Overall Intersection		-		**3.2**	**A**	-		**6.9**	**B**
28 Deer Park Avenue & Park Avenue									
Deer Park Avenue	NB	LT	0.30	4.9	A	LT	0.51	5.9	B
	SB	TR	0.85	14.0	B	TR	0.81	11.9	B
Park Avenue	EB	LR	0.66	12.3	B	LR	0.73	13.9	B
Overall Intersection		-	**0.77**	**11.2**	**B**	-	**0.78**	**10.4**	**B**
29 Deer Park Avenue/Fire Island Avenue & West Main Street/East Main Street									
Fire Island Avenue	NB	LTR	0.50	24.4	C	LTR	0.80	37.3	D
Deer Park Avenue	SB	DrL	0.50	25.0	C	LTR	0.87	37.9	D
		TR	0.44	23.7	C	-	-	-	-
West Main Street	EB	L	0.41	8.8	B	L	0.64	16.1	C
		TR	0.52	5.2	B	TR	0.62	6.2	B
East Main Street	WB	L	0.11	5.6	B	L	0.17	5.9	B
		TR	0.72	11.0	B	TR	0.71	10.7	B
Overall Intersection		-	**0.66**	**11.9**	**B**	-	**0.77**	**16.2**	**C**
DEER PARK									
30 Executive Drive & Long Island Avenue									
Executive Drive	NB	L	0.39	9.2	B	L	0.47	10.4	B
		TR	0.55	10.8	B	TR	0.18	8.2	B
	SB	L	0.01	19.7	C	L	0.01	19.7	C
		T	0.19	20.5	C	T	0.75	28.8	D
		R	0.07	20.0	C	R	0.32	9.0	B
Long Island Avenue	EB	L	0.23	18.4	C	L	0.24	18.5	C
		T	0.16	18.0	C	T	0.07	17.5	C
		R	0.45	20.2	C	R	0.57	21.8	C
	WB	L	0.26	12.6	B	L	0.81	22.6	C
		T	0.05	11.1	B	T	0.12	11.5	B
		R	0.02	10.9	B	R	0.01	10.9	B
Overall Intersection		-	**0.44**	**12.8**	**B**	-	**0.73**	**17.1**	**C**
31 Executive Drive & Pine Aire Drive									
Executive Drive	SB	L	0.41	19.7	C	L	0.74	26.5	D
		LR	0.40	19.7	C	LR	0.73	26.4	D
Pine Aire Drive	EB	L	0.34	6.8	B	L	0.14	9.7	B
		T	0.23	4.2	A	T	0.59	9.3	B
	WB	LT	0.56	14.9	B	LT	0.46	18.6	C
		R	0.97	27.6	D	R	0.42	8.7	B
Overall Intersection		-	**0.48**	**19.5**	**C**	-	**0.64**	**16.8**	**C**

Table L - 1 (continued)

EXISTING LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
HUNTINGTON									
32 New York Avenue (NYS Rt. 110) & Railroad Street/Broadway									
New York Avenue (NYS Rt. 110)	NB	L	0.31	8.5	B	L	0.41	12.1	B
		T	0.43	16.1	C	T	0.54	17.2	C
		R	0.24	14.5	B	R	0.21	14.2	B
	SB	L	0.44	9.5	B	L	0.82	28.7	D
		T	0.36	15.4	C	T	0.67	19.2	C
		R	0.14	13.7	B	R	0.18	14.0	B
Railroad Street	EB	L	0.35	28.6	D	L	0.45	28.9	D
		TR	0.68	33.0	D	TR	0.96	54.6	E
Broadway	WB	L	0.62	21.5	C	L	0.63	23.0	C
		T	0.61	22.6	C	T	0.32	19.1	C
		R	0.36	19.4	C	R	0.40	19.9	C
Overall Intersection		-	**0.61**	**18.3**	**C**	-	**0.80**	**23.1**	**C**
33 Park Avenue & Broadway									
Park Avenue	NB	L	0.95	42.5	E	L	0.72	22.5	C
		T	0.32	2.3	A	T	0.28	2.2	A
	SB	T	0.43	9.9	B	T	0.43	9.9	B
Broadway	EB	L	0.31	19.4	C	L	0.78	29.1	D
Overall Intersection		-	**0.55**	**13.8**	**B**	-	**0.58**	**11.6**	**B**
PORT JEFFERSON									
34 Main Street (NYS Rt. 25A) & LIRR Parking Entrance[3]									
Main Street	NB	L		4.5	A	L		25.3	D
	SB	L		6.4	B	L		10.1	C
Overall Intersection		-		**0.2**	**A**	-		**0.8**	**A**
35 Main Street (NYS Rt. 25A) & North Country Road									
Main Street (NYS Rt. 25A)	NB	LTR	0.85	16.1	C	LTR	0.97	37.3	D
	SB	L	0.29	6.5	B	L	0.94	60.2	F
		TR	0.26	6.0	B	TR	0.59	12.0	B
Sheep Pasture Road	EB	LTR	0.25	23.3	C	LTR	0.63	28.5	D
North Country Road	WB	L	0.79	27.9	D	L	0.93	39.8	D
		TR	0.35	18.1	C	TR	0.22	15.7	C
Overall Intersection		-	**0.81**	**17.1**	**C**	-	**0.92**	**28.7**	**D**
RONKONKOMA									
36 Hawkins Avenue & Union Avenue									
Hawkins Avenue	NB	TR	0.36	9.5	B	TR	0.63	9.1	B
	SB	L	0.67	5.8	B	L	0.80	22.0	C
		T	0.36	3.2	A	T	0.18	2.2	A
Union Avenue	WB	L	0.26	16.6	C	L	0.21	19.9	C
		R	0.32	8.5	B	R	0.49	15.1	C
Overall Intersection		-	**0.49**	**6.8**	**B**	-	**0.58**	**11.8**	**B**
37 Hawkins Avenue & LIE North Service Road									
Hawkins Avenue	NB	L	0.65	32.5	D	L	0.31	22.7	C
		T	0.30	19.6	C	T	0.30	15.2	C
	SB	TR	0.66	29.6	D	TR	0.48	24.0	C
L.I.E. North Service Road	WB	LTR	0.83	12.6	B	LTR	0.31	13.2	B
Overall Intersection		-	**0.83**	**16.3**	**C**	-	**0.46**	**17.3**	**C**
38 Hawkins Avenue & LIE South Service Road									
Hawkins Avenue	NB	TR	0.46	21.5	C	TR	0.83	33.6	D
	SB	L	0.68	32.5	D	L	0.48	24.8	C
		T	0.45	17.4	C	T	0.18	13.9	B
L.I.E. South Service Road	EB	LT	0.24	10.9	B	LT	0.79	16.0	C
Overall Intersection		-	**0.53**	**18.0**	**C**	-	**0.75**	**19.8**	**C**
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue									
LIRR Parking Lot	NB	L	0.02	12.2	B	L	0.05	12.3	B
		TR	0.01	12.2	B	TR	0.16	12.6	B
Ronkonkoma Avenue Ramp	SB	L	0.18	12.6	B	L	0.20	12.7	B
		TR	0.03	12.2	B	TR	0.04	12.3	B
Railroad Avenue	EB	L	0.04	1.9	A	L	0.04	1.9	A
		T	0.19	2.1	A	T	0.34	2.5	A
		R	0.01	1.9	A	R	0.01	1.9	A
	WB	L	0.01	1.8	A	L	0.01	1.8	A
		TR	0.50	3.1	A	TR	0.29	2.3	A
Overall Intersection		-	**0.42**	**3.7**	**A**	-	**0.31**	**4.1**	**A**

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF.

TABLE L-2

2010 NO BUILD
LIRR STATIONS TRAFFIC
LEVELS OF SERVICE

Table L - 2

2010 NO BUILD STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
GREAT NECK									
1 Middle Neck Road & North Station Plaza									
Middle Neck Road	NB	L	1.03	*	F*	L	0.67	22.2	C
		TR	0.44	8.4	B	TR	0.46	8.6	B
	SB	LTR	0.74	15.4	C	LTR	0.83	18.6	C
North Station Plaza	EB	L	0.26	11.8	B	L	0.27	11.8	B
		TR	0.50	13.5	B	TR	0.64	15.4	C
	WB	L	0.69	21.5	C	L	1.32	*	F*
		TR	0.25	11.6	B	TR	0.21	11.4	B
Overall Intersection		-	*	*	F*	-	1.09	26.2	D
2 Middle Neck Road & South Station Plaza									
Middle Neck Road	NB	L	1.19	*	F*	L	0.87	38.2	D
		TR	0.49	7.7	B	TR	0.38	7.0	B
	SB	L	0.83	31.4	D	L	0.22	6.3	B
		TR	0.45	7.5	B	TR	0.49	7.7	B
South Station Plaza	EB	DfL	0.91	41.4	E	LTR	0.98	39.0	D
		TR	0.52	15.1	C	-			-
	WB	L	0.27	13.1	B	L	0.76	33.8	D
		TR	0.52	15.1	C	TR	0.47	14.5	B
Overall Intersection		-	*	*	F*	-	0.91	17.9	C
HEMPSTEAD									
3 Main Street & West Columbia Street									
Main Street	NB	LT	0.31	4.4	A	LT	0.25	4.2	A
		R	0.10	3.7	A	R	0.11	3.7	A
	SB	LTR	0.43	5.1	B	LTR	0.72	9.0	B
West Columbia Street	EB	LTR	0.35	18.5	C	LTR	0.55	20.4	C
	WB	LTR	0.85	34.1	D	LTR	0.86	36.4	D
Overall Intersection		-	0.55	13.8	B	-	0.76	14.8	B
4 Main Street & Fulton Street (NYS Rt. 24)									
Main Street	NB	TR	0.59	18.1	C	TR	0.48	17.1	C
	SB	TR	0.56	18.5	C	TR	1.02	58.5	E
Fulton Street (NYS Rt.24)	EB	TR	0.57	4.2	A	TR	0.62	4.4	A
	WB	TR	0.43	3.5	A	TR	0.57	4.1	A
Overall Intersection		-	0.58	8.3	B	-	0.76	13.3	B
5 Fulton Street (NYS Rt. 24) & Washington Ave.									
Washington Avenue	NB	L	0.08	11.5	B	L	0.09	13.2	B
		TR	0.94	26.1	D	TR	0.53	14.4	B
	SB	L	0.50	19.3	C	L	0.74	23.2	C
		TR	0.68	16.1	C	TR	0.75	17.3	C
Fulton Street (NYS Rt. 24)	EB	LTR	1.04	41.3	E	LTR	0.98	28.7	D
	WB	LT	1.13	*	F*	LT	1.17	*	F*
		R	0.59	11.5	B	R	0.27	9.1	B
Overall Intersection		-	*	*	F*	-	*	*	F*
HICKSVILLE									
6 Newbridge Road (NYS Rt. 106) & West John Street									
Newbridge Road (NYS Rt. 106)	NB	L	0.96	57.2	E	L	0.82	33.3	D
		T	0.41	9.9	B	T	0.51	10.7	B
		R	0.08	7.9	B	R	0.06	7.8	B
	SB	L	0.13	13.2	B	L	0.81	46.1	E
		T	0.84	22.8	C	T	0.80	21.1	C
		R	0.49	16.3	C	R	0.25	14.0	B
West John Street	EB	L	0.80	30.3	D	L	1.04	*	F*
		T	0.40	23.9	C	T	0.90	37.9	D
		R	0.43	24.4	C	R	0.55	27.0	D
	WB	L	0.69	21.0	C	L	0.64	21.3	C
		TR	0.85	32.7	D	TR	0.59	26.8	D
Overall Intersection		-	0.87	23.6	C	-	*	*	F*

Table L - 2 (continued)

2010 NO BUILD STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
13 Center Street & West Park Avenue									
Center Street	NB	LT	0.09	14.4	B	LT	0.04	14.2	B
West Park Avenue	WB	TR	0.43	6.5	B	TR	0.50	7.0	B
Overall Intersection		-	**0.31**	**7.1**	**B**	-	**0.34**	**7.2**	**B**
14a Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	TR	0.14	14.6	B	TR	0.11	14.5	B
	SB	DfL	0.03	14.1	B	DfL	0.03	14.1	B
		T	0.02	14.0	B	T	0.02	14.0	B
West Park Avenue	EB	LTR	0.51	7.0	B	LTR	0.59	7.7	B
Overall Intersection		-	**0.38**	**7.8**	**B**	-	**0.42**	**8.1**	**B**
14b Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	L	0.11	14.5	B	L	0.03	14.1	B
West Park Avenue	WB	LT	0.48	6.9	B	LT	0.55	7.4	B
Overall Intersection		-	**0.35**	**7.8**	**B**	-	**0.37**	**7.5**	**B**
BAYSIDE									
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard									
Bell Boulevard	NB	LTR	1.06	*	F*	LTR	0.95	53.9	E
	SB	LTR	0.60	26.4	D	LTR	0.85	32.7	D
Northern Boulevard (NYS Rt. 25A)	EB	DfL	0.70	25.2	D	-	-	-	-
		T	0.65	5.8	B	LT	0.94	13.3	B
		R	0.19	3.7	A	R	0.25	3.9	A
	WB	L	0.79	22.6	C	L	0.61	10.2	B
		T	0.83	8.3	B	T	0.50	4.9	A
		R	0.16	3.6	A	R	0.18	3.7	A
Overall Intersection		-	*	*	**F***	-	**0.91**	**17.5**	**C**
16 Bell Boulevard & 41st Avenue									
Bell Boulevard	NB	LTR	1.08	63.7	F	LTR	1.07	59.5	E
	SB	LTR	0.65	8.8	B	LTR	0.78	11.8	B
41st Avenue	EB	LTR	0.53	12.4	B	LTR	0.54	12.6	B
	WB	LTR	0.31	10.5	B	LTR	0.62	14.2	B
Overall Intersection		-	**0.86**	**33.7**	**D**	-	**0.89**	**31.3**	**D**
MINEOLA									
17 Mineola Boulevard & Old Country Boulevard									
Mineola Boulevard	NB	L	0.98	50.2	E	L	0.76	19.5	C
		TR	1.04	52.4	E	TR	1.07	*	F*
	SB	L	0.93	41.6	E	L	0.91	36.7	D
		TR	0.70	18.8	C	TR	0.85	23.0	C
Old Country Road	EB	L	0.70	16.5	C	L	0.71	17.1	C
		TR	1.06	57.4	E	TR	0.91	27.4	D
	WB	L	0.90	36.1	D	L	0.97	50.1	E
		T	0.74	19.7	C	T	0.73	19.4	C
		R	0.54	17.4	C	R	0.74	21.8	C
Overall Intersection		-	**1.00**	**38.7**	**D**	-	*	*	**F***
18 Mineola Boulevard & 2nd Street									
Mineola Boulevard	NB	L	1.08	*	F*	L	0.60	14.0	B
		TR	0.36	4.7	A	TR	0.48	5.9	B
	SB	L	0.14	4.0	A	L	0.92	59.4	E
		TR	0.95	21.4	C	TR	1.06	*	F*
2nd Street	EB	L	0.12	11.0	B	L	0.16	14.7	B
		TR	0.68	16.1	C	TR	0.85	28.8	D
	WB	LTR	1.21	*	F*	LTR	1.06	*	F*
Overall Intersection		-	*	*	**F***	-	*	*	**F***

Table L - 2 (continued)

2010 NO BUILD STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
PORT WASHINGTON									
19 Main Street & LIRR Parking Entrance[3]									
Main Street	WB	L		9.2	B	L		6.0	B
Overall Intersection		-		**0.6**	**A**	-		**0.3**	**A**
20 Main Street & Port Washington Boulevard (NYS Rte. 101)									
Port Washington Boulevard (NYS Rt. 101)	NB	L	1.23	*	F*	L	0.96	27.0	D
		TR	0.40	2.7	A	TR	0.36	3.9	A
	SB	L	0.33	9.0	B	L	0.22	9.9	B
		TR	0.53	10.0	B	TR	0.38	10.9	B
Main Street	EB	LT	1.20	*	F*	LT	0.99	67.5	F
		R	0.45	18.9	C	R	0.50	18.2	C
	WB	LTR	0.62	31.2	D	LTR	0.99	67.8	F
Overall Intersection		-	*	*	**F***	-	**0.95**	**22.5**	**C**
VALLEY STREAM									
21 South Franklin Avenue & Merrick Road									
South Franklin Avenue	NB	LR	0.49	15.3	C	LR	0.72	20.7	C
	SB	LTR	0.26	13.3	B	LTR	0.27	13.3	B
Merrick Road	EB	TR	0.42	5.3	B	TR	0.53	5.9	B
	WB	LT	0.61	6.7	B	LT	0.98	24.7	C
Overall Intersection		-	**0.57**	**7.7**	**B**	-	**0.89**	**15.4**	**C**
22 South Franklin Avenue & West Hawthorne Avenue									
South Franklin Avenue	NB	LT	0.19	7.2	B	LT	0.29	7.6	B
	SB	TR	0.15	7.0	B	TR	0.25	7.4	B
West Hawthorne Avenue	EB	LR	0.18	10.1	B	LR	0.38	11.3	B
	WB	LTR	0.17	10.1	B	DfL	0.17	10.1	B
						TR	0.17	10.1	B
Overall Intersection		-	**0.19**	**8.2**	**B**	-	**0.33**	**8.6**	**B**
23 South Franklin Avenue & Sunrise Highway (NYS Rt.27)									
South Franklin Avenue	NB	LTR	0.45	32.7	D	LTR	0.53	33.6	D
	SB	L	0.78	51.6	E	L	0.99	79.9	F
		R	0.23	30.8	D	R	0.31	31.4	D
Sunrise Highway (NYS Rt. 27)	EB	L	0.28	4.5	A	L	0.49	7.6	B
		T	0.38	4.6	A	T	0.60	6.1	B
	WB	T	0.46	5.1	B	T	0.45	5.0	A
		R	0.08	3.5	A	R	0.07	3.5	A
Overall Intersection		-	**0.53**	**9.3**	**B**	-	**0.69**	**12.0**	**B**
MERRICK									
24 Merrick Avenue & Broadcast Plaza[3]									
Merrick Avenue	NB	L		4.6	A	L		4.6	A
Broadcast Plaza	EB	LR		7.5	B	LR		17.6	C
Overall Intersection		-		**0.9**	**A**	-		**1.9**	**A**
25 Merrick Avenue & Smith Street									
Merrick Avenue	NB	L	0.61	22.9	C	L	0.46	16.8	C
		TR	0.85	25.2	D	TR	1.03	*	F*
	SB	L	0.22	9.5	B	L	0.36	10.8	B
		TR	1.00	41.7	E	TR	0.94	28.8	D
Smith Street	EB	L	0.52	11.2	B	L	0.44	9.2	B
		TR	0.34	13.8	B	TR	0.73	19.3	C
	WB	L	0.18	8.0	B	L	0.27	9.1	B
		TR	0.86	26.8	D	TR	0.45	14.7	B
Overall Intersection		-	**0.93**	**27.7**	**D**	-	*	*	**F***

Table L - 2 (continued)

2010 NO BUILD STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
26 Merrick Avenue & Sunrise Highway (NYS Rt. 27)									
Merrick Avenue	NB	L	0.45	31.0	D	L	0.47	29.3	D
		TR	0.63	33.6	D	TR	0.70	31.9	D
	SB	L	0.50	24.0	C	L	1.01	71.5	F
		T	0.34	22.6	C	T	0.61	23.2	C
		R	0.31	22.4	C	R	0.25	18.9	C
Sunrise Highway (NYS Rt. 27)	EB	L	0.56	37.5	D	L	0.53	33.3	D
		T	0.89	27.0	D	T	0.75	22.7	C
		R	0.03	14.2	B	R	0.09	15.7	C
	WB	L	0.25	33.5	D	L	0.72	38.8	D
		T	1.11	*	F*	T	0.84	25.0	C
		R	0.10	14.7	B	R	0.20	16.4	C
Overall Intersection		-	*	*	F*	-	**0.89**	**27.0**	**D**
BABYLON									
27 Deer Park Avenue & Railroad Avenue[3]									
Deer Park Avenue	NB	L		6.6	B	L		5.6	B
Railroad Avenue	EB	L		47.3	E	L		197.8	F
		R		6.6	B	R		6.1	B
Overall Intersection		-		**6.9**	**B**	-		**32.8**	**D**
28 Deer Park Avenue & Park Avenue									
Deer Park Avenue	NB	LT	0.41	5.4	B	LT	0.71	8.3	B
	SB	TR	1.08	*	F*	TR	1.03	43.1	E
Park Avenue	EB	LR	0.82	17.5	C	LR	0.91	24.5	C
Overall Intersection		-	*	*	F*	-	**0.98**	**26.0**	**D**
29 Deer Park Avenue/Fire Island Avenue & West Main Street/East Main Street									
Fire Island Avenue	NB	LTR	0.68	28.6	D	LTR	1.18	*	F*
Deer Park Avenue	SB	DfL	0.72	33.7	D	LTR	1.06	79.8	F
		TR	0.55	25.4	D	-	-	-	-
West Main Street	EB	L	0.54	15.8	C	L	0.81	36.6	D
		TR	0.65	6.5	B	TR	0.78	9.1	B
East Main Street	WB	L	0.15	5.8	B	L	0.25	6.5	B
		TR	0.89	18.5	C	TR	0.88	17.2	C
Overall Intersection		-	**0.85**	**16.7**	**C**	-	*	*	**F***
DEER PARK									
30 Executive Drive & Long Island Avenue									
Executive Drive	NB	L	0.50	10.0	B	L	0.59	12.7	B
		TR	0.70	12.5	B	TR	0.23	8.5	B
	SB	L	0.01	19.7	C	L	0.01	19.7	C
		T	0.24	20.8	C	T	0.93	45.0	E
		R	0.10	20.1	C	R	0.41	9.6	B
Long Island Avenue	EB	L	0.29	18.8	C	L	0.34	19.3	C
		T	0.20	18.2	C	T	0.08	17.6	C
		R	0.57	21.9	C	R	0.73	26.2	D
	WB	L	0.34	13.8	B	L	1.04	57.5	E
		T	0.06	11.2	B	T	0.15	11.6	B
		R	0.02	11.0	B	R	0.01	10.9	B
Overall Intersection		-	**0.57**	**14.1**	**B**	-	**0.90**	**28.3**	**D**
31 Executive Drive & Pine Aire Drive									
Executive Drive	SB	L	0.50	20.7	C	L	0.92	40.2	E
		LR	0.51	20.8	C	LR	0.92	40.1	E
Pine Aire Drive	EB	L	0.45	10.4	B	L	0.19	10.3	B
		T	0.22	4.4	A	T	0.74	12.0	B
	WB	LT	0.70	17.3	C	LT	0.98	54.8	E
		R	1.23	*	F*	R	0.54	9.9	B
Overall Intersection		-	*	*	F*	-	**0.80**	**27.6**	D

Table L - 2 (continued)

2010 NO BUILD STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
HUNTINGTON									
32 New York Avenue (NYS Rt. 110) & Railroad Street/Broadway									
New York Avenue (NYS Rt. 110)	NB	L	0.46	9.8	B	L	0.50	16.7	C
		T	0.54	17.3	C	T	0.67	19.1	C
		R	0.30	15.0	B	R	0.26	14.6	B
	SB	L	0.66	14.6	B	L	1.12	*	F*
		T	0.45	16.3	C	T	0.83	23.4	C
		R	0.17	14.0	B	R	0.22	14.3	B
Railroad Street	EB	L	0.82	62.3	F	L	0.66	34.3	D
		TR	0.84	40.9	E	TR	1.20	*	F*
Broadway	WB	L	0.88	35.8	D	L	0.78	28.2	D
		T	0.76	26.1	D	T	0.40	19.8	C
		R	0.45	20.4	C	R	0.50	21.1	C
Overall Intersection		-	**0.74**	**22.0**	**C**	-	*	*	**F***
33 Park Avenue & Broadway									
Park Avenue	NB	L	1.23	*	F*	L	0.90	34.7	D
		T	0.39	2.5	A	T	0.34	2.4	A
	SB	T	0.53	10.6	B	T	0.54	10.7	B
Broadway	EB	L	0.38	19.9	C	L	1.01	63.1	F
Overall Intersection		-	*	*	**F***	-	**0.73**	**18.3**	**C**
PORT JEFFERSON									
34 Main Street (NYS Rt. 25A) & LIRR Parking Entrance[3]									
Main Street	NB	L		6.5	B	L		245.8	F
	SB	L		10.4	C	L		21.2	D
Overall Intersection		-		**0.3**	**A**	-		**7.5**	**B**
35 Main Street (NYS Rt. 25A) & North Country Road									
Main Street (NYS Rt. 25A)	NB	LTR	1.37	*	F*	LTR	2.71	*	F*
	SB	L	0.45	8.8	B	L	1.61	*	F*
		TR	0.38	6.7	B	TR	0.87	20.2	C
Sheep Pasture Road	EB	LTR	0.38	24.2	C	LTR	0.96	49.1	E
North Country Road	WB	L	1.31	*	F*	L	1.66	*	F*
		TR	0.52	19.8	C	TR	0.32	16.5	C
Overall Intersection		-	*	*	**F***	-	*	*	**F***
RONKONKOMA									
36 Hawkins Avenue & Union Avenue									
Hawkins Avenue	NB	TR	0.45	10.2	B	TR	0.79	12.6	B
	SB	L	0.92	22.1	C	L	1.01	59.9	E
		T	0.45	3.6	A	T	0.23	2.3	A
Union Avenue	WB	L	0.33	17.0	C	L	0.26	20.2	C
		R	0.42	9.1	B	R	0.63	17.1	C
Overall Intersection		-	**0.73**	**11.7**	**B**	-	**0.90**	**20.1**	**C**
37 Hawkins Avenue & LIE North Service Road									
Hawkins Avenue	NB	L	0.82	42.4	E	L	0.46	29.8	D
		T	0.37	20.1	C	T	0.37	15.8	C
	SB	TR	0.84	35.3	D	TR	0.61	25.7	D
L.I.E. North Service Road	WB	LTR	1.04	35.4	D	LTR	0.39	13.9	B
Overall Intersection		-	**0.99**	**34.3**	**D**	-	**0.59**	**18.6**	**C**
38 Hawkins Avenue & LIE South Service Road									
Hawkins Avenue	NB	TR	0.58	22.8	C	TR	1.05	67.9	F
	SB	L	1.06	99.9	F	L	0.59	27.1	D
		T	0.56	18.6	C	T	0.23	14.2	B
L.I.E. South Service Road	EB	LT	0.30	11.3	B	LT	0.98	27.5	D
Overall Intersection		-	**0.62**	**25.1**	**D**	-	**0.90**	**34.4**	**D**
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue									
LIRR Parking Lot	NB	L	0.03	12.2	B	L	0.07	12.3	B
		TR	0.01	12.2	B	TR	0.20	12.7	B
Ronkonkoma Avenue Ramp	SB	L	0.22	12.8	B	L	0.26	13.0	B
		TR	0.04	12.2	B	TR	0.05	12.3	B
Railroad Avenue	EB	L	0.09	2.0	A	L	0.06	1.9	A
		T	0.24	2.2	A	T	0.43	2.8	A
		R	0.01	1.9	A	R	0.01	1.9	A
	WB	L	0.01	1.8	A	L	0.01	1.8	A
		TR	0.62	3.9	A	TR	0.36	2.6	A
Overall Intersection		-	**0.52**	**4.2**	**A**	-	**0.39**	**4.3**	**A**

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF.

TABLE L-3

2020 NO BUILD
LIRR STATIONS TRAFFIC
LEVELS OF SERVICE

Table L - 3
2020 NO BUILD LIRR STATION AREA LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
GREAT NECK									
1 Middle Neck Road & North Station Plaza									
Middle Neck Road	NB	L	1.20	159.1	F	L	0.78	30.3	D
		TR	0.47	8.7	B	TR	0.50	8.8	B
	SB	LTR	0.84	19.0	C	LTR	0.93	26.2	D
North Station Plaza	EB	L	0.31	12.1	B	L	0.31	12.0	B
		TR	0.54	13.9	B	TR	0.69	16.4	C
	WB	L	0.83	35.9	D	L	1.50	508.9	F
		TR	0.27	11.7	B	TR	0.22	11.5	B
Overall Intersection		-	**0.96**	**39.3**	**D**	-	**1.18**	**38.6**	**D**
2 Middle Neck Road & South Station Plaza									
Middle Neck Road	NB	L	1.55	570.1	F*	L	1.15	150.6	F
		TR	0.53	8.0	B	TR	0.41	7.2	B
	SB	L	1.06	95.4	F	L	0.26	6.6	B
		TR	0.49	7.7	B	TR	0.53	8.0	B
South Station Plaza	EB	DfL	1.06	85.4	F	LTR	1.08	71.1	F
		TR	0.56	15.6	C	-	-	-	*
	WB	L	0.31	13.5	B	L	0.96	77.4	F
		TR	0.55	15.6	C	TR	0.50	14.9	B
Overall Intersection		-	**1.36**	**55.9**	**E**	-	**1.12**	**31.8**	**D**
HICKSVILLE									
6 Newbridge Road (NYS Rt. 106) & West John Street									
Newbridge Road (NYS Rt 106)	NB	L	1.05	82.1	F	L	0.88	42.5	E
		T	0.44	10.1	B	T	0.55	11.1	B
		R	0.08	7.9	B	R	0.07	7.9	B
	SB	L	0.15	13.4	B	L	0.95	79.6	F
		T	0.91	26.4	D	T	0.86	23.4	C
		R	0.53	16.8	C	R	0.26	14.1	B
West John Street	EB	L	0.86	36.9	D	L	1.19	155.7	F
		T	0.43	24.2	C	T	0.98	47.8	E
		R	0.46	24.8	C	R	0.59	27.9	D
	WB	L	0.77	24.7	C	L	0.69	23.1	C
		TR	0.92	37.7	D	TR	0.64	27.5	D
Overall Intersection		-	**1.06**	**27.4**	**D**	-	**1.21**	**34.7**	**D**
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue									
Newbridge Road (NYS Rt. 106)	NB	L	0.93	48.5	E	L	0.23	15.0	B
		T	0.61	18.5	C	T	0.73	19.8	C
		R	0.06	14.0	B	R	0.09	13.5	B
	SB	L	0.22	9.9	B	L	0.52	14.4	B
		T	0.79	22.1	C	T	1.18	123.4	F
		R	1.08	77.7	F	R	0.40	15.8	C
Duffy Avenue	EB	L	0.44	17.1	C	L	1.12	107.2	F
		T	0.12	14.0	B	T	0.62	17.7	C
		R	0.14	14.1	B	R	0.36	14.6	B
	WB	LTR	1.02	66.1	F	LTR	1.04	88.5	F
Overall Intersection		-	**1.03**	**36.7**	**D**	-	**1.14**	**70.3**	**F**
8 Broadway (NYS Rt 107) & East John Street									
Broadway (NYS Rt 107)	NB	L	0.89	55.6	E	L	0.71	39.4	D
		TR	0.53	8.3	B	TR	0.55	9.5	B
	SB	L	0.35	13.5	B	L	0.65	29.7	D
		TR	0.37	12.8	B	TR	0.79	21.3	C
East John Street	EB	L	0.39	25.3	D	L	0.29	21.0	C
		T	0.28	29.1	D	T	0.59	30.0	D
		R	0.39	25.7	D	R	0.70	28.4	D
	WB	LTR	0.82	38.6	D	LTR	0.70	32.7	D
Overall Intersection		-	**0.60**	**22.3**	**C**	-	**0.75**	**22.2**	**C**
9 Bay Avenue & East Barclay Street/Woodbury Road									
Bay Avenue	NB	LTR	0.25	6.7	B	LTR	0.41	7.5	B
	SB	L	0.40	7.5	B	L	0.29	6.9	B
		LT	0.51	2.3	A	LT	0.33	1.6	A
East Barclay Street	EB	LTR	0.30	20.2	C	LTR	0.37	20.5	C
Woodbury Road	WB	LT	0.68	21.3	C	LT	0.89	33.7	D
		R	0.14	16.0	C	R	0.95	44.2	E
Overall Intersection		-	**0.48**	**8.9**	**B**	-	**0.54**	**17.1**	**C**

Table L - 3
2020 NO BUILD LIRR STATION AREA LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
BAYSIDE									
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard									
Bell Boulevard	NB	LTR	1.25	193.1	F	LTR	1.03	73.7	F
	SB	LTR	0.67	27.6	D	LTR	0.95	40.9	E
Northern Boulevard (NYS Rt 25A)	EB	DfL	1.01	107.2	F	DfL	1.43	426.3	F*
		T	0.71	6.5	B	T	0.88	9.6	B
		R	0.21	3.8	A	R	0.28	4.0	A
	WB	L	0.93	48.2	E	L	1.13	169.9	F*
		T	0.92	11.5	B	T	0.55	5.2	B
		R	0.18	3.7	A	R	0.20	3.8	A
Overall Intersection		-	**0.90**	**33.3**	**D**	-	**1.27**	**35.4**	**D**
16 Bell Boulevard & 41st Avenue									
Bell Boulevard	NB	LTR	1.28	193.4	F	LTR	1.26	169.9	F
	SB	LTR	0.73	10.4	B	LTR	0.90	18.3	C
41st Avenue	EB	LTR	0.59	13.3	B	LTR	0.61	13.8	B
	WB	LTR	0.36	10.8	B	LTR	0.73	18.1	C
Overall Intersection		-	**1.00**	**91.8**	**F**	-	**1.04**	**78.4**	**F**
DEER PARK									
30 Executive Drive & Long Island Avenue									
Executive Drive	NB	L	0.63	11.4	B	L	0.72	16.8	C
		TR	0.85	16.3	C	TR	0.29	8.8	B
	SB	L	0.01	19.7	C	L	0.01	19.7	C
		T	0.29	21.1	C	T	1.14	111.9	F
		R	0.12	20.2	C	R	0.49	10.4	B
Long Island Avenue	EB	L	0.37	19.4	C	L	0.47	21.0	C
		T	0.25	18.5	C	T	0.10	17.7	C
		R	0.69	24.9	C	R	0.89	37.7	D
	WB	L	0.44	15.5	C	L	1.30	216.4	F*
		T	0.07	11.2	B	T	0.19	11.8	B
		R	0.02	11.0	B	R	0.01	10.9	B
Overall Intersection		-	**0.73**	**16.6**	**C**	-	**1.10**	**76.5**	**F**
31 Executive Drive & Pine Aire Drive									
Executive Drive	SB	L	1.02	62.4	F	L	1.14	108.3	F
		LR	0.21	18.3	C	LR	1.14	108.2	F
Pine Aire Drive	EB	L	0.55	14.3	B	L	0.25	11.1	B
		T	0.35	4.7	A	T	0.90	19.6	C
	WB	LT	0.85	23.3	C	LT	1.19	148.2	F
		R	1.51	567.0	F*	R	0.66	11.9	B
Overall Intersection		-	**0.86**	**269.7**	**F***	-	**0.98**	**67.7**	**F**

Table L - 3
2020 NO BUILD LIRR STATION AREA LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
RONKONKOMA									
36 Hawkins Avenue & Union Avenue									
Hawkins Avenue	NB	TR	0.56	11.2	B	TR	0.96	26.5	D
	SB	L	1.23	157.8	F*	L	1.26	208.1	F
		T	0.55	4.1	A	T	0.28	2.4	A
Union Avenue	WB	L	0.40	17.5	C	L	0.31	20.5	C
		R	0.53	10.1	B	R	0.79	21.9	C
Overall Intersection		-	**1.23**	**50.1**	**E**	-	**1.57**	**51.7**	**E**
37 Hawkins Avenue & LIE North Service Road									
Hawkins Avenue	NB	L	0.99	72.3	F	L	0.58	33.9	D
		T	0.45	20.8	C	T	0.45	16.6	C
	SB	TR	1.03	65.6	F	TR	0.75	28.4	D
L.I.E. North Service Road	WB	LTR	1.27	175.3	F*	LTR	0.48	14.7	B
Overall Intersection		-	**1.18**	**142.8**	**F***	-	**0.66**	**20.2**	**C**
38 Hawkins Avenue & LIE South Service Road									
Hawkins Avenue	NB	TR	0.70	25.0	C	TR	1.29	211.5	F
	SB	L	1.40	348.1	F*	L	0.72	30.5	D
		T	0.69	20.5	C	T	0.28	14.5	B
L.I.E. South Service Road	EB	LT	0.36	11.8	B	LT	1.19	123.1	F
Overall Intersection		-	**0.70**	**49.1**	**E**	-	**1.10**	**125.7**	**F**
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue									
LIRR Parking Lot	NB	L	0.03	12.2	B	L	0.09	12.4	B
		TR	0.01	12.2	B	TR	0.25	12.9	B
Ronkonkoma Avenue Ramp	SB	L	0.27	13.0	B	L	0.33	13.3	B
		TR	0.04	12.3	B	TR	0.06	12.3	B
Railroad Avenue	EB	L	0.13	2.0	A	L	0.10	2.0	A
		T	0.29	2.3	A	T	0.52	3.2	A
		R	0.01	1.9	A	R	0.01	1.9	A
	WB	L	0.01	1.8	A	L	0.01	1.8	A
		TR	0.75	5.8	B	TR	0.44	2.8	A
Overall Intersection		-	**0.64**	**5.5**	**B**	-	**0.48**	**4.6**	**A**

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or I/PHF. Also it is beyond the scope of HCM to assess delay for an approach which operates at oversaturated conditions.

TABLE L-4

2010 BUILD
LIRR STATIONS TRAFFIC
LEVELS OF SERVICE

Table L - 4

2010 BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
GREAT NECK									
1 Middle Neck Road & North Station Plaza									
Middle Neck Road	NB	L	1.08	*	F*	L	0.69	23.8	C
		TR	0.44	8.4	B	TR	0.46	8.6	B
	SB	LTR	0.87	21.2	C	LTR	0.91	25.0	C
North Station Plaza	EB	L	0.29	12.0	B	L	0.30	12.0	B
		TR	0.52	13.7	B	TR	0.65	15.6	C
	WB	L	0.81	32.4	D	L	1.50	*	F*
		TR	0.27	11.8	B	TR	0.24	11.5	B
Overall Intersection		-	*	*	F*	-	*	*	F*
2 Middle Neck Road & South Station Plaza									
Middle Neck Road	NB	L	1.24	*	F*	L	0.90	45.4	E
		TR	0.50	7.8	B	TR	0.38	7.0	B
	SB	L	0.84	33.1	D	L	0.22	6.3	B
		TR	0.46	7.5	B	TR	0.50	7.8	B
South Station Plaza	EB	DfL	0.91	42.1	E	LTR	0.99	42.1	E
		TR	0.53	15.3	C	-	-	-	-
	WB	L	0.31	13.4	B	L	0.85	47.0	E
		TR	0.52	15.1	C	TR	0.48	14.6	B
Overall Intersection		-	*	*	F*	-	**0.94**	**19.4**	**C**
HEMPSTEAD									
3 Main Street & West Columbia Street									
Main Street	NB	LT	0.31	4.4	A	LT	0.25	4.2	A
		R	0.10	3.7	A	R	0.11	3.7	A
	SB	LTR	0.43	5.2	B	LTR	0.72	9.1	B
West Columbia Street	EB	LTR	0.35	18.5	C	LTR	0.55	20.4	C
	WB	LTR	0.85	34.1	D	LTR	0.86	36.4	D
Overall Intersection		-	**0.55**	**13.8**	**B**	-	**0.76**	**14.8**	**B**
4 Main Street & Fulton Street (NYS Rt. 24)									
Main Street	NB	TR	0.59	18.1	C	TR	0.48	17.1	C
	SB	TR	0.56	18.5	C	TR	1.02	58.5	E
Fulton Street (NYS Rt.24)	EB	TR	0.57	4.2	A	TR	0.62	4.4	A
	WB	TR	0.43	3.5	A	TR	0.57	4.1	A
Overall Intersection		-	**0.58**	**8.3**	**B**	-	**0.76**	**13.3**	**B**
5 Fulton Street (NYS Rt. 24) & Washington Ave.									
Washington Avenue	NB	L	0.08	11.5	B	L	0.09	13.2	B
		TR	0.94	26.8	D	TR	0.54	14.4	B
	SB	L	0.50	19.4	C	L	0.74	23.4	C
		TR	0.68	16.1	C	TR	0.75	17.4	C
Fulton Street (NYS Rt. 24)	EB	LTR	1.04	41.3	E	LTR	0.98	28.7	D
	WB	LT	1.13	*	F*	LT	1.17	*	F*
		R	0.60	11.7	B	R	0.28	9.1	B
Overall Intersection		-	*	*	F*	-	*	*	F*
HICKSVILLE									
6 Newbridge Road (NYS Rt. 106) & West John Street									
Newbridge Road (NYS Rt. 106)	NB	L	0.96	57.3	E	L	0.82	33.3	D
		T	0.41	9.9	B	T	0.51	10.7	B
		R	0.08	7.9	B	R	0.06	7.8	B
	SB	L	0.13	13.2	B	L	0.82	47.0	E
		T	0.85	23.1	C	T	0.80	21.1	C
		R	0.49	16.3	C	R	0.25	14.0	B
West John Street	EB	L	0.80	30.3	D	L	1.05	*	F*
		T	0.40	23.9	C	T	0.90	38.0	D
		R	0.43	24.4	C	R	0.55	27.0	D
	WB	L	0.70	21.2	C	L	0.64	21.3	C
		TR	0.85	32.7	D	TR	0.59	26.8	D
Overall Intersection		-	**0.87**	**23.7**	**C**	-	*	*	F*

Table L - 4 (continued)

2010 BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
14a Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	TR	0.14	14.6	B	TR	0.11	14.5	B
	SB	DfL	0.03	14.1	B	DfL	0.03	14.1	B
		T	0.02	14.0	B	T	0.02	14.0	B
West Park Avenue	EB	LTR	0.51	7.0	B	LTR	0.59	7.7	B
Overall Intersection		-	**0.38**	**7.8**	**B**	-	**0.42**	**8.1**	**B**
14b Edwards Boulevard & West Park Avenue									
Edwards Boulevard	NB	L	0.11	14.5	B	L	0.03	14.1	B
West Park Avenue	WB	LT	0.48	6.9	B	LT	0.55	7.4	B
Overall Intersection		-	**0.35**	**7.8**	**B**	-	**0.37**	**7.5**	**B**
BAYSIDE									
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard									
Bell Boulevard	NB	LTR	1.10	*	F*	LTR	0.97	57.3	E
	SB	LTR	0.62	26.7	D	LTR	0.89	35.0	D
Northern Boulevard (NYS Rt. 25A)	EB	DfL	0.79	36.9	D	-	-	-	-
		T	0.65	5.8	B	LT	0.95	13.5	B
		R	0.19	3.7	A	R	0.25	3.9	A
	WB	L	0.79	22.6	C	L	0.61	10.2	B
		T	0.83	8.3	B	T	0.50	4.9	A
		R	0.17	3.7	A	R	0.18	3.7	A
Overall Intersection		-	*	*	**F***	-	**0.93**	**18.5**	**C**
16 Bell Boulevard & 41st Avenue									
Bell Boulevard	NB	LTR	1.17	*	F*	LTR	1.13	*	F*
	SB	LTR	0.68	9.3	B	LTR	0.81	12.9	B
41st Avenue	EB	LTR	0.55	12.6	B	LTR	0.60	13.6	B
	WB	LTR	0.37	10.9	B	LTR	0.79	21.9	C
Overall Intersection		-	*	*	**F***	-	*	*	**F***
MINEOLA									
17 Mineola Boulevard & Old Country Boulevard									
Mineola Boulevard	NB	L	0.98	51.2	E	L	0.76	19.5	C
		TR	1.04	52.7	E	TR	1.07	*	F*
	SB	L	0.94	42.4	E	L	0.91	37.3	D
		TR	0.70	18.8	C	TR	0.85	23.1	C
Old Country Road	EB	L	0.70	16.6	C	L	0.71	17.1	C
		TR	1.06	57.4	E	TR	0.91	27.4	D
	WB	L	0.90	36.1	D	L	0.97	50.1	E
		T	0.75	19.8	C	T	0.73	19.4	C
		R	0.55	17.4	C	R	0.74	21.9	C
Overall Intersection		-	**1.00**	**38.9**	**D**	-	*	*	**F***
18 Mineola Boulevard & 2nd Street									
Mineola Boulevard	NB	L	1.09	*	F*	L	0.60	14.1	B
		TR	0.36	4.7	A	TR	0.48	5.9	B
	SB	L	0.14	4.0	A	L	0.92	59.4	E
		TR	0.95	22.1	C	TR	1.06	*	F*
2nd Street	EB	L	0.12	11.0	B	L	0.16	14.7	B
		TR	0.69	16.2	C	TR	0.86	28.9	D
	WB	LTR	1.22	*	F*	LTR	1.06	*	F*
Overall Intersection		-	*	*	**F***	-	*	*	*

Table L - 4 (continued)

2010 BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
PORT WASHINGTON									
19 Main Street & LIRR Parking Entrance[3]									
Main Street	WB	L		11.1	C	L		6.4	B
Overall Intersection		-		**0.9**	**A**	-		**0.4**	**A**
20 Main Street & Port Washington Boulevard (NYS Rte. 101)									
Port Washington Boulevard (NYS Rt. 101)	NB	L	1.31	*	*	L	0.99	33.5	D
		TR	0.40	2.7	A	TR	0.36	3.9	A
	SB	L	0.33	9.0	B	L	0.22	10.3	B
		TR	0.54	10.1	B	TR	0.39	10.9	B
Main Street	EB	LT	1.24	*	F*	LT	1.03	76.9	F
		R	0.45	19.0	C	R	0.50	18.2	C
	WB	LTR	0.64	31.9	D	LTR	1.03	78.0	F
Overall Intersection		-	*	*	**F***	-	**0.99**	**25.3**	**D**
VALLEY STREAM									
21 South Franklin Avenue & Merrick Road									
South Franklin Avenue	NB	LTR	0.49	15.3	C	LTR	0.73	21.0	C
	SB	LTR	0.26	13.3	B	LTR	0.27	13.4	B
Merrick Road	EB	TR	0.42	5.3	B	TR	0.53	5.9	B
	WB	LT	0.61	6.8	B	LT	0.98	26.0	D
Overall Intersection		-	**0.57**	**7.7**	**B**	-	**0.90**	**16.0**	**C**
22 South Franklin Avenue & West Hawthorne Avenue									
South Franklin Avenue	NB	LT	0.20	7.2	B	LT	0.30	7.6	B
	SB	TR	0.15	7.0	B	TR	0.25	7.4	B
West Hawthorne Avenue	EB	LR	0.18	10.1	B	LR	0.38	11.3	B
	WB	LTR	0.18	10.1	B	DfL	0.17	10.1	B
						TR	0.17	10.1	B
Overall Intersection		-	**0.19**	**8.2**	**B**	-	**0.34**	**8.6**	**B**
23 South Franklin Avenue & Sunrise Highway (NYS Rt.27)									
South Franklin Avenue	NB	LTR	0.46	32.7	D	LTR	0.53	33.6	D
	SB	L	0.81	54.4	E	L	1.00	82.4	F
		R	0.23	30.8	D	R	0.31	31.5	D
Sunrise Highway (NYS Rt. 27)	EB	L	0.29	4.6	A	L	0.49	7.6	B
		T	0.38	4.6	A	T	0.60	6.1	B
	WB	T	0.46	5.1	B	T	0.45	5.0	A
		R	0.08	3.5	A	R	0.08	3.5	A
Overall Intersection		-	**0.54**	**9.4**	**B**	-	**0.69**	**12.1**	**B**
MERRICK									
24 Merrick Avenue & Broadcast Plaza[3]									
Merrick Avenue	NB	L		4.6	A	L		4.6	A
Broadcast Plaza	EB	LR		7.6	B	LR		18.6	C
Overall Intersection		-		**0.9**	**A**	-		**2.0**	**A**
25 Merrick Avenue & Smith Street									
Merrick Avenue	NB	L	0.61	22.9	C	L	0.46	16.8	C
		TR	0.86	25.4	D	TR	1.04	*	F*
	SB	L	0.22	9.5	B	L	0.36	10.8	B
		TR	1.01	44.5	E	TR	0.94	29.3	D
Smith Street	EB	L	0.52	11.2	B	L	0.44	9.2	B
		TR	0.34	13.8	B	TR	0.73	19.3	C
	WB	L	0.18	8.0	B	L	0.27	9.1	B
		TR	0.86	26.8	D	TR	0.45	14.7	B
Overall Intersection		-	**0.93**	**28.6**	**D**	-	*	*	**F***

Table L - 4 (continued)

2010 BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
26 Merrick Avenue & Sunrise Highway (NYS Rt. 27)									
Merrick Avenue	NB	L	0.45	31.1	D	L	0.48	29.9	D
		TR	0.65	34.0	D	TR	0.70	32.1	D
	SB	L	0.52	24.2	C	L	1.01	73.0	F
		T	0.34	22.6	C	T	0.62	23.3	C
		R	0.32	22.4	C	R	0.26	18.9	C
Sunrise Highway (NYS Rt. 27)	EB	L	0.56	37.5	D	L	0.53	33.3	D
		T	0.89	27.0	D	T	0.75	22.7	C
		R	0.03	14.2	B	R	0.09	15.7	C
	WB	L	0.25	33.5	D	L	0.73	39.1	D
		T	1.11	*	F*	T	0.84	25.0	C
		R	0.10	14.7	B	R	0.20	16.4	C
Overall Intersection		-	*	*	F*	-	**0.90**	**27.1**	**D**
BABYLON									
27 Deer Park Avenue & Railroad Avenue[3]									
Deer Park Avenue	NB	L		6.9	B	L		5.7	B
Railroad Avenue	EB	L		60.8	F	L		245.5	F
		R		6.7	B	R		6.2	B
Overall Intersection		-		**8.6**	**B**	-		**42.5**	**E**
28 Deer Park Avenue & Park Avenue									
Deer Park Avenue	NB	LT	0.43	5.5	B	LT	0.73	8.7	B
	SB	TR	1.12	*	F*	TR	1.04	46.4	E
Park Avenue	EB	LR	0.82	17.6	C	LR	0.93	27.7	D
Overall Intersection		-	*	*	F*	-	**1.00**	**28.1**	**D**
29 Deer Park Avenue/Fire Island Avenue & West Main Street/East Main Street									
Fire Island Avenue	NB	LTR	0.69	29.0	D	LTR	1.21	*	F*
Deer Park Avenue	SB	DfL	0.74	35.5	D	LTR	1.09	91.5	F
		TR	0.56	25.4	D	-	-	-	-
West Main Street	EB	L	0.54	16.0	C	L	0.81	36.6	D
		TR	0.65	6.5	B	TR	0.78	9.1	B
East Main Street	WB	L	0.15	5.8	B	L	0.25	6.5	B
		TR	0.90	19.3	C	TR	0.88	17.4	C
Overall Intersection		-	**0.86**	**17.2**	**C**	-	*	*	**F***
DEER PARK									
30 Executive Drive & Long Island Avenue									
Executive Drive	NB	L	0.54	10.3	B	L	0.60	13.1	B
		TR	0.70	12.5	B	TR	0.23	8.5	B
	SB	L	0.01	19.7	C	L	0.01	19.7	C
		T	0.24	20.8	C	T	0.93	45.0	E
		R	0.10	20.1	C	R	0.41	9.6	B
Long Island Avenue	EB	L	0.29	18.8	C	L	0.34	19.3	C
		T	0.20	18.2	C	T	0.08	17.6	C
		R	0.58	22.2	C	R	0.81	30.1	D
	WB	L	0.34	13.8	B	L	1.04	57.5	E
		T	0.06	11.2	B	T	0.15	11.6	B
		R	0.02	11.0	B	R	0.01	10.9	B
Overall Intersection		-	**0.57**	**14.1**	**B**	-	**0.91**	**28.7**	**D**
31 Executive Drive & Pine Aire Drive									
Executive Drive	SB	L	0.51	20.8	C	L	0.95	43.8	E
		LR	0.51	20.9	C	LR	0.95	43.7	E
Pine Aire Drive	EB	L	0.46	10.8	B	L	0.20	10.3	B
		T	0.29	4.4	A	T	0.74	12.0	B
	WB	LT	0.70	17.3	C	LT	0.98	54.8	E
		R	1.25	*	F*	R	0.54	9.9	B
Overall Intersection		-	*	*	F*	-	**0.81**	**29.1**	**D**

Table L - 4 (continued)

2010 BUILD LIRR STATION AREA TRAFFIC LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
HUNTINGTON									
32 New York Avenue (NYS Rt. 110) & Railroad Street/Broadway									
New York Avenue (NYS Rt. 110)	NB	L	0.46	9.8	B	L	0.50	16.7	C
		T	0.54	17.3	C	T	0.67	19.1	C
		R	0.31	15.0	B	R	0.26	14.6	B
	SB	L	0.69	15.9	C	L	1.12	*	F*
		T	0.45	16.3	C	T	0.83	23.4	C
		R	0.18	14.0	B	R	0.22	14.3	B
Railroad Street	EB	L	0.82	62.3	F	L	0.68	35.0	D
		TR	0.85	41.6	E	TR	1.20	*	F*
Broadway	WB	L	0.89	36.7	D	L	0.79	29.0	D
		T	0.76	26.1	D	T	0.41	19.8	C
		R	0.45	20.4	C	R	0.52	21.3	C
Overall Intersection		-	**0.74**	**22.2**	**C**	-	*	*	**F***
33 Park Avenue & Broadway									
Park Avenue	NB	L	1.26	*	F*	L	0.90	35.0	D
		T	0.39	2.5	A	T	0.34	2.4	A
	SB	T	0.53	10.7	B	T	0.54	10.7	B
Broadway	EB	L	0.38	20.0	C	L	1.05	*	F*
Overall Intersection		-	*	*	**F***	-	*	*	**F***
PORT JEFFERSON									
34 Main Street (NYS Rt. 25A) & LIRR Parking Entrance[3]									
Main Street	NB	L		6.5	B	L		245.8	F
	SB	L		10.4	C	L		21.2	D
Overall Intersection		-		**0.3**	**A**	-		**7.5**	**B**
35 Main Street (NYS Rt. 25A) & North Country Road									
Main Street (NYS Rt. 25A)	NB	LTR	1.37	*	F*	LTR	2.71	*	F*
	SB	L	0.45	8.8	B	L	1.61	*	F*
		TR	0.38	6.7	B	TR	0.87	20.2	C
Sheep Pasture Road	EB	LTR	0.38	24.2	C	LTR	0.96	49.1	E
North Country Road	WB	L	1.31	*	F*	L	1.66	*	F*
		TR	0.52	19.8	C	TR	0.32	16.5	C
Overall Intersection		-	*	*	**F***	-	*	*	**F***
RONKONKOMA									
36 Hawkins Avenue & Union Avenue									
Hawkins Avenue	NB	TR	0.47	10.3	B	TR	0.88	17.5	C
	SB	L	0.94	24.8	C	L	1.03	64.7	F
		T	0.52	4.0	A	T	0.23	2.3	A
Union Avenue	WB	L	0.36	17.1	C	L	0.26	20.2	C
		R	0.42	9.1	B	R	0.63	17.1	C
Overall Intersection		-	**0.75**	**12.2**	**B**	-	**0.93**	**22.6**	**C**
37 Hawkins Avenue & LIE North Service Road									
Hawkins Avenue	NB	L	0.82	42.6	E	L	0.46	30.0	D
		T	0.37	20.2	C	T	0.39	16.0	C
	SB	TR	0.90	40.2	E	TR	0.61	25.8	D
L.I.E. North Service Road	WB	LTR	1.05	39.5	D	LTR	0.40	13.9	B
Overall Intersection		-	**1.00**	**38.0**	**D**	-	**0.59**	**18.7**	**C**
38 Hawkins Avenue & LIE South Service Road									
Hawkins Avenue	NB	TR	0.58	23.0	C	TR	1.13	*	F*
	SB	L	1.07	106.2	F	L	0.59	27.1	D
		T	0.62	19.4	C	T	0.23	14.2	B
L.I.E. South Service Road	EB	LT	0.30	11.3	B	LT	0.98	28.0	D
Overall Intersection		-	**0.62**	**25.7**	**D**	-	*	*	**F***
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue									
LIRR Parking Lot	NB	L	0.03	12.2	B	L	0.09	12.4	B
		TR	0.01	12.2	B	TR	0.25	12.9	B
Ronkonkoma Avenue Ramp	SB	L	0.23	12.8	B	L	0.27	13.0	B
		TR	0.04	12.3	B	TR	0.05	12.3	B
Railroad Avenue	EB	L	0.10	2.0	A	L	0.07	1.9	A
		T	0.25	2.3	A	T	0.44	2.8	A
		R	0.02	1.9	A	R	0.01	1.9	A
	WB	L	0.03	1.9	A	L	0.00	1.8	A
		TR	0.64	4.2	A	TR	0.37	2.6	A
Overall Intersection		-	**0.54**	**4.3**	**A**	-	**0.40**	**4.5**	**A**

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF.

TABLE L-5

2020 BUILD
LIRR STATIONS TRAFFIC
LEVELS OF SERVICE

Table L - 5
2020 BUILD LIRR STATION AREA LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
GREAT NECK									
1 Middle Neck Road & North Station Plaza									
Middle Neck Road	NB	L	1.26	200.1	F*	L	0.79	31.9	D
		TR	0.47	8.7	B	TR	0.50	8.8	B
	SB	LTR	0.98	36.1	D	LTR	1.00	39.9	D
North Station Plaza	EB	L	0.34	12.4	B	L	0.33	12.3	B
		TR	0.56	14.2	B	TR	0.70	16.6	C
	WB	L	1.00	74.6	F	L	1.68	810.4	F*
		TR	0.29	11.9	B	TR	0.25	11.6	B
Overall Intersection		-	**1.04**	**40.7**	**E**	-	**1.27**	**59.1**	**E**
2 Middle Neck Road & South Station Plaza									
Middle Neck Road	NB	L	1.62	701.1	F*	L	1.21	195.9	F*
		TR	0.53	8.1	B	TR	0.41	7.2	B
	SB	L	1.07	99.7	F	L	0.27	6.6	B
		TR	0.50	7.8	B	TR	0.53	8.0	B
South Station Plaza	EB	DfL	1.07	87.2	F	LTR	1.10	76.1	F
		TR	0.57	15.9	C	-	-	-	-
	WB	L	0.37	14.0	B	L	1.08	126.4	F*
		TR	0.56	15.6	C	TR	0.51	15.0	B
Overall Intersection		-	**1.40**	**64.2**	**F**	-	**1.17**	**36.4**	**D**
HICKSVILLE									
6 Newbridge Road (NYS Rt. 106) & West John Street									
Newbridge Road (NYS Rt. 106)	NB	L	1.05	82.1	F	L	0.88	42.5	E
		T	0.44	10.1	B	T	0.55	11.2	B
		R	0.08	7.9	B	R	0.07	7.9	B
	SB	L	0.15	13.4	B	L	0.96	81.4	F
		T	0.92	27.2	D	T	0.86	23.4	C
		R	0.53	16.8	C	R	0.26	14.1	B
West John Street	EB	L	0.87	38.1	D	L	1.19	160.2	F*
		T	0.43	24.2	C	T	0.98	48.0	E
		R	0.46	24.8	C	R	0.59	27.9	D
	WB	L	0.78	25.3	D	L	0.69	23.1	C
		TR	0.92	37.7	D	TR	0.64	27.5	D
		-	**1.06**	**27.6**	**D**	-	**1.22**	**35.0**	**D**
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue									
Newbridge Road (NYS Rt. 106)	NB	L	0.98	58.7	E	L	0.24	15.0	B
		T	0.61	18.5	C	T	0.73	19.8	C
		R	0.07	14.0	B	R	0.09	13.5	B
	SB	L	0.22	9.9	B	L	0.52	14.4	B
		T	0.80	22.3	C	T	1.18	124.1	F*
		R	1.09	82.1	F	R	0.40	15.8	C
Duffy Avenue	EB	L	0.44	17.2	C	L	1.16	127.5	F*
		T	0.12	14.0	B	T	0.63	18.1	C
		R	0.14	14.1	B	R	0.36	14.6	B
	WB	LTR	1.07	86.5	F	LTR	1.16	143.5	F
		-	**1.05**	**40.8**	**E**	-	**1.16**	**75.4**	**F**
8 Broadway (NYS Rt 107) & East John Street									
Broadway (NYS Rt 107)	NB	L	0.89	55.6	E	L	0.71	39.4	D
		TR	0.53	8.3	B	TR	0.56	9.5	B
	SB	L	0.35	13.5	B	L	0.65	29.8	D
		TR	0.37	12.9	B	TR	0.79	21.3	C
East John Street	EB	L	0.39	25.3	D	L	0.29	21.0	C
		T	0.28	29.1	D	T	0.59	30.1	D
		R	0.39	25.7	D	R	0.70	28.4	D
	WB	LTR	0.82	38.7	D	LTR	0.71	32.7	D
		-	**0.60**	**22.3**	**C**	-	**0.75**	**22.2**	**C**
9 Bay Avenue & East Barclay Street/Woodbury Road									
Bay Avenue	NB	LTR	0.26	6.8	B	LTR	0.42	7.6	B
	SB	L	0.41	7.5	B	L	0.29	6.9	B
		LT	0.51	2.3	A	LT	0.33	1.6	A
East Barclay Street	EB	LTR	0.30	20.2	C	LTR	0.37	20.5	C
Woodbury Road	WB	LT	0.68	21.3	C	LT	0.89	34.0	D
		R	0.14	16.0	C	R	0.95	44.2	E
Overall Intersection		-	**0.48**	**8.9**	**B**	-	**0.55**	**17.1**	**C**

Table L - 5
2020 BUILD LIRR STATION AREA LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg Stopped Delay	LOS
BAYSIDE									
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard									
Bell Boulevard	NB	LTR	1.34	267.8	F*	LTR	1.05	80.7	F
	SB	LTR	0.70	28.1	D	LTR	1.00	49.0	E
Northern Boulevard (NYS Rt. 25A)	EB	D/L	1.13	172.2	F*	-	1.45	465.9	F*
		T	0.71	6.5	B	LT	0.88	9.6	B
		R	0.21	3.8	A	R	0.28	4.0	A
	WB	L	0.93	48.2	E	L	1.13	169.9	F*
		T	0.92	11.5	B	T	0.55	5.2	B
		R	0.19	3.7	A	R	0.20	3.8	A
Overall Intersection		-	**0.98**	**43.6**	**E**	-	**1.30**	**39.2**	**D**
16 Bell Boulevard & 41st Avenue									
Bell Boulevard	NB	LTR	1.43	336.5	F*	LTR	1.31	215.2	F*
	SB	LTR	0.76	11.3	B	LTR	0.92	20.4	C
41st Avenue	EB	LTR	0.62	13.9	B	LTR	0.68	15.6	C
	WB	LTR	0.44	11.5	B	LTR	0.94	41.8	E
Overall Intersection		-	**1.10**	**156.5**	**F***	-	**1.16**	**99.4**	**F***
DEER PARK									
30 Executive Drive & Long Island Avenue									
Executive Drive	NB	L	0.67	12.2	B	L	0.73	17.2	C
		TR	0.85	16.3	C	TR	0.29	8.8	B
	SB	L	0.01	19.7	C	L	0.01	19.7	C
		T	0.29	21.1	C	T	1.14	111.9	F
		R	0.12	20.2	C	R	0.49	10.4	B
Long Island Avenue	EB	L	0.37	19.4	C	L	0.47	21.0	C
		T	0.25	18.5	C	T	0.10	17.7	C
		R	0.71	25.5	D	R	0.97	51.9	E
	WB	L	0.44	15.5	C	L	1.30	216.4	F*
		T	0.07	11.2	B	T	0.18	11.8	B
		R	0.02	11.0	B	R	0.01	10.9	B
Overall Intersection		-	**0.73**	**16.7**	**C**	-	**1.12**	**77.6**	**F**
31 Executive Drive & Pine Aire Drive									
Executive Drive	SB	L	1.03	65.8	F	L	1.16	122.2	F*
		LR	0.22	18.3	C	LR	1.16	121.9	F*
Pine Aire Drive	EB	L	0.56	14.5	B	L	0.25	11.1	B
		T	0.35	4.7	A	T	0.90	19.6	C
	WB	LT	0.85	23.3	C	LT	1.19	148.2	F*
		R	1.54	830.9	F*	R	0.67	12.0	B
Overall Intersection		-	**0.86**	**391.3**	**F***	-	**0.99**	**73.3**	**F**

Table L - 5
2020 BUILD LIRR STATION AREA LEVELS OF SERVICE

INTERSECTION & APPROACH		A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	P.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS
RONKONKOMA									
36 Hawkins Avenue & Union Avenue									
Hawkins Avenue	NB	TR	0.57	11.4	B	TR	1.07	54.3	E
	SB	L	1.26	184.5	F*	L	1.26	208.1	F*
		T	0.63	4.8	A	T	0.28	2.4	A
Union Avenue	WB	L	0.43	17.7	C	L	0.32	20.5	C
		R	0.53	10.1	B	R	0.79	21.9	C
Overall Intersection		-	**1.31**	**57.8**	**E**	-	**1.59**	**62.5**	**F**
37 Hawkins Avenue & LIE North Service Road									
Hawkins Avenue	NB	L	0.99	72.3	F	L	0.58	34.0	D
		T	0.45	20.8	C	T	0.47	16.8	C
	SB	TR	1.10	92.8	F*	TR	0.75	28.6	D
L.I.E. North Service Road	WB	LTR	1.28	186.7	F*	LTR	0.49	14.8	B
Overall Intersection		-	**1.21**	**154.3**	**F***	-	**0.66**	**20.3**	**C**
38 Hawkins Avenue & LIE South Service Road									
Hawkins Avenue	NB	TR	0.71	25.1	D	TR	1.39	304.7	F*
	SB	L	1.40	348.1	F*	L	0.72	30.5	D
		T	0.75	21.8	C	T	0.28	14.5	B
L.I.E. South Service Road	EB	LT	0.36	11.8	B	LT	1.20	125.1	F*
Overall Intersection		-	**0.70**	**49.1**	**E**	-	**1.13**	**148.0**	**F***
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue									
LIRR Parking Lot	NB	L	0.03	12.2	B	L	0.11	12.4	B
		TR	0.01	12.2	B	TR	0.29	13.1	B
Ronkonkoma Avenue Ramp	SB	L	0.28	13.0	B	L	0.34	13.4	B
		TR	0.06	12.3	B	TR	0.06	12.3	B
Railroad Avenue	EB	L	0.13	2.0	A	L	0.12	2.0	A
		T	0.30	2.4	A	T	0.54	3.3	A
		R	0.02	1.9	A	R	0.01	1.9	A
	WB	L	0.04	1.9	A	L	0.01	1.9	A
		TR	0.77	6.4	B	TR	0.45	2.9	A
Overall Intersection		-	**0.66**	**5.8**	**B**	-	**0.49**	**4.8**	**A**

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF. Also it is beyond the scope of HCM to assess delay for an approach which operates at oversaturated conditions.

TABLE L-6

2010 MITIGATED BUILD LIRR STATIONS TRAFFIC AM LEVELS OF SERVICE

TABLE L - 6
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
GREAT NECK														
1 Middle Neck Road & North Station Plaza														
Middle Neck Road	NB	L	1.03	*	F*	L	[redacted]			L	1.03	68.6	F	- Modify signal timing (shift 1 sec. green time from NB/SB phase to exclusive NB phase)
		TR	0.44	8.4	B	TR	0.44	8.4	B	TR	0.44	8.4	B	
	SB	LTR	0.74	15.4	C	LTR	0.87	21.2	C	LTR	0.89	23.7	C	
North Station Plaza	EB	L	0.26	11.8	B	L	0.29	12.0	B	L	0.29	12.0	B	- Restripe WB approach from one 11 ft. left lane and one 16 ft. thru lane to one 14 ft. left lane and one 13 ft. thru lane
		TR	0.50	13.5	B	TR	0.52	13.7	B	TR	0.52	13.7	B	
	WB	L	0.69	21.5	C	L	[redacted]			L	0.74	24.3	C	
		TR	0.25	11.6	B	TR	0.27	11.8	B	TR	0.30	11.9	B	
Overall Intersection		-	*	*	F*	-	*	*	F*	-	**0.89**	**20.9**	**C**	
2 Middle Neck Road & South Station Plaza														
Middle Neck Road	NB	L	1.19	*	F*	L	[redacted]			L	1.20	168.6	F	- Restripe NB approach from one 10 ft. left lane and one 12 ft. thru lane to two 11 ft. lanes
		TR	0.49	7.7	B	TR	0.50	7.8	B	TR	0.51	7.9	B	
	SB	L	0.83	31.4	D	L	0.84	33.1	D	L	0.84	33.1	D	
		TR	0.45	7.5	B	TR	0.46	7.5	B	TR	0.46	7.5	B	
South Station Plaza	EB	DfL	0.91	41.4	E	DfL	0.91	42.1	E	DfL	0.91	42.1	E	
		TR	0.52	15.1	C	TR	0.53	15.3	C	TR	0.53	15.3	C	
	WB	L	0.27	13.1	B	L	0.31	13.4	B	L	0.31	13.4	B	
		TR	0.52	15.1	C	TR	0.52	15.1	C	TR	0.52	15.1	C	
Overall Intersection		-	*	*	F*	-	*	*	F*	-	**1.08**	**23.1**	**C**	
HEMPSTEAD														
3 Main Street & West Columbia Street														
Main Street	NB	LT	0.31	4.4	A	LT	0.31	4.4	A					- Mitigation not required
		R	0.10	3.7	A	R	0.10	3.7	A					
	SB	LTR	0.43	5.1	B	LTR	0.43	5.2	B					
West Columbia Street	EB	LTR	0.35	18.5	C	LTR	0.35	18.5	C					
	WB	LTR	0.85	34.1	D	LTR	0.85	34.1	D					
Overall Intersection		-	**0.55**	**13.8**	**B**	-	**0.55**	**13.8**	**B**					
4 Main Street & Fulton Street (NYS Rt. 24)														
Main Street	NB	TR	0.59	18.1	C	TR	0.59	18.1	C					- Mitigation not required
	SB	TR	0.56	18.5	C	TR	0.56	18.5	C					
Fulton Street (NYS Rt.24)	EB	TR	0.57	4.2	A	TR	0.57	4.2	A					
	WB	TR	0.43	3.5	A	TR	0.43	3.5	A					
Overall Intersection		-	**0.58**	**8.3**	**B**	-	**0.58**	**8.3**	**B**					

TABLE L - 6 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
5 Fulton Street (NYS Rt. 24) & Washington Ave.														
Washington Avenue	NB	L	0.08	11.5	B	L	0.08	11.5	B					- Mitigation not required
		TR	0.94	26.1	D	TR	0.94	26.8	D					
	SB	L	0.50	19.3	C	L	0.50	19.4	C					
		TR	0.68	16.1	C	TR	0.68	16.1	C					
Fulton Street (NYS Rt. 24)	EB	LTR	1.04	41.3	E	LTR	1.04	41.3	E					
	WB	LT	1.13	*	F*	LT	1.13	*	F*					
		R	0.59	11.5	B	R	0.60	11.7	B					
Overall Intersection		-	*	*	F*	-	*	*	F*					
HICKSVILLE														
6 Newbridge Road (NYS Rt. 106) & West John Street														
Newbridge Road (NYS Rt. 106)	NB	L	0.96	57.2	E	L	0.96	57.3	E					- Mitigation not required
		T	0.41	9.9	B	T	0.41	9.9	B					
		R	0.08	7.9	B	R	0.08	7.9	B					
	SB	L	0.13	13.2	B	L	0.13	13.2	B					
		T	0.84	22.8	C	T	0.85	23.1	C					
		R	0.49	16.3	C	R	0.49	16.3	C					
West John Street	EB	L	0.80	30.3	D	L	0.80	30.3	D					
		T	0.40	23.9	C	T	0.40	23.9	C					
		R	0.43	24.4	C	R	0.43	24.4	C					
	WB	L	0.69	21.0	C	L	0.70	21.2	C					
		TR	0.85	32.7	D	TR	0.85	32.7	D					
Overall Intersection		-	**0.87**	**23.6**	**C**	-	**0.87**	**23.7**	**C**					
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue														
Newbridge Road (NYS Rt. 106)	NB	L	0.87	37.1	D	L	[redacted]			L	0.87	36.8	D	- Modify signal timing (shift 1 sec. green time from existing actuated NB/SB phase to existing actuated NB/SB left turn phase)
		T	0.56	18.0	C	T	0.57	18.0	C	T	0.58	18.5	C	
		R	0.06	13.9	B	R	0.06	14.0	B	R	0.06	14.4	B	
	SB	L	0.19	9.5	B	L	0.19	9.5	B	L	0.18	9.5	B	
		T	0.73	20.6	C	T	0.74	20.8	C	T	0.76	21.6	C	
		R	1.00	50.5	E	R	1.00	52.7	E	R	1.03	59.5	E	
Duffy Avenue	EB	L	0.39	16.5	C	L	0.40	16.6	C	L	0.40	16.6	C	
		T	0.11	13.9	B	T	0.12	13.9	B	T	0.12	13.9	B	
		R	0.13	14.0	B	R	0.13	14.0	B	R	0.13	14.0	B	
	WB	LTR	0.94	46.7	E	LTR	0.98	54.2	E	LTR	0.98	54.2	E	
Overall Intersection		-	**0.96**	**28.5**	**D**	-	**0.98**	**30.4**	**D**	-	**0.99**	**31.4**	**D**	

TABLE L - 6 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
8 Broadway (NYS Rt 107) & East John Street														
Broadway (NYS Rt 107)	NB	L	0.83	49.2	E	L	0.83	49.2	E					- Mitigation not required
		TR	0.49	7.9	B	TR	0.49	7.9	B					
	SB	L	0.31	12.9	B	L	0.31	12.9	B					
		TR	0.35	12.6	B	TR	0.35	12.6	B					
East John Street	EB	L	0.35	24.8	C	L	0.35	24.8	C					
		T	0.26	29.0	D	T	0.26	29.0	D					
		R	0.36	25.4	D	R	0.36	25.4	D					
	WB	LTR	0.76	36.0	D	LTR	0.76	36.1	D					
Overall Intersection		-	**0.56**	**20.9**	**C**	-	**0.56**	**20.9**	**C**					
9 Bay Avenue & East Barclay Street/Woodbury Road														
Bay Avenue	NB	LTR	0.28	20.1	C	LTR	0.28	20.1	C					- Mitigation not required
	SB	L	0.37	17.2	C	L	0.37	17.2	C					
		LT	0.41	17.5	C	LT	0.41	17.5	C					
East Barclay Street	EB	LTR	0.23	6.7	B	LTR	0.24	6.7	B					
Woodbury Road	WB	LT	0.37	7.3	B	LT	0.37	7.3	B					
		R	0.47	2.1	A	R	0.47	2.1	A					
Overall Intersection		-	**0.44**	**8.3**	**B**	-	**0.44**	**8.3**	**B**					
MALVERNE														
10 Hempstead Avenue & Nassau Avenue/Francis Street – LIRR Entrance														
Hempstead Avenue	NB	LTR	0.94	25.0	C	LTR	0.95	25.2	D					- Mitigation not required
	SB	LTR	0.53	7.3	B	LTR	0.54	7.4	B					
Nassau Avenue	EB	LTR	0.18	10.1	B	LTR	0.18	10.1	B					
Francis Street - LIRR Entrance	WB	LTR	0.20	10.2	B	LTR	0.20	10.2	B					
Overall Intersection		-	**0.65**	**17.1**	**C**	-	**0.65**	**17.2**	**C**					
11 Hempstead Avenue & Utterby Road														
Hempstead Avenue	NB	TR	0.90	25.8	D	TR	0.90	25.8	D					- Mitigation not required
	SB	LT	0.57	6.7	B	LT	0.57	6.7	B					
Utterby Road	WB	L	0.20	20.2	C	L	0.20	20.2	C					
		R	0.77	33.0	D	R	0.77	33.0	D					
Overall Intersection		-	**0.50**	**18.0**	**C**	-	**0.50**	**18.0**	**C**					
LONG BEACH														
12a LIRR Parking Lot Exit & West Park Avenue														
LIRR Parking Lot Exit	SB	L	0.12	14.5	B	L	0.12	14.5	B					- Mitigation not required
West Park Avenue	EB	T	0.43	6.5	B	T	0.43	6.5	B					
Overall Intersection		-	**0.32**	**7.2**	**B**	-	**0.32**	**7.2**	**B**					

TABLE L - 6 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
12b LIRR Parking Lot Exit & West Park Avenue														
LIRR Parking Lot Exit	SB	TR	0.17	14.8	B	TR	0.17	14.8	B					- Mitigation not required
West Park Avenue	WB	LT	0.45	6.6	B	LT	0.45	6.6	B					
Overall Intersection		-	**0.35**	**7.6**	**B**	-	**0.35**	**7.6**	**B**					
13 Center Street & West Park Avenue														
Center Street	NB	LT	0.09	14.4	B	LT	0.09	14.4	B					- Mitigation not required
West Park Avenue	WB	TR	0.43	6.5	B	TR	0.43	6.5	B					
Overall Intersection		-	**0.31**	**7.1**	**B**	-	**0.31**	**7.1**	**B**					
14a Edwards Boulevard & West Park Avenue														
Edwards Boulevard	NB	TR	0.14	14.6	B	TR	0.14	14.6	B					- Mitigation not required
	SB	DfL	0.03	14.1	B	DfL	0.03	14.1	B					
		T	0.02	14.0	B	T	0.02	14.0	B					
West Park Avenue	EB	LTR	0.51	7.0	B	LTR	0.51	7.0	B					
Overall Intersection		-	**0.38**	**7.8**	**B**	-	**0.38**	**7.8**	**B**					
14b Edwards Boulevard & West Park Avenue														
Edwards Boulevard	NB	L	0.11	14.5	B	L	0.11	14.5	B					- Mitigation not required
West Park Avenue	WB	LT	0.48	6.9	B	LT	0.48	6.9	B					
Overall Intersection		-	**0.35**	**7.8**	**B**	-	**0.35**	**7.8**	**B**					
BAYSIDE														
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard														
Bell Boulevard	NB	LTR	1.06	*	F*	LTR				LTR	1.03	68.5	F	- Prohibit parking on the NB approach
	SB	LTR	0.60	26.4	D	LTR	0.62	26.7	D	LTR	0.64	27.5	D	- Restripe the EB approach from three
Northern Boulevard (NYS Rt. 25A)	EB	DfL	0.70	25.2	D	DfL				DfL	0.74	29.3	D	through lanes with a shared left turn plus
		T	0.65	5.8	B	T	0.65	5.8	B	T	0.64	5.3	B	one right turn lane, to one left turn only lane,
		R	0.19	3.7	A	R	0.19	3.7	A	R	0.19	3.4	A	two through lanes, and one right turn lane
	WB	L	0.79	22.6	C	L	0.79	22.6	C	L	0.76	19.1	C	- Modify signal timing (take 2 sec. green
		T	0.83	8.3	B	T	0.83	8.3	B	T	0.82	7.6	B	from SB only phase and give 1 sec.
		R	0.16	3.6	A	R	0.17	3.7	A	R	0.16	3.3	A	green time to EB/WB phase and 1 sec.
														green time to NB/SB phase)
Overall Intersection		-	*	*	F*	-	*	*	F*	-	**0.76**	**16.5**	**C**	

TABLE L - 6 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
16 Bell Boulevard & 41st Avenue														
Bell Boulevard	NB	LTR	1.08	63.7	F	LTR	[redacted]			L	0.40	5.4	B	- Modify signal timing (shift 4 sec. green
		LTR	0.65	8.8	B					TR	0.77	9.8	B	time from EB/WB phase to NB/SB
	SB	LTR	0.53	12.4	B	LTR	0.68	9.3	B	LTR	0.60	6.4	B	phase)
41st Avenue	EB	LTR	0.31	10.5	B	LTR	0.55	12.6	B	LTR	0.67	17.6	C	- Restripe NB approach from one 20' lane
	WB					LTR	0.37	10.9	B	LTR	0.48	14.2	B	to one 11' exclusive left turn lane and one 11' through/right lane by shifting the
Overall Intersection		-	**0.86**	**33.7**	**D**	-	[redacted]			-	**0.74**	**9.7**	**B**	centerline 2' to the west
MINEOLA														
17 Mineola Boulevard & Old Country Boulevard														
Mineola Boulevard	NB	L	0.98	50.2	E	L	0.98	51.2	E					- Mitigation not required
		TR	1.04	52.4	E	TR	1.04	52.7	E					
	SB	L	0.93	41.6	E	L	0.94	42.4	E					
		TR	0.70	18.8	C	TR	0.70	18.8	C					
Old Country Road	EB	L	0.70	16.5	C	L	0.70	16.6	C					
		TR	1.06	57.4	E	TR	1.06	57.4	E					
	WB	L	0.90	36.1	D	L	0.90	36.1	D					
		T	0.74	19.7	C	T	0.75	19.8	C					
		R	0.54	17.4	C	R	0.55	17.4	C					
Overall Intersection		-	**1.00**	**38.7**	**D**	-	**1.00**	**38.9**	**D**					
18 Mineola Boulevard & 2nd Street														
Mineola Boulevard	NB	L	1.08	*	F*	L	1.09	*	F*					- Mitigation not required
		TR	0.36	4.7	A	TR	0.36	4.7	A					
	SB	L	0.14	4.0	A	L	0.14	4.0	A					
		TR	0.95	21.4	C	TR	0.95	22.1	C					
2nd Street	EB	L	0.12	11.0	B	L	0.12	11.0	B					
		TR	0.68	16.1	C	TR	0.69	16.2	C					
	WB	LTR	1.21	*	F*	LTR	1.22	*	F*					
Overall Intersection		-	*	*	**F***	-	*	*	**F***					
PORT WASHINGTON														
19 Main Street & LIRR Parking Entrance[3]														
Main Street	WB	L		9.2	B	L		11.1	C					- Mitigation not required
Overall Intersection		-		**0.6**	**A**	-		**0.9**	**A**					

TABLE L - 6 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
20 Main Street & Port Washington Boulevard (NYS Rte. 101)														
Port Washington Boulevard (NYS Rt. 101)	NB	L	1.23	*	F*	L	[redacted]			L	1.23	176.3	F	- Modify signal timing (shift 1 sec. green
		TR	0.40	2.7	A	TR	0.40	2.7	A	TR	0.40	3.0	A	time from pretimed NB/SB phase to
	SB	L	0.33	9.0	B	L	0.33	9.0	B	L	0.35	10.6	B	existing acuated EB/WB phase; shift 2
		TR	0.53	10.0	B	TR	0.54	10.1	B	TR	0.57	11.9	B	sec. green time from NB/SB phase to
Main Street	EB	LT	1.20	*	F*	LT	[redacted]			LT	1.19	162.9	F	existing actuated NB only phase)
		R	0.45	18.9	C	R	0.45	19.0	C	R	0.43	17.3	C	
	WB	LTR	0.62	31.2	D	LTR	0.64	31.9	D	LTR	0.61	30.3	D	
Overall Intersection		-	*	*	F*	-	*	*	F*	-	**1.47**	**46.0**	**E**	
VALLEY STREAM														
21 South Franklin Avenue & Merrick Road														
South Franklin Avenue	NB	LR	0.49	15.3	C	LTR	0.49	15.3	C					- Mitigation not required
	SB	LTR	0.26	13.3	B	LTR	0.26	13.3	B					
Merrick Road	EB	TR	0.42	5.3	B	TR	0.42	5.3	B					
	WB	LT	0.61	6.7	B	LT	0.61	6.8	B					
Overall Intersection		-	**0.57**	**7.7**	**B**	-	**0.57**	**7.7**	**B**					
22 South Franklin Avenue & West Hawthorne Avenue														
South Franklin Avenue	NB	LT	0.19	7.2	B	LT	0.20	7.2	B					- Mitigation not required
	SB	TR	0.15	7.0	B	TR	0.15	7.0	B					
West Hawthorne Avenue	EB	LR	0.18	10.1	B	LR	0.18	10.1	B					
	WB	LTR	0.17	10.1	B	LTR	0.18	10.1	B					
Overall Intersection		-	**0.19**	**8.2**	**B**	-	**0.19**	**8.2**	**B**					
23 South Franklin Avenue & Sunrise Highway (NYS Rt.27)														
South Franklin Avenue	NB	LTR	0.45	32.7	D	LTR	0.46	32.7	D					- Mitigation not required
	SB	L	0.78	51.6	E	L	0.81	54.4	E					
		R	0.23	30.8	D	R	0.23	30.8	D					
Sunrise Highway (NYS Rt. 27)	EB	L	0.28	4.5	A	L	0.29	4.6	A					
		T	0.38	4.6	A	T	0.38	4.6	A					
	WB	T	0.46	5.1	B	T	0.46	5.1	B					
		R	0.08	3.5	A	R	0.08	3.5	A					
Overall Intersection		-	**0.53**	**9.3**	**B**	-	**0.54**	**9.4**	**B**					
MERRICK														
24 Merrick Avenue & Broadcast Plaza[3]														
Merrick Avenue	NB	L		4.6	A	L		4.6	A					- Mitigation not required
Broadcast Plaza	EB	LR		7.5	B	LR		7.6	B					
Overall Intersection		-		**0.9**	**A**	-		**0.9**	**A**					

TABLE L - 6 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
25 Merrick Avenue & Smith Street														
Merrick Avenue	NB	L	0.61	22.9	C	L	0.61	22.9	C					- Mitigation not required
		TR	0.85	25.2	D	TR	0.86	25.4	D					
	SB	L	0.22	9.5	B	L	0.22	9.5	B					
		TR	1.00	41.7	E	TR	1.01	44.5	E					
Smith Street	EB	L	0.52	11.2	B	L	0.52	11.2	B					
		TR	0.34	13.8	B	TR	0.34	13.8	B					
	WB	L	0.18	8.0	B	L	0.18	8.0	B					
		TR	0.86	26.8	D	TR	0.86	26.8	D					
Overall Intersection		-	**0.93**	**27.7**	**D**	-	**0.93**	**28.6**	**D**					
26 Merrick Avenue & Sunrise Highway (NYS Rt. 27)														
Merrick Avenue	NB	L	0.45	31.0	D	L	0.45	31.1	D					- Mitigation not required
		TR	0.63	33.6	D	TR	0.65	34.0	D					
	SB	L	0.50	24.0	C	L	0.52	24.2	C					
		T	0.34	22.6	C	T	0.34	22.6	C					
		R	0.31	22.4	C	R	0.32	22.4	C					
Sunrise Highway (NYS Rt. 27)	EB	L	0.56	37.5	D	L	0.56	37.5	D					
		T	0.89	27.0	D	T	0.89	27.0	D					
		R	0.03	14.2	B	R	0.03	14.2	B					
	WB	L	0.25	33.5	D	L	0.25	33.5	D					
		T	1.11	*	F*	T	1.11	*	F*					
		R	0.10	14.7	B	R	0.10	14.7	B					
Overall Intersection		-	*	*	**F***	-	*	*	**F***					
BABYLON														
27 Deer Park Avenue & Railroad Avenue[3]														
Deer Park Avenue	NB	L		6.6	B	L		6.9	B	LT	0.50	4.5	A	- Install a traffic signal
	SB	L		47.3	E					TR	0.74	10.9	B	
Railroad Avenue	EB	R		6.6	B	L		[illegible]		L	0.46	19.5	C	
						R		6.7	B	R	0.50	20.1	C	
Overall Intersection		-		**6.9**	**B**	-		**8.6**	**B**	-	**0.50**	**11.1**	**B**	
28 Deer Park Avenue & Park Avenue														
Deer Park Avenue	NB	LT	0.41	5.4	B	LT	0.43	5.5	B	LT	0.36	5.2	B	- Eliminate four 15 minute parking spaces
	SB	TR	1.08	*	F*	TR	[illegible]			T	0.53	6.2	B	on the SB approach and restripe SB
Park Avenue		LR	0.82	17.5	C					R	0.50	6.1	B	approach from one 13 ft. lane to two
	EB					LR	0.82	17.6	C	LTR	0.82	17.6	C	10 ft. lanes
Overall Intersection		-	*	*	**F***	-	[illegible]			-	**0.65**	**9.0**	**B**	

TABLE L - 6 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build				2010 AM Build				2010 AM Mitigated Build				Mitigation Measures
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
29 Deer Park Avenue/Fire Island Avenue & West Main Street/East Main Street														
Fire Island Avenue	NB	LTR	0.68	28.6	D	LTR	0.69	29.0	D					- Mitigation not required
Deer Park Avenue	SB	DfL	0.72	33.7	D	DfL	0.74	35.5	D					
		TR	0.55	25.4	D	TR	0.56	25.4	D					
West Main Street	EB	L	0.54	15.8	C	L	0.54	16.0	C					
		TR	0.65	6.5	B	TR	0.65	6.5	B					
East Main Street	WB	L	0.15	5.8	B	L	0.15	5.8	B					
		TR	0.89	18.5	C	TR	0.90	19.3	C					
Overall Intersection		-	**0.85**	**16.7**	**C**	-	**0.86**	**17.2**	**C**					
DEER PARK														
30 Executive Drive & Long Island Avenue														
Executive Drive	NB	L	0.50	10.0	B	L	0.54	10.3	B					- Mitigation not required
		TR	0.70	12.5	B	TR	0.70	12.5	B					
	SB	L	0.01	19.7	C	L	0.01	19.7	C					
		T	0.24	20.8	C	T	0.24	20.8	C					
		R	0.10	20.1	C	R	0.10	20.1	C					
Long Island Avenue	EB	L	0.29	18.8	C	L	0.29	18.8	C					
		T	0.20	18.2	C	T	0.20	18.2	C					
		R	0.57	21.9	C	R	0.58	22.2	C					
	WB	L	0.34	13.8	B	L	0.34	13.8	B					
		T	0.06	11.2	B	T	0.06	11.2	B					
		R	0.02	11.0	B	R	0.02	11.0	B					
Overall Intersection		-	**0.57**	**14.1**	**B**	-	**0.57**	**14.1**	**B**					
31 Executive Drive & Pine Aire Drive														
Executive Drive	SB	L	0.50	20.7	C	L	0.51	20.8	C	L	0.36	17.1	C	- Modify signal timing (shift 5 sec. green
		LR	0.51	20.8	C	LR	0.51	20.9	C	LR	0.51	18.5	C	time from existing actuated EB only
Pine Aire Drive	EB	L	0.45	10.4	B	L	0.46	10.8	B	L	0.56	13.5	B	phase to existing actuated SB/WB right
		T	0.29	4.4	A	T	0.29	4.4	A	T	0.31	5.8	B	turn phase)
	WB	LT	0.70	17.3	C	LT	0.70	17.3	C	LT	0.70	17.3	C	
		R	1.23	*	F*	R				R	1.16	106.1	F	
Overall Intersection		-	*	*	F*	-				-	**0.63**	**55.7**	**E**	

TABLE L - 6 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build				2010 AM Build				2010 AM Mitigated Build				Mitigation Measures
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
HUNTINGTON														
32 New York Avenue (NYS Rt. 110) & Railroad Street/Broadway														
New York Avenue (NYS Rt. 110)	NB	L	0.46	9.8	B	L	0.46	9.8	B					- Mitigation not required
		T	0.54	17.3	C	T	0.54	17.3	C					
		R	0.30	15.0	B	R	0.31	15.0	B					
	SB	L	0.66	14.6	B	L	0.69	15.9	C					
		T	0.45	16.3	C	T	0.45	16.3	C					
		R	0.17	14.0	B	R	0.18	14.0	B					
Railroad Street	EB	L	0.82	62.3	F	L	0.82	62.3	F					
		TR	0.84	40.9	E	TR	0.85	41.6	E					
Broadway	WB	L	0.88	35.8	D	L	0.89	36.7	D					
		T	0.76	26.1	D	T	0.76	26.1	D					
		R	0.45	20.4	C	R	0.45	20.4	C					
	Overall Intersection	-	**0.74**	**22.0**	**C**	-	**0.74**	**22.2**	**C**					
33 Park Avenue & Broadway														
Park Avenue	NB	L	1.23	*	F*	L				L	0.97	41.0	E	- Modify signal timing (shift 5 sec. green
		T	0.39	2.5	A	T	0.39	2.5	A	T	0.39	2.5	A	time from NB/SB phase to exclusive
	SB	T	0.53	10.6	B	T	0.53	10.7	B	T	0.65	14.1	B	NB phase)
Broadway	EB	L	0.38	19.9	C	L	0.38	20.0	C	L	0.39	20.0	C	
	Overall Intersection	-	*	*	**F***	-	*	*	**F***	-	**0.71**	**15.5**	**C**	
PORT JEFFERSON														
34 Main Street (NYS Rt. 25A) & LIRR Parking Entrance[3]														
Main Street	NB	L		6.5	B	L		6.5	B					- Mitigation not required
	SB	L		10.4	C	L		10.4	C					
	Overall Intersection	-		**0.3**	**A**	-		**0.3**	**A**					
35 Main Street (NYS Rt. 25A) & North Country Road														
Main Street (NYS Rt. 25A)	NB	LTR	1.37	*	F*	LTR	1.37	*	F*					- Mitigation not required
	SB	L	0.45	8.8	B	L	0.45	8.8	B					
		TR	0.38	6.7	B	TR	0.38	6.7	B					
Sheep Pasture Road	EB	LTR	0.38	24.2	C	LTR	0.38	24.2	C					
North Country Road	WB	L	1.31	*	F*	L	1.31	*	F*					
		TR	0.52	19.8	C	TR	0.52	19.8	C					
	Overall Intersection	-	*	*	**F***	-	*	*	**F***					

TABLE L - 6 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2010 AM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 AM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
RONKONKOMA														
36 Hawkins Avenue & Union Avenue														
Hawkins Avenue	NB	TR	0.45	10.2	B	TR	0.47	10.3	B					- Mitigation not required
	SB	L	0.92	22.1	C	L	0.94	24.8	C					
		T	0.45	3.6	A	T	0.52	4.0	A					
Union Avenue	WB	L	0.33	17.0	C	L	0.36	17.1	C					
		R	0.42	9.1	B	R	0.42	9.1	B					
Overall Intersection		-	**0.73**	**11.7**	**B**	-	**0.75**	**12.2**	**B**					
37 Hawkins Avenue & LIE North Service Road														
Hawkins Avenue	NB	L	0.82	42.4	E	L	0.82	42.6	E	L	0.87	49.7	E	- Modify signal timing (shift 1 sec.
		T	0.37	20.1	C	T	0.37	20.2	C	T	0.37	20.2	C	green time from NB only phase to
	SB	TR	0.84	35.3	D	TR	0.86	35.8	D	TR	0.86	35.9	D	NB/SB phase)
L.I.E. North Service Road	WB	LTR	1.04	35.4	D	LTR	1.05	39.5	D	LTR	1.05	39.5	D	
Overall Intersection		-	**0.99**	**34.3**	**D**	-	**1.00**	**38.0**	**D**	-	**1.01**	**37.8**	**D**	
38 Hawkins Avenue & LIE South Service Road														
Hawkins Avenue	NB	TR	0.58	22.8	C	TR	0.58	23.0	C					- Mitigation not required
	SB	L	1.06	99.9	F	L	1.07	106.2	F					
		T	0.56	18.6	C	T	0.62	19.4	C					
L.I.E. South Service Road	EB	LT	0.30	11.3	B	LT	0.30	11.3	B					
Overall Intersection		-	**0.62**	**25.1**	**D**	-	**0.62**	**25.7**	**D**					
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue														
LIRR Parking Lot	NB	L	0.03	12.2	B	L	0.03	12.2	B					- Mitigation not required
		TR	0.01	12.2	B	TR	0.01	12.2	B					
Ronkonkoma Avenue Ramp	SB	L	0.22	12.8	B	L	0.23	12.8	B					
		TR	0.04	12.2	B	TR	0.04	12.3	B					
Railroad Avenue	EB	L	0.09	2.0	A	L	0.10	2.0	A					
		T	0.24	2.2	A	T	0.25	2.3	A					
		R	0.01	1.9	A	R	0.02	1.9	A					
	WB	L	0.01	1.8	A	L	0.03	1.9	A					
		TR	0.62	3.9	A	TR	0.64	4.2	A					
Overall Intersection		-	**0.52**	**4.2**	**A**	-	**0.54**	**4.3**	**A**					

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

TABLE L-7

2020 MITIGATED BUILD LIRR STATIONS TRAFFIC AM LEVELS OF SERVICE

Table L - 7

2020 MITIGATION LIRR STATION AREA LEVELS OF SERVICE (AM PEAK HOUR)

INTERSECTION & APPROACH		2020 No Build A.M. Peak Hour				2020 Build A.M. Peak Hour				2020 Mitigation A.M. Peak Hour				2020 Mitigation Measure
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
GREAT NECK														
1 Middle Neck Road & North Station Plaza														
Middle Neck Road	NB	L	1.20	159.1	F	L	1.26	200.1	F*	L	1.17	136.5	F	- Modify signal timing (shift 3 sec. green time from NB/SB phase to EB/WB phase). - Prohibit parking for the NB approach and add a 9 ft. right turn lane. - Prohibit parking for the SB approach and add a 9 ft. right turn lane. - Restripe WB approach from one 11 ft. left lane and one 16 ft. thru lane to one 14 ft. left lane and one 13 ft. thru lane.
		TR	0.47	8.7	B	TR	0.47	8.7	B	T	0.38	9.1	B	
		-	-	-	-	-	-	-	-	R	0.21	8.2	B	
	SB	LTR	0.84	19.0	C	LTR	0.98	36.1	D	LT	0.79	18.2	C	
		-	-	-	-	-	-	-	-	R	0.15	10.4	B	
North Station Plaza	EB	L	0.31	12.1	B	L	0.34	12.4	B	L	0.31	10.9	B	
		TR	0.54	13.9	B	TR	0.56	14.2	B	TR	0.51	12.5	B	
	WB	L	0.83	35.9	D	L	1.00	74.6	F	L	0.78	26.5	D	
		TR	0.27	11.7	B	TR	0.29	11.9	B	TR	0.30	10.7	B	
Overall Intersection		-	**0.96**	**39.3**	**D**	-	**1.04**	**49.7**	**E**	-	**0.93**	**26.1**	**D**	
2 Middle Neck Road & South Station Plaza														
Middle Neck Road	NB	L	1.55	570.1	F*	L	1.62	701.5	F*	L	1.56	517.1	F	- Restripe NB approach from one 10 ft. left lane and one 12 ft. thru lane to two 11 ft. lanes.
		TR	0.53	8.0	B	TR	0.53	8.1	B	TR	0.55	8.2	B	
	SB	L	1.06	95.4	F	L	1.07	99.7	F	L	1.07	99.7	F	
		TR	0.49	7.7	B	TR	0.50	7.8	B	TR	0.50	7.8	B	
South Station Plaza	EB	DfL	1.06	85.4	F	DfL	1.07	87.2	F	DfL	1.07	87.2	F	
		TR	0.56	15.6	C	TR	0.57	15.9	C	TR	0.57	15.9	C	
	WB	L	0.31	13.5	B	L	0.37	14.0	B	L	0.37	14.0	B	
		TR	0.55	15.6	C	TR	0.56	15.6	C	TR	0.56	15.6	C	
Overall Intersection		-	**1.36**	**55.9**	**E**	-	**1.40**	**64.2**	**F**	-	**1.37**	**52.3**	**E**	
HICKSVILLE														
6 Newbridge Road (NYS Rt. 106) & West John Street														
Newbridge Road (NYS Rt. 106)	NB	L	1.05	82.1	F	L	1.05	82.1	F	L	1.05	82.4	F	- Modify signal timing (shift 1 sec. green time from NB/SB phase to EB/WB left turn phase)
		T	0.44	10.1	B	T	0.44	10.1	B	T	0.45	10.5	B	
		R	0.08	7.9	B	R	0.08	7.9	B	R	0.09	8.2	B	
	SB	L	0.15	13.4	B	L	0.15	13.4	B	L	0.15	13.8	B	
		T	0.91	26.4	D	T	0.92	27.2	D	T	0.93	29.4	D	
		R	0.53	16.8	C	R	0.53	16.8	C	R	0.54	17.4	C	
West John Street	EB	L	0.86	36.9	D	L	0.87	38.1	D	L	0.82	32.1	D	
		T	0.43	24.2	C	T	0.43	24.2	C	T	0.43	24.2	C	
		R	0.46	24.8	C	R	0.46	24.8	C	R	0.46	24.8	C	
	WB	L	0.77	24.7	C	L	0.78	25.3	C	L	0.75	22.8	C	
		TR	0.92	37.7	D	TR	0.92	37.7	D	TR	0.92	37.7	D	
Overall Intersection		-	**1.06**	**27.4**	**D**	-	**1.06**	**27.6**	**D**	-	**1.06**	**28.1**	**D**	
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue														
Newbridge Road (NYS Rt. 106)	NB	L	0.93	48.5	E	L	0.98	58.7	E	L	0.93	46.6	E	- Modify signal timing (shift 1 sec. green time from existing actuated EB phase to existing actuated EB/WB phase, shift 1 sec green time from existing actuated EB phase to existing actuated NB/SB turn phase).
		T	0.61	18.5	C	T	0.61	18.5	C	T	0.61	18.5	C	
		R	0.06	14.0	B	R	0.07	14.0	B	R	0.07	14.0	B	
	SB	L	0.22	9.9	B	L	0.22	9.9	B	L	0.20	9.6	B	
		T	0.79	22.1	C	T	0.80	22.3	C	T	0.80	22.3	C	
		R	1.08	77.7	F	R	1.09	82.1	F	R	1.09	82.1	F	
Duffy Avenue	EB	L	0.44	17.1	C	L	0.44	17.2	C	L	0.49	18.1	C	
		T	0.12	14.0	B	T	0.12	14.0	B	T	0.13	14.4	B	
		R	0.14	14.1	B	R	0.14	14.1	B	R	0.15	14.5	B	
	WB	LTR	1.02	66.1	F	LTR	1.07	86.5	F	LTR	1.04	69.5	F	
Overall Intersection		-	**1.03**	**36.7**	**D**	-	**1.05**	**40.8**	**E**	-	**1.05**	**37.9**	**D**	

Table L - 7
2020 MITIGATION LIRR STATION AREA LEVELS OF SERVICE (AM PEAK HOUR)

	INTERSECTION & APPROACH		2020 No Build A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	2020 Build A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	2020 Mitigation A.M. Peak Hour Mvt.	V/C	Avg. Stopped Delay	LOS	2020 Mitigation Measure
8	**Broadway (NYS Rt 107) & East John Street**														
	Broadway (NYS Rt 107)	NB	L	0.89	55.6	E	L	0.89	55.6	E					- Mitigation not required.
			TR	0.53	8.3	B	TR	0.53	8.3	B					
		SB	L	0.35	13.5	B	L	0.35	13.5	B					
			TR	0.37	12.8	B	TR	0.37	12.9	B					
	East John Street	EB	L	0.39	25.3	D	L	0.39	25.3	D					
			T	0.28	29.1	D	T	0.28	29.1	D					
			R	0.39	25.7	D	R	0.39	25.7	D					
		WB	LTR	0.82	38.6	D	LTR	0.82	38.7	D					
	Overall Intersection		-	**0.60**	**22.3**	**C**		**0.60**	**22.3**	**C**					
9	**Bay Avenue & East Barclay Street/Woodbury Road**														
	Bay Avenue	NB	LTR	0.25	6.7	B	LTR	0.26	6.8	B					- Mitigation not required.
		SB	L	0.40	7.5	B	L	0.41	7.5	B					
			LT	0.51	2.3	A	LT	0.51	2.3	A					
	East Barclay Street	EB	LTR	0.30	20.2	C	LTR	0.30	20.2	C					
	Woodbury Road	WB	LT	0.68	21.3	C	LT	0.68	21.3	C					
			R	0.14	16.0	C	R	0.14	16.0	C					
	Overall Intersection		-	**0.48**	**8.9**	**B**		**0.48**	**8.9**	**B**					
BAYSIDE															
15	**Northern Boulevard (NYS Rt. 25A) & Bell Boulevard**														
	Bell Boulevard	NB	LTR	1.25	193.1	F	LTR	1.34	267.8	F*	LTR	1.21	160.7	F	- Prohibit parking on the NB approach.
		SB	LTR	0.67	27.6	D	LTR	0.70	28.1	D	LTR	0.70	28.1	D	- Restripe EB approach from three through
	Northern Boulevard (NYS Rt. 25A)	EB	DIL	1.01	107.2	F	DIL	1.13	172.2	F*	L	0.74	34.5	D	lanes with a shared left turn plus one right
			T	0.71	6.5	B	T	0.71	6.5	B	T	0.77	10.4	B	turn lane, to one left turn only lane, two
			R	0.21	3.8	A	R	0.21	3.8	A	R	0.22	6.0	B	through lanes, and one right turn lane.
		WB	L	0.93	48.2	E	L	0.93	48.2	E	L	0.80	22.2	C	- Modify signal timing (shift 2 sec. green
			T	0.92	11.5	B	T	0.92	11.5	B	T	1.00	24.7	C	time from SB only phase to NB/SB phase,
			R	0.18	3.7	A	R	0.19	3.7	A	R	0.20	5.9	B	shift 6 sec. green time from EB/WB
															phase to new EB/WB left turn phase).
	Overall Intersection		-	**0.90**	**33.3**	**D**	-	**0.98**	**43.6**	**E**	-	**0.89**	**35.3**	**D**	
16	**Bell Boulevard & 41st Avenue**														
	Bell Boulevard	NB	LTR	1.28	193.4	F	LTR	1.43	316.5	F*	L	0.56	8.2	B	- Modify signal timing (shift 4 sec. green
			-	-	-	-	-	-	-	-	TR	0.85	13.0	B	time from EB phase to NB/SB phase)
		SB	LTR	0.73	10.4	B	LTR	0.76	11.3	B	LTR	0.67	7.3	B	- Restripe NB approach from one 20 ft.
	41st Avenue	EB	LTR	0.59	13.3	B	LTR	0.62	13.9	B	LTR	0.76	21.3	C	left lane to one 11 ft. exclusive left turn
		WB	LTR	0.36	10.8	B	LTR	0.44	11.5	B	LTR	0.57	16.0	C	lane and one 11 ft through / right lane by
															by shifting the center line 2 ft. to the west.
	Overall Intersection		-	**1.00**	**91.8**	**F**	-	**1.10**	**156.5**	**F***	-	**0.82**	**12.0**	**B**	
DEER PARK															
30	**Executive Drive & Long Island Avenue**														
	Executive Drive	NB	L	0.63	11.4	B	L	0.67	12.2	B	L	0.67	12.2	B	- Modify signal timing (shift 1 sec. green
			TR	0.85	16.3	C	TR	0.85	16.3	C	TR	0.85	16.3	C	time from WB phase to EB/WB phase)
		SB	L	0.01	19.7	C	L	0.01	19.7	C	L	0.01	19.7	C	
			T	0.29	21.1	C	T	0.29	21.1	C	T	0.29	21.1	C	
			R	0.12	20.2	C	R	0.12	20.2	C	R	0.12	20.2	C	
	Long Island Avenue	EB	L	0.37	19.4	C	L	0.37	19.4	C	L	0.36	18.9	C	
			T	0.25	18.5	C	T	0.25	18.5	C	T	0.24	18.0	C	
			R	0.69	24.9	C	R	0.71	25.5	D	R	0.68	24.1	C	
		WB	L	0.44	15.5	C	L	0.44	15.5	C	L	0.45	15.5	C	
			T	0.07	11.2	B	T	0.07	11.2	B	T	0.07	11.2	B	
			R	0.02	11.0	B	R	0.02	11.0	B	R	0.02	11.0	B	
	Overall Intersection		-	**0.73**	**16.6**	**C**	-	**0.73**	**16.7**	**C**	-	**0.73**	**16.5**	**C**	

Table L - 7
2020 MITIGATION LIRR STATION AREA LEVELS OF SERVICE (AM PEAK HOUR)

			2020 No Build A.M. Peak Hour				2020 Build A.M. Peak Hour				2020 Mitigation A.M. Peak Hour				2020 Mitigation Measure
	INTERSECTION & APPROACH		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
31	**Executive Drive & Pine Aire Drive**														
	Executive Drive	SB	L	1.02	62.4	F	L	1.03	65.8	F	L	0.44	17.7	C	- Modify signal timing (shift 5 sec. green
			LR	0.21	18.3	C	LR	0.22	18.3	C	LR	0.62	20.2	C	time from existing actuated EB only
	Pine Aire Drive	EB	L	0.55	14.3	B	L	0.56	14.5	B	L	0.76	23.3	C	phase to existing actuated SB/WB right
			T	0.35	4.7	A	T	0.35	4.7	A	T	0.38	6.2	B	turn phase, shift 2 sec. green time from
		WB	LT	0.85	23.3	C	LT	0.85	23.3	C	LT	0.81	20.2	C	existing actuated EB only phase to
			R	1.51	567.0	F*	R	1.54	630.9	F*	R	1.39	513.4	F	existing actuated EB/WB phase).
	Overall Intersection		-	**0.86**	**269.7**	**F***	-	**0.86**	**391.3**	**F***	-	**0.77**	**241.5**	**F***	
RONKONKOMA															
36	**Hawkins Avenue & Union Avenue**														
	Hawkins Avenue	NB	TR	0.56	11.2	B	TR	0.57	11.4	B	TR	0.56	11.1	B	- Modify signal timing (shift 2 sec. green
		SB	L	1.23	157.8	F*	L	1.26	184.5	F*	L	1.17	108.1	F	time from WB phase to SB phase)
			T	0.55	4.1	A	T	0.63	4.8	A	T	0.61	4.0	A	- Restripe the NB approach from one 12 ft.
	Union Avenue	WB	L	0.40	17.5	C	L	0.43	17.7	C	L	0.48	19.2	C	lane to one 13 ft. lane.
			R	0.53	10.1	B	R	0.53	10.1	B	R	0.53	10.1	B	
	Overall Intersection		-	**1.23**	**50.1**	**E**	-	**1.31**	**57.8**	**E**	-	**1.20**	**34.7**	**D**	
37	**Hawkins Avenue & LIE North Service Road**														
	Hawkins Avenue	NB	L	0.99	72.3	F	L	0.99	72.3	F	L	0.63	37.4	D	- Restripe the NB approach from one left
			T	0.45	20.8	C	T	0.45	20.8	C	LT	0.63	24.8	C	turn lane and two through lanes to one
		SB	TR	1.03	65.6	F	TR	1.10	92.8	F*	TR	1.01	60.7	F	left turn lane, one shared left/through lane,
	L.I.E. North Service Road	WB	LTR	1.27	175.3	F*	LTR	1.28	186.7	F*	LTR	1.28	192.9	F	and one through lane.
				0.00											- Modify signal timing (increase cycle length
	Overall Intersection		-	**1.18**	**142.8**	**F***	-	**1.21**	**154.3**	**F***	-	**1.12**	**152.9**	**F**	10 sec. and give 6 sec. green time to WB
38	**Hawkins Avenue & LIE South Service Road**														phase and 4 sec. green time to NB/SB
	Hawkins Avenue	NB	TR	0.70	25.0	C	TR	0.71	25.1	D	TR	0.66	22.6	C	phase).
		SB	L	1.40	348.1	F*	L	1.40	348.1	F*	L	1.40	340.2	F	- Modify signal timing (shift 3 sec. green
			T	0.69	20.5	C	T	0.75	21.8	C	T	0.70	19.4	C	time from EB phase to NB/SB phase).
	L.I.E. South Service Road	EB	LT	0.36	11.8	B	LT	0.36	11.8	B	LT	0.38	13.2	B	
	Overall Intersection		-	**0.70**	**49.1**	**E**	-	**0.70**	**49.1**	**E**	-	**0.73**	**46.9**	**E**	
RONKONKOMA															
39	**Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue**														
	LIRR Parking Lot	NB	L	0.03	12.2	B	L	0.03	12.2	B					- Mitigation not required.
			TR	0.01	12.2	B	TR	0.01	12.2	B					
	Ronkonkoma Avenue Ramp	SB	L	0.27	13.0	B	L	0.28	13.0	B					
			TR	0.04	12.3	B	TR	0.06	12.3	B					
	Railroad Avenue	EB	L	0.13	2.0	A	L	0.13	2.0	A					
			T	0.29	2.3	A	T	0.30	2.4	A					
			R	0.01	1.9	A	R	0.02	1.9	A					
		WB	L	0.01	1.8	A	L	0.04	1.9	A					
			TR	0.75	5.8	B	TR	0.77	6.4	B					
	Overall Intersection		-	**0.64**	**5.5**	**B**	-	**0.66**	**5.8**	**B**					

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF. Also it is beyond the scope of HCM to assess delay for an approach which operates at oversaturated conditions.

TABLE L-8

2010 MITIGATED BUILD LIRR STATIONS TRAFFIC PM LEVELS OF SERVICE

TABLE L - 8
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
GREAT NECK														
1 Middle Neck Road & North Station Plaza														
Middle Neck Road	NB	L	0.67	22.2	C	L	0.69	23.8	C	L	0.69	23.8	C	- Modify signal timing (shift 6 sec. green
		TR	0.46	8.6	B	TR	0.46	8.6	B	TR	0.46	8.6	B	time from existing actuated EB/WB
	SB	LTR	0.83	18.6	C	LTR	0.91	25.0	C	LTR	0.91	25.0	C	phase to new exclusive lead actuated
North Station Plaza	EB	L	0.27	11.8	B	L	0.30	12.0	B	L	0.31	14.1	B	WB phase)
		TR	0.64	15.4	C	TR	0.65	15.6	C	TR	0.76	20.4	C	- Restripe WB approach from one 11 ft.
	WB	L	1.32	*	F*	L	[redacted]			L	0.92	57.8	E	left lane and one 16 ft. thru lane to one
		TR	0.21	11.4	B	TR	0.24	11.5	B	TR	0.26	11.7	B	14 ft. left lane and one 13 ft. thru lane
	Overall Intersection	-	**1.09**	**26.2**	**D**	-	*	*	**F***	-	**0.91**	**19.1**	**C**	
2 Middle Neck Road & South Station Plaza														
Middle Neck Road	NB	L	0.87	38.2	D	L	[redacted]			L	0.55	12.9	B	- Modify signal timing (shift 8 sec. green
		TR	0.38	7.0	B	TR	0.38	7.0	B	TR	0.61	15.6	C	time from NB/SB phase to existing
	SB	L	0.22	6.3	B	L	0.22	6.3	B	L	0.24	9.2	B	actuated EB/WB phase; shift 10 sec.
		TR	0.49	7.7	B	TR	0.50	7.8	B	TR	0.76	18.2	C	green time from NB/SB phase to new
South Station Plaza	EB	LTR	0.98	39.0	D	LTR	[redacted]			LTR	0.82	18.0	C	actuated left turn phse for NB/SB left
		-			-	-	-	-	-	-			-	turns)
	WB	L	0.76	33.8	D	L	[redacted]			L	0.80	35.4	D	- Restripe NB approach from one 10 ft.
		TR	0.47	14.5	B	TR	0.48	14.6	B	TR	0.38	10.6	B	left lane and one 12 ft. thru lane to two
														11 ft. lanes
	Overall Intersection	-	**0.91**	**17.9**	**C**	-	**0.94**	**19.4**	**C**	-	**0.80**	**17.0**	**C**	
HEMPSTEAD														
3 Main Street & West Columbia Street														
Main Street	NB	LT	0.25	4.2	A	LT	0.25	4.2	A					- Mitigation not required
		R	0.11	3.7	A	R	0.11	3.7	A					
	SB	LTR	0.72	9.0	B	LTR	0.72	9.1	B					
West Columbia Street	EB	LTR	0.55	20.4	C	LTR	0.55	20.4	C					
	WB	LTR	0.86	36.4	D	LTR	0.86	36.4	D					
	Overall Intersection	-	**0.76**	**14.8**	**B**	-	**0.76**	**14.8**	**B**					
4 Main Street & Fulton Street (NYS Rt. 24)														
Main Street	NB	TR	0.48	17.1	C	TR	0.48	17.1	C					- Mitigation not required
	SB	TR	1.02	58.5	E	TR	1.02	58.5	E					
Fulton Street (NYS Rt.24)	EB	TR	0.62	4.4	A	TR	0.62	4.4	A					
	WB	TR	0.57	4.1	A	TR	0.57	4.1	A					
	Overall Intersection	-	**0.76**	**13.3**	**B**	-	**0.76**	**13.3**	**B**					

TABLE L - 8 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build				2010 PM Build				2010 PM Mitigated Build				Mitigation Measures
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
5 Fulton Street (NYS Rt. 24) & Washington Ave.														
Washington Avenue	NB	L	0.09	13.2	B	L	0.09	13.2	B					- Mitigation not required
		TR	0.53	14.4	B	TR	0.54	14.4	B					
	SB	L	0.74	23.2	C	L	0.74	23.4	C					
		TR	0.75	17.3	C	TR	0.75	17.4	C					
Fulton Street (NYS Rt. 24)	EB	LTR	0.98	28.7	D	LTR	0.98	28.7	D					
	WB	LT	1.17	*	F*	LT	1.17	*	F*					
		R	0.27	9.1	B	R	0.28	9.1	B					
Overall Intersection		-	*	*	F*	-	*	*	F*					
HICKSVILLE														
6 Newbridge Road (NYS Rt. 106) & West John Street														
Newbridge Road (NYS Rt. 106)	NB	L	0.82	33.3	D	L	0.82	33.3	D					- Mitigation not required
		T	0.51	10.7	B	T	0.51	10.7	B					
		R	0.06	7.8	B	R	0.06	7.8	B					
	SB	L	0.81	46.1	E	L	0.82	47.0	E					
		T	0.80	21.1	C	T	0.80	21.1	C					
		R	0.25	14.0	B	R	0.25	14.0	B					
West John Street	EB	L	1.04	*	F*	L	1.05	*	F*					
		T	0.90	37.9	D	T	0.90	38.0	D					
		R	0.55	27.0	D	R	0.55	27.0	D					
	WB	L	0.64	21.3	C	L	0.64	21.3	C					
		TR	0.59	26.8	D	TR	0.59	26.8	D					
Overall Intersection		-	*	*	F*	-	*	*	F*					
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue														
Newbridge Road (NYS Rt. 106)	NB	L	0.21	14.9	B	L	0.22	14.9	B	L	0.25	15.6	C	- Modify signal timing (shift 2 sec.
		T	0.68	18.8	C	T	0.68	18.8	C	T	0.68	18.8	C	green time from existing actuated NB/SB
		R	0.08	13.4	B	R	0.08	13.4	B	R	0.08	13.4	B	left turn phase to existing actuated
	SB	L	0.48	13.3	B	L	0.48	13.3	B	L	0.56	15.5	C	EB/WB phase)
		T	1.09	*	F*	T	1.10	*	F*	T	1.10	77.3	F	
		R	0.37	15.5	C	R	0.37	15.5	C	R	0.37	15.5	C	
Duffy Avenue	EB	L	1.01	58.1	E	L	[illegible]	[illegible]	[illegible]	L	1.01	54.3	E	
		TR	0.57	17.0	C	TR	0.59	17.3	C	TR	0.57	16.1	C	
		R	0.33	14.4	B	R	0.33	14.4	B	R	0.32	13.5	B	
	WB	LTR	0.86	43.8	E	LTR	[illegible]	[illegible]	[illegible]	LTR	0.89	46.8	E	
Overall Intersection		-	*	*	F*	-	*	*	F*	-	**1.03**	**45.1**	**E**	

TABLE L - 8 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
8 Broadway (NYS Rt 107) & East John Street														
Broadway (NYS Rt 107)	NB	L	0.65	38.0	D	L	0.65	38.0	D					- Mitigation not required
		TR	0.51	9.1	B	TR	0.52	9.1	B					
	SB	L	0.56	22.9	C	L	0.56	22.9	C					
		TR	0.73	19.8	C	TR	0.73	19.8	C					
East John Street	EB	L	0.25	20.8	C	L	0.25	20.8	C					
		T	0.55	29.5	D	T	0.55	29.5	D					
		R	0.65	27.0	D	R	0.65	27.0	D					
	WB	LTR	0.62	30.7	D	LTR	0.62	30.8	D					
Overall Intersection		-	**0.69**	**21.0**	**C**	-	**0.69**	**21.1**	**C**					
9 Bay Avenue & East Barclay Street/Woodbury Road														
Bay Avenue	NB	LTR	0.34	20.3	C	LTR	0.34	20.3	C					- Mitigation not required
	SB	L	0.83	27.9	D	L	0.83	27.9	D					
		LT	0.88	33.5	D	LT	0.88	33.8	D					
East Barclay Street	EB	LTR	0.38	7.3	B	LTR	0.39	7.4	B					
Woodbury Road	WB	LT	0.26	6.8	B	LT	0.27	6.8	B					
		R	0.31	1.6	A	R	0.31	1.6	A					
Overall Intersection		-	**0.50**	**14.5**	**B**	-	**0.50**	**14.5**	**B**					
MALVERNE														
10 Hempstead Avenue & Nassau Avenue/Francis Street – LIRR Entrance														
Hempstead Avenue	NB	LTR	0.85	15.7	C	LTR	0.85	15.7	C					- Mitigation not required
	SB	LTR	0.91	20.3	C	LTR	0.91	20.3	C					
Nassau Avenue	EB	LTR	0.20	10.2	B	LTR	0.20	10.2	B					
Francis Street - LIRR Entrance	WB	LTR	0.38	11.2	B	LTR	0.38	11.2	B					
Overall Intersection		-	**0.70**	**17.1**	**C**	-	**0.70**	**17.1**	**C**					
11 Hempstead Avenue & Utterby Road														
Hempstead Avenue	NB	TR	0.77	17.4	C	TR	0.77	17.4	C					- Mitigation not required
	SB	LT	0.63	7.2	B	LT	0.63	7.2	B					
Utterby Road	WB	L	0.26	20.4	C	L	0.26	20.4	C					
		R	0.62	25.6	D	R	0.62	25.6	D					
Overall Intersection		-	**0.52**	**13.1**	**B**	-	**0.52**	**13.1**	**B**					
LONG BEACH														
12a LIRR Parking Lot Exit & West Park Avenue														
LIRR Parking Lot Exit	SB	L	0.17	14.8	B	L	0.18	14.8	B					- Mitigation not required
West Park Avenue	EB	T	0.51	7.1	B	T	0.51	7.1	B					
Overall Intersection		-	**0.39**	**7.8**	**B**	-	**0.39**	**7.8**	**B**					

TABLE L - 8 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build				2010 PM Build				2010 PM Mitigated Build				Mitigation Measures
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
12b LIRR Parking Lot Exit & West Park Avenue														
LIRR Parking Lot Exit	SB	TR	0.17	14.8	B	TR	0.18	14.8	B					- Mitigation not required
West Park Avenue	WB	LT	0.51	7.0	B	LT	0.51	7.0	B					
Overall Intersection		-	**0.39**	**7.9**	**B**	-	**0.39**	**7.9**	**B**					
13 Center Street & West Park Avenue														
Center Street	NB	LT	0.04	14.2	B	LT	0.04	14.2	B					- Mitigation not required
West Park Avenue	WB	TR	0.50	7.0	B	TR	0.50	7.0	B					
Overall Intersection		-	**0.34**	**7.2**	**B**	-	**0.34**	**7.2**	**B**					
14a Edwards Boulevard & West Park Avenue														
Edwards Boulevard	NB	TR	0.11	14.5	B	TR	0.11	14.5	B					- Mitigation not required
	SB	DfL	0.03	14.1	B	DfL	0.03	14.1	B					
		T	0.02	14.0	B	T	0.02	14.0	B					
West Park Avenue	EB	LTR	0.59	7.7	B	LTR	0.59	7.7	B					
Overall Intersection		-	**0.42**	**8.1**	**B**	-	**0.42**	**8.1**	**B**					
14b Edwards Boulevard & West Park Avenue														
Edwards Boulevard	NB	L	0.03	14.1	B	L	0.03	14.1	B					- Mitigation not required
West Park Avenue	WB	LT	0.55	7.4	B	LT	0.55	7.4	B					
Overall Intersection		-	**0.37**	**7.5**	**B**	-	**0.37**	**7.5**	**B**					
BAYSIDE														
15 Northern Boulevard (NYS Rt. 25A) & Bell Boulevard														
Bell Boulevard	NB	LTR	0.95	53.9	E	LTR	0.97	57.3	E	LTR	0.97	57.3	E	- As a result of mitigation required for AM,
	SB	LTR	0.85	32.7	D	LTR	0.89	35.0	D	LTR	0.89	35.0	D	restripe the EB approach from three
Northern Boulevard (NYS Rt. 25A)	EB	-	-	-	-	-	-	-	-	L	0.77	21.5	C	through lanes with a shared left turn plus
		LT	0.94	13.3	B	LT	0.95	13.5	B	T	0.93	19.0	C	one right turn lane, to one left turn only lane,
		R	0.25	3.9	A	R	0.25	3.9	A	R	0.30	8.4	B	two through lanes, and one right turn lane
	WB	L	0.61	10.2	B	L	0.61	10.2	B	L	0.40	9.0	B	- Modify signal timing (shift 11 sec. green
		T	0.50	4.9	A	T	0.50	4.9	A	T	0.59	10.6	B	time from EB/WB phase to a new EB/WB
		R	0.18	3.7	A	R	0.18	3.7	A	R	0.21	8.0	B	left turn only phase)
Overall Intersection		-	**0.91**	**17.5**	**C**	-	**0.93**	**18.5**	**C**	-	**0.92**	**22.5**	**C**	

TABLE L - 8 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
16 Bell Boulevard & 41st Avenue														
Bell Boulevard	NB	LTR	1.07	59.5	E	LTR	[redacted]			L	0.41	7.4	B	- Restripe NB approach from one 20' lane
										TR	0.87	16.4	C	to one 11' exclusive left turn lane and one
	SB	LTR	0.78	11.8	B	LTR	0.81	12.9	B	LTR	0.83	14.2	B	11' through/right lane by shifting the
41st Avenue	EB	LTR	0.54	12.6	B	LTR	0.60	13.6	B	LTR	0.60	13.6	B	centerline 2' to the west
	WB	LTR	0.62	14.2	B	LTR	0.79	21.9	C	LTR	0.79	21.9	C	
Overall Intersection		-	**0.89**	**31.3**	**D**	-	[redacted]			-	**0.84**	**15.7**	**C**	
MINEOLA														
17 Mineola Boulevard & Old Country Boulevard														
Mineola Boulevard	NB	L	0.76	19.5	C	L	0.76	19.5	C					- Mitigation not required
		TR	1.07	*	F*	TR	1.07	*	F*					
	SB	L	0.91	36.7	D	L	0.91	37.3	D					
		TR	0.85	23.0	C	TR	0.85	23.1	C					
Old Country Road	EB	L	0.71	17.1	C	L	0.71	17.1	C					
		TR	0.91	27.4	D	TR	0.91	27.4	D					
	WB	L	0.97	50.1	E	L	0.97	50.1	E					
		T	0.73	19.4	C	T	0.73	19.4	C					
		R	0.74	21.8	C	R	0.74	21.9	C					
Overall Intersection		-	*	*	**F***	-	*	*	**F***					
18 Mineola Boulevard & 2nd Street														
Mineola Boulevard	NB	L	0.60	14.0	B	TR	0.60	14.1	B					- Mitigation not required
		TR	0.48	5.9	B	L	0.48	5.9	B					
	SB	L	0.92	59.4	E	TR	0.92	59.4	E					
		TR	1.06	*	F*	L	1.06	*	F*					
2nd Street	EB	L	0.16	14.7	B	TR	0.16	14.7	B					
		TR	0.85	28.8	D	LTR	0.86	28.9	D					
	WB	LTR	1.06	*	F*	0.00	1.06	*	F*					
Overall Intersection		-	*	*	**F***	-	*	*	**F***					
PORT WASHINGTON														
19 Main Street & LIRR Parking Entrance[3]														
Main Street	WB	L		6.0	B	L		6.4	B					- Mitigation not required
Overall Intersection		-		**0.3**	**A**	-		**0.4**	**A**					

TABLE L - 8 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build				2010 PM Build				2010 PM Mitigated Build				Mitigation Measures
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
20 Main Street & Port Washington Boulevard (NYS Rte. 101)														
Port Washington Boulevard (NYS Rt. 101)	NB	L	0.96	27.0	D	L	0.99	33.5	D	L	0.98	31.6	D	- Modify signal timing (shift 1 sec. green
		TR	0.36	3.9	A	TR	0.36	3.9	A	TR	0.36	4.3	A	time from pretimed NB/SB phase to
	SB	L	0.22	9.9	B	L	0.27	10.3	B	L	0.28	10.8	B	existing actuated EB/WB phase)
		TR	0.38	10.9	B	TR	0.38	10.9	B	TR	0.39	11.4	B	
Main Street	EB	LT	0.99	67.5	F	LT	1.03	76.9	F	LT	1.00	68.4	F	
		R	0.50	18.2	C	R	0.50	18.2	C	R	0.49	17.6	C	
	WB	LTR	0.99	67.8	F	LTR	[illegible]			LTR	0.98	64.5	F	
Overall Intersection		-	**0.95**	**22.5**	**C**	-	**0.99**	**25.3**	**D**	-	**0.98**	**23.2**	**C**	
VALLEY STREAM														
21 South Franklin Avenue & Merrick Road														
South Franklin Avenue	NB	LR	0.72	20.7	C	LTR	0.73	21.0	C	LTR	0.77	23.6	C	- Modify signal timing (shift 1 sec. green
	SB	LTR	0.27	13.3	B	LTR	0.27	13.4	B	LTR	0.28	13.8	B	time from existing actuated NB/SB
Merrick Road	EB	TR	0.53	5.9	B	TR	0.53	5.9	B	TR	0.52	5.6	B	phase to existing actuated EB/WB
	WB	LT	0.98	24.7	C	LT	[illegible]			LT	0.96	21.8	C	phase)
Overall Intersection		-	**0.89**	**15.4**	**C**	-	**0.90**	**16.0**	**C**	-	**0.90**	**14.4**	**B**	
22 South Franklin Avenue & West Hawthorne Avenue														
South Franklin Avenue	NB	LT	0.29	7.6	B	LT	0.30	7.6	B					- Mitigation not required
	SB	TR	0.25	7.4	B	TR	0.25	7.4	B					
West Hawthorne Avenue	EB	LR	0.38	11.3	B	LR	0.38	11.3	B					
	WB	DfL	0.17	10.1	B	DfL	0.17	10.1	B					
		TR	0.17	10.1	B	TR	0.17	10.1	B					
Overall Intersection		-	**0.33**	**8.6**	**B**	-	**0.34**	**8.6**	**B**					
23 South Franklin Avenue & Sunrise Highway (NYS Rt.27)														
South Franklin Avenue	NB	LTR	0.53	33.6	D	L	0.53	33.6	D					- Mitigation not required
	SB	L	0.99	79.9	F	R	1.00	82.4	F					
		R	0.31	31.4	D	L	0.31	31.5	D					
Sunrise Highway (NYS Rt. 27)	EB	L	0.49	7.6	B	T	0.49	7.6	B					
		T	0.60	6.1	B	T	0.60	6.1	B					
	WB	T	0.45	5.0	A	R	0.45	5.0	A					
		R	0.07	3.5	A	0.00	0.08	3.5	A					
Overall Intersection		-	**0.69**	**12.0**	**B**	-	**0.69**	**12.1**	**B**					
MERRICK														
24 Merrick Avenue & Broadcast Plaza[3]														
Merrick Avenue	NB	L		4.6	A	L		4.6	A					- Mitigation not required
Broadcast Plaza	EB	LR		17.6	C	LR		18.6	C					
Overall Intersection		-		**1.9**	**A**	-		**2.0**	**A**					

TABLE L - 8 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build				2010 PM Build				2010 PM Mitigated Build				Mitigation Measures
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
25 Merrick Avenue & Smith Street														
Merrick Avenue	NB	L	0.46	16.8	C	L	0.46	16.8	C	L	0.46	16.3	C	- Modify signal timing (shift 1 sec. green
		TR	1.03	*	F*	TR				TR	1.00	45.6	E	time from existing actuated EB/WB
	SB	L	0.36	10.8	B	L	0.36	10.8	B	L	0.36	10.6	B	phase to existing actuated NB/SB
		TR	0.94	28.8	D	TR	0.94	29.3	D	TR	0.92	25.2	D	phase)
Smith Street	EB	L	0.44	9.2	B	L	0.44	9.2	B	L	0.45	9.7	B	
		TR	0.73	19.3	C	TR	0.73	19.3	C	TR	0.76	21.0	C	
	WB	L	0.27	9.1	B	L	0.27	9.1	B	L	0.27	9.5	B	
		TR	0.45	14.7	B	TR	0.45	14.7	B	TR	0.47	15.3	C	
Overall Intersection		-	*	*	F*	-	*	*	F*	-	**0.87**	**26.5**	**D**	
26 Merrick Avenue & Sunrise Highway (NYS Rt. 27)														
Merrick Avenue	NB	L	0.47	29.3	D	L	0.48	29.9	D					- Mitigation not required
		TR	0.70	31.9	D	TR	0.70	32.1	D					
	SB	L	1.01	71.5	F	L	1.01	73.0	F					
		T	0.61	23.2	C	T	0.62	23.3	C					
		R	0.25	18.9	C	R	0.26	18.9	C					
Sunrise Highway (NYS Rt. 27)	EB	L	0.53	33.3	D	L	0.53	33.3	D					
		T	0.75	22.7	C	T	0.75	22.7	C					
		R	0.09	15.7	C	R	0.09	15.7	C					
	WB	L	0.72	38.8	D	L	0.73	39.1	D					
		T	0.84	25.0	C	T	0.84	25.0	C					
		R	0.20	16.4	C	R	0.20	16.4	C					
Overall Intersection		-	**0.89**	**27.0**	**D**	-	**0.90**	**27.1**	**D**					
BABYLON														
27 Deer Park Avenue & Railroad Avenue[3]														
Deer Park Avenue	NB	L		5.6	B	L		5.7	B	LT	0.44	4.1	A	- Install a traffic signal
	SB	L		197.8	F					TR	0.69	9.8	B	
Railroad Avenue	EB	R		6.1	B	L				L	0.67	23.1	C	
						R		6.2	B	R	0.40	19.0	C	
Overall Intersection		-		**32.8**	**D**	-				-	**0.5**	**11.2**	**B**	
28 Deer Park Avenue & Park Avenue														
Deer Park Avenue	NB	LT	0.71	8.3	B	LT	0.73	8.7	B	LT	0.66	7.7	B	- Eliminate parking on the SB approach
	SB	TR	1.03	43.1	E	TR	1.04	46.4	E	T	0.59	7.1	B	and restripe SB approach from one
		LR	0.91	24.5	C					R	0.38	5.7	B	13 ft. lane to two 10 ft. lanes
Park Avenue	EB					LR				LR	0.89	22.0	C	- Modify signal timing (shift 1 sec. green
Overall Intersection		-	**0.98**	**26.0**	**D**	-	**1.00**	**28.1**	**D**	-	**0.76**	**11.2**	**B**	time from NB/SB phase to actuated EB phase)

TABLE L - 8 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
29 Deer Park Avenue/Fire Island Avenue & West Main Street/East Main Street														
Fire Island Avenue	NB	LTR	1.18	*	F*	LTR	[illegible]			LTR	1.13	127.3	F	- Modify signal timing (shift 1 sec. green
Deer Park Avenue	SB	LTR	1.06	79.8	F	LTR	[illegible]			LTR	1.04	70.7	F	time from pretimed EB/WB phase to
		-	-	-	-	-	-	-	-	-			-	existing actuated NB/SB phase)
West Main Street	EB	L	0.81	36.6	D	L	0.81	36.6	D	L	0.81	36.6	D	
		TR	0.78	9.1	B	TR	0.78	9.1	B	TR	0.79	9.7	B	
East Main Street	WB	L	0.25	6.5	B	L	0.25	6.5	B	L	0.26	6.9	B	
		TR	0.88	17.2	C	TR	0.88	17.4	C	TR	0.90	18.8	C	
Overall Intersection		-	*	*	F*	-	[illegible]			-	**0.97**	**34.0**	**D**	
DEER PARK														
30 Executive Drive & Long Island Avenue														
Executive Drive	NB	L	0.59	12.7	B	L	0.60	13.1	B					- Mitigation not required
		TR	0.23	8.5	B	TR	0.23	8.5	B					
	SB	L	0.01	19.7	C	L	0.01	19.7	C					
		T	0.93	45.0	E	T	0.93	45.0	E					
		R	0.41	9.6	B	R	0.41	9.6	B					
Long Island Avenue	EB	L	0.34	19.3	C	L	0.34	19.3	C					
		T	0.08	17.6	C	T	0.08	17.6	C					
		R	0.73	26.2	D	R	0.81	30.1	D					
	WB	L	1.04	57.5	E	L	1.04	57.5	E					
		T	0.15	11.6	B	T	0.15	11.6	B					
		R	0.01	10.9	B	R	0.01	10.9	B					
Overall Intersection		-	**0.90**	**28.3**	**D**	-	**0.91**	**28.7**	**D**					
31 Executive Drive & Pine Aire Drive														
Executive Drive	SB	L	0.92	40.2	E	L	0.95	43.8	E					- Mitigation not required
		LR	0.92	40.1	E	LR	0.95	43.7	E					
Pine Aire Drive	EB	L	0.19	10.3	B	L	0.20	10.3	B					
		T	0.74	12.0	B	T	0.74	12.0	B					
	WB	LT	0.98	54.8	E	LT	0.98	54.8	E					
		R	0.54	9.9	B	R	0.54	9.9	B					
Overall Intersection		-	**0.80**	**27.6**	D	-	**0.81**	**29.1**	**D**					

TABLE L - 8 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build				2010 PM Build				2010 PM Mitigated Build				Mitigation Measures
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
HUNTINGTON														
32 New York Avenue (NYS Rt. 110) & Railroad Street/Broadway														
New York Avenue (NYS Rt. 110)	NB	L	0.50	16.7	C	L	0.50	16.7	C					- Mitigation not required
		T	0.67	19.1	C	T	0.67	19.1	C					
		R	0.26	14.6	B	R	0.26	14.6	B					
	SB	L	1.12	*	F*	L	1.12	*	F*					
		T	0.83	23.4	C	T	0.83	23.4	C					
		R	0.22	14.3	B	R	0.22	14.3	B					
Railroad Street	EB	L	0.66	34.3	D	L	0.68	35.0	D					
		TR	1.20	*	F*	TR	1.20	*	F*					
Broadway	WB	L	0.78	28.2	D	L	0.79	29.0	D					
		T	0.40	19.8	C	T	0.41	19.8	C					
		R	0.50	21.1	C	R	0.52	21.3	C					
Overall Intersection		-	*	*	F*	-	*	*	F*					
33 Park Avenue & Broadway														
Park Avenue	NB	L	0.90	34.7	D	L	0.90	35.0	D	L	0.90	35.0	D	- Modify signal timing (shift 1 sec. green
		T	0.34	2.4	A	T	0.34	2.4	A	T	0.35	2.7	A	time from NB/SB phase to EB phase)
	SB	T	0.54	10.7	B	T	0.54	10.7	B	T	0.56	11.3	B	
Broadway	EB	L	1.01	63.1	F	L	[redacted]			L	0.97	50.8	E	
Overall Intersection		-	**0.73**	**18.3**	**C**	-	*	*	F*	-	**0.74**	**17.2**	**C**	
PORT JEFFERSON														
34 Main Street (NYS Rt. 25A) & LIRR Parking Entrance[3]														
Main Street	NB	L		245.8	F	L		245.8	F					- Mitigation not required
	SB	L		21.2	D	L		21.2	D					
Overall Intersection		-		**7.5**	**B**	-		**7.5**	**B**					
35 Main Street (NYS Rt. 25A) & North Country Road														
Main Street (NYS Rt. 25A)	NB	LTR	2.71	*	F*	LTR	2.71	*	F*					- Mitigation not required
	SB	L	1.61	*	F*	L	1.61	*	F*					
		TR	0.87	20.2	C	TR	0.87	20.2	C					
Sheep Pasture Road	EB	LTR	0.96	49.1	E	LTR	0.96	49.1	E					
North Country Road	WB	L	1.66	*	F*	L	1.66	*	F*					
		TR	0.32	16.5	C	TR	0.32	16.5	C					
Overall Intersection		-	*	*	F*	-	*	*	F*					

TABLE L - 8 (continued)
2010 MITIGATED BUILD LIRR STATION AREA
TRAFFIC LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2010 PM No Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Build Mvt.	V/C	Avg. Stopped Delay	LOS	2010 PM Mitigated Build Mvt.	V/C	Avg. Stopped Delay	LOS	Mitigation Measures
RONKONKOMA														
36 Hawkins Avenue & Union Avenue														
Hawkins Avenue	NB	TR	0.79	12.6	B	TR	0.88	17.5	C	TR	0.88	17.5	C	- Modify signal timing (shift 1 sec. green
	SB	L	1.01	59.9	E	L	[redacted]			L	0.97	47.2	E	time from acuated WB phase to exclusive
		T	0.23	2.3	A	T	0.23	2.3	A	T	0.23	2.1	A	actuated SB phase)
Union Avenue	WB	L	0.26	20.2	C	L	0.26	20.2	C	L	0.28	20.8	C	
		R	0.63	17.1	C	R	0.63	17.1	C	R	0.63	17.1	C	
	Overall Intersection	-	**0.90**	**20.1**	**C**	-	**0.93**	**22.6**	**C**	-	**0.78**	**19.8**	**C**	
37 Hawkins Avenue & LIE North Service Road														
Hawkins Avenue	NB	L	0.46	29.8	D	L	0.46	30.0	D	L	0.47	29.6	D	- Signal timing modified to coordinate
		T	0.37	15.8	C	T	0.39	16.0	C	T	0.38	15.5	C	with intersection of Hawkins Avenue with
	SB	TR	0.61	25.7	D	TR	0.61	25.8	D	TR	0.58	24.3	C	LIE South Service Road
L.I.E. North Service Road	WB	LTR	0.39	13.9	B	LTR	0.40	13.9	B	LTR	0.40	14.4	B	
	Overall Intersection	-	**0.59**	**18.6**	**C**	-	**0.59**	**18.7**	**C**	-	**0.60**	**18.3**	**C**	
38 Hawkins Avenue & LIE South Service Road														
Hawkins Avenue	NB	TR	1.05	67.9	F	TR	[redacted]			TR	1.04	63.1	F	- Modify signal timing (shift 1 sec. green
	SB	L	0.59	27.1	D	L	0.59	27.1	D	L	0.62	28.2	D	time from EB phase to NB/SB phase;
		T	0.23	14.2	B	T	0.23	14.2	B	T	0.23	13.7	B	shift 1 sec. green time from exclusive
L.I.E. South Service Road	EB	LT	0.98	27.5	D	LT	0.98	28.0	D	LT	1.00	32.4	D	SB phase to NB/SB phase)
	Overall Intersection	-	**0.90**	**34.4**	**D**	-	[redacted]			-	**0.92**	**37.0**	**D**	
39 Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue														
LIRR Parking Lot	NB	L	0.07	12.3	B	L	0.09	12.4	B					- Mitigation not required
		TR	0.20	12.7	B	TR	0.25	12.9	B					
Ronkonkoma Avenue Ramp	SB	L	0.26	13.0	B	L	0.27	13.0	B					
		TR	0.05	12.3	B	TR	0.05	12.3	B					
Railroad Avenue	EB	L	0.06	1.9	A	L	0.07	1.9	A					
		T	0.43	2.8	A	T	0.44	2.8	A					
		R	0.01	1.9	A	R	0.01	1.9	A					
	WB	L	0.01	1.8	A	L	0.00	1.8	A					
		TR	0.36	2.6	A	TR	0.37	2.6	A					
	Overall Intersection	-	**0.39**	**4.3**	**A**	-	**0.40**	**4.5**	**A**					

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

TABLE L-9

2020 MITIGATED BUILD LIRR STATIONS TRAFFIC PM LEVELS OF SERVICE

Table L - 9

2020 MITIGATION LIRR STATION AREA LEVELS OF SERVICE (PM PEAK HOUR)

INTERSECTION & APPROACH		2020 No Build P.M. Peak Hour				2020 Build P.M. Peak Hour				2020 Mitigation P.M. Peak Hour				2020 Mitigation Measure
		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
GREAT NECK														
1 Middle Neck Road & North Station Plaza														
Middle Neck Road	NB	L	0.78	30.3	D	L	0.79	31.9	D	L	0.79	31.9	D	- Modify signal timing (shift 5 sec.
		TR	0.50	8.8	B	TR	0.50	8.8	B	TR	0.50	8.8	B	green time from existing actuated EB/WB
	SB	LTR	0.93	26.2	D	LTR	1.00	39.9	D	LTR	1.00	39.9	D	phase to new exclusive lead actuated WB
North Station Plaza	EB	L	0.31	12.0	B	L	0.33	12.3	B	L	0.35	14.4	B	phase).
		TR	0.69	16.4	C	TR	0.79	16.6	C	TR	0.82	23.0	C	- Restripe WB approach from one 11 ft.
	WB	L	1.50	508.9	F	L	1.68	510.4	F*	L	1.04	93.5	F	left lane and one 16 ft. thru lane to one
		TR	0.22	11.5	B	TR	0.25	11.6	B	TR	0.28	11.8	B	14 ft. left lane and one 13 ft. thru lane.
Overall Intersection		-	**1.18**	**38.6**	**D**	-	**1.27**	**59.1**	**E**	-	**0.99**	**26.2**	**D**	
2 Middle Neck Road & South Station Plaza														
Middle Neck Road	NB	L	1.15	150.6	F	L	1.21	195.9	F*	L	0.59	15.0	B	- Modify signal timing (shift 10 sec.
		TR	0.41	7.2	B	TR	0.41	7.2	B	TR	0.69	17.7	C	green time from NB/SB phase to existing
	SB	L	0.26	6.6	B	L	0.27	6.6	B	L	0.27	10.2	B	actuated EB/WB phase, shift 10 sec. green
		TR	0.53	8.0	B	TR	0.53	8.0	B	TR	0.88	23.3	C	time from NB/SB phase to new actuated
South Station Plaza	EB	LTR	1.08	71.1	F	LTR	1.10	76.1	F	LTR	0.86	19.1	C	left turn phase for NB/SB left turns).
	WB	L	0.96	77.4	F	L	1.08	126.4	F*	L	0.95	66.4	F	- Restripe NB approach from one 10 ft.
		TR	0.50	14.9	B	TR	0.51	15.0	B	TR	0.39	9.9	B	left lane and one 12 ft. thru lane to two
														11 ft. lanes.
Overall Intersection		-	**1.12**	**31.8**	**D**	-	**1.17**	**36.4**	**D**	-	**0.92**	**20.5**	**C**	
HICKSVILLE														
6 Newbridge Road (NYS Rt. 106) & West John Street														
Newbridge Road (NYS Rt. 106)	NB	L	0.88	42.5	E	L	0.88	42.5	E					- Mitigation not required.
		T	0.55	11.1	B	T	0.55	11.2	B					
		R	0.07	7.9	B	R	0.07	7.9	B					
	SB	L	0.95	79.6	F	L	0.96	81.4	F					
		T	0.86	23.4	C	T	0.86	23.4	C					
		R	0.26	14.1	B	R	0.26	14.1	B					
West John Street	EB	L	1.19	155.7	F	L	1.19	160.2	F					
		T	0.98	47.8	E	T	0.98	48.0	E					
		R	0.59	27.9	D	R	0.59	27.9	D					
	WB	L	0.69	23.1	C	L	0.69	23.1	C					
		TR	0.64	27.5	D	TR	0.64	27.5	D					
Overall Intersection		-	**1.21**	**34.7**	**D**	-	**1.22**	**35.0**	**D**					
7 Newbridge Road (NYS Rt. 106) & Duffy Avenue														
Newbridge Road (NYS Rt. 106)	NB	L	0.23	15.0	B	L	0.24	15.0	B	L	0.30	16.1	C	- Modify signal timing (shift 3 sec.
		T	0.73	19.8	C	T	0.73	19.8	C	T	0.73	19.8	C	green time from existing actuated NB/SB
		R	0.09	13.5	B	R	0.09	13.5	B	R	0.09	13.5	B	left turn phase to existing actuated EB/WB
	SB	L	0.52	14.4	B	L	0.52	14.4	B	L	0.66	19.8	C	phase).
		T	1.18	123.4	F	T	1.18	124.1	F	T	1.18	124.1	F*	
		R	0.40	15.8	C	R	0.40	15.8	C	R	0.40	15.8	C	
Duffy Avenue	EB	L	1.12	107.2	F	L	1.16	127.5	F*	L	1.09	91.2	F*	
		T	0.62	17.7	C	T	0.63	18.1	C	T	0.60	16.2	C	
		R	0.36	14.6	B	R	0.36	14.6	B	R	0.34	13.3	B	
	WB	LTR	1.04	88.5	F	LTR	1.16	143.5	F*	LTR	1.04	84.6	F	
Overall Intersection		-	**1.14**	**70.3**	**F**	-	**1.16**	**75.4**	**F**	-	**1.14**	**68.7**	**F**	

Table L - 9

2020 MITIGATION LIRR STATION AREA LEVELS OF SERVICE (PM PEAK HOUR)

			2020 No Build P.M. Peak Hour				2020 Build P.M. Peak Hour				2020 Mitigation P.M. Peak Hour				2020 Mitigation Measure
	INTERSECTION & APPROACH		Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	Mvt.	V/C	Avg. Stopped Delay	LOS	
8	**Broadway (NYS Rt 107) & East John Street**														
	Broadway (NYS Rt 107)	NB	L	0.71	39.4	D	L	0.71	39.4	D					- Mitigation not required.
			TR	0.55	9.5	B	TR	0.56	9.5	B					
		SB	L	0.65	29.7	D	L	0.65	29.8	D					
			TR	0.79	21.3	C	TR	0.79	21.3	C					
	East John Street	EB	L	0.29	21.0	C	L	0.29	21.0	C					
			T	0.59	30.0	D	T	0.59	30.1	D					
			R	0.70	28.4	D	R	0.70	28.4	D					
		WB	LTR	0.70	32.7	D	LTR	0.71	32.7	D					
	Overall Intersection		-	**0.75**	**22.2**	**C**	-	**0.75**	**22.2**	**C**					
9	**Bay Avenue & East Barclay Street/Woodbury Road**														
	Bay Avenue	NB	LTR	0.41	7.5	B	LTR	0.42	7.6	B					- Mitigation not required.
		SB	L	0.29	6.9	B	L	0.29	6.9	B					
			LT	0.33	1.6	A	LT	0.33	1.6	A					
	East Barclay Street	EB	LTR	0.37	20.5	C	LTR	0.37	20.5	C					
	Woodbury Road	WB	LT	0.89	33.7	D	LT	0.89	34.0	D					
			R	0.95	44.2	E	R	0.95	44.2	E					
	Overall Intersection		-	**0.54**	**17.1**	**C**	-	**0.55**	**17.1**	**C**					
BAYSIDE															
15	**Northern Boulevard (NYS Rt. 25A) & Bell Boulevard**														
	Bell Boulevard	NB	LTR	1.03	73.7	F	LTR	1.05	80.7	F	LTR	1.05	80.7	F	- Restripe the EB approach from three
		SB	LTR	0.95	40.9	E	LTR	1.00	49.0	E	LTR	1.00	49.0	E	through lanes with a shared left turn plus
	Northern Boulevard (NYS Rt. 25A)	EB	DfL	1.43	426.3	F*	DfL	1.45	465.9	F*	DfL	1.06	94.5	F	one right turn lane, to one left only lane,
			T	0.88	9.6	B	T	0.88	9.6	B	T	0.98	23.0	C	two through, and one right turn lane.
			R	0.28	4.0	A	R	0.28	4.0	A	R	0.31	7.2	B	- Modify signal timing (shift 8 sec.
		WB	L	1.13	169.9	F*	L	1.13	169.9	F*	L	0.59	13.9	B	green time from EB/WB to a new EB/WB
			T	0.55	5.2	B	T	0.55	5.2	B	T	0.62	9.4	B	left turn only phase.)
			R	0.20	3.8	A	R	0.20	3.8	A	R	0.23	6.8	B	
	Overall Intersection		-	**1.27**	**35.4**	**D**	-	**1.30**	**39.2**	**D**	-	**1.07**	**30.8**	**D**	
16	**Bell Boulevard & 41st Avenue**														
	Bell Boulevard	NB	LTR	1.26	169.9	F*	LTR	1.31	215.2	F*	L	0.53	10.1	B	- Prohibit parking for the WB approach
											TR	0.96	26.5	D	and restripe the WB approach from one
		SB	LTR	0.90	18.3	C	LTR	0.92	20.4	C	LTR	0.93	21.8	C	11 ft. shared through lane to one 9 ft. left
	41st Avenue	EB	LTR	0.61	13.8	B	LTR	0.68	15.6	C	LTR	0.62	13.8	B	turn lane and one 11 ft. shared through/
		WB	LTR	0.73	18.1	C	LTR	0.94	41.8	E	L	0.55	13.0	B	right lane.
											TR	0.17	9.7	B	- Restripe NB approach from one 20 ft.
	Overall Intersection		-	**1.04**	**78.4**	**F**	-	**1.16**	**99.4**	**F***	-	**0.82**	**20.9**	**C**	left lane to one 11 ft. exclusive left turn lane and one 11 ft through / right lane by by shifting the center line 2 ft. to the west.
DEER PARK															
30	**Executive Drive & Long Island Avenue**														
	Executive Drive	NB	L	0.72	16.8	C	L	0.73	17.2	C	L	0.78	19.8	C	- Modify signal timing (shift 2 sec. green
			TR	0.29	8.8	B	TR	0.29	8.8	B	TR	0.30	9.5	B	time from NB lead phase to EB/WB phase)
		SB	L	0.01	19.7	C	L	0.01	19.7	C	L	0.01	19.7	C	
			T	1.14	111.9	F	T	1.14	111.9	F	T	1.14	111.9	F	
			R	0.49	10.4	B	R	0.49	10.4	B	R	0.47	9.5	B	
	Long Island Avenue	EB	L	0.47	21.0	C	L	0.47	21.0	C	L	0.43	19.5	C	
			T	0.10	17.7	C	T	0.10	17.7	C	T	0.09	16.7	C	
			R	0.89	37.7	D	R	0.97	51.9	E	R	0.90	38.3	D	
		WB	L	1.30	216.4	F*	L	1.30	216.4	F*	L	1.24	172.4	F	
			T	0.19	11.8	B	T	0.18	11.8	B	T	0.18	11.0	B	
			R	0.01	10.9	B	R	0.01	10.9	B	R	0.01	10.2	B	
	Overall Intersection		-	**1.10**	**76.5**	**F**	-	**1.12**	**77.6**	**F**	-	**1.11**	**66.1**	**F**	

Table L - 9
2020 MITIGATION LIRR STATION AREA LEVELS OF SERVICE (PM PEAK HOUR)

			2020 No Build P.M. Peak Hour				2020 Build P.M. Peak Hour				2020 Mitigation P.M. Peak Hour				2020 Mitigation Measure
	INTERSECTION & APPROACH		Mvt	V/C	Avg. Stopped Delay	LOS	Mvt	V/C	Avg. Stopped Delay	LOS	Mvt	V/C	Avg. Stopped Delay	LOS	
31	**Executive Drive & Pine Aire Drive**														
	Executive Drive	SB	L	1.14	108.3	F	L	1.16	122.2	F*	L	1.09	85.8	F	- Modify signal timing (shift 2 sec. green
			LR	1.14	108.2	F	LR	1.16	121.9	F*	LR	1.09	85.8	F	time from EB lead phase to SB phase).
	Pine Aire Drive	EB	L	0.25	11.1	B	L	0.25	11.1	B	L	0.27	12.0	B	
			T	0.90	19.6	C	T	0.90	19.6	C	T	0.93	23.7	C	
		WB	LT	1.19	148.2	F	LT	1.19	148.2	F*	LT	1.19	148.2	F	
			R	0.66	11.9	B	R	0.67	12.0	B	R	0.64	10.7	B	
	Overall Intersection		-	**0.98**	**67.7**	**F**	-	**0.99**	**73.3**	**F**	-	**0.99**	**60.4**	**F**	
RONKONKOMA															
36	**Hawkins Avenue & Union Avenue**														
	Hawkins Avenue	NB	TR	0.96	26.5	D	TR	1.07	54.3	F	TR	1.01	36.5	D	- Restripe the NB approach from one 12 ft.
		SB	L	1.26	208.1	F	L	1.26	208.1	F*	L	1.26	215.2	F	lane to one 13 ft. lane.
			T	0.28	2.4	A	T	0.28	2.4	A	T	0.28	2.2	A	- Modify signal timing (increase cycle
	Union Avenue	WB	L	0.31	20.5	C	L	0.32	20.5	C	L	0.34	21.2	C	length by 10 sec. and add time to NB/SB
			R	0.79	21.9	C	R	0.79	21.9	C	R	0.82	23.8	C	phase, shift 5 sec. green time from actuated
															SB phase to NB/SB phase, and shift
	Overall Intersection		-	**1.57**	**51.7**	**E**	-	**1.59**	**62.5**	**F**	-	**1.59**	**56.2**	**E**	2 sec. green time from actuated WB
															phase to NB/SB phase).
37	**Hawkins Avenue & LIE North Service Road**														
	Hawkins Avenue	NB	L	0.58	33.9	D	L	0.58	34.0	D	L	0.58	34.0	D	- As a result of mitigation required for
			T	0.45	16.6	C	T	0.47	16.8	C	LT	0.47	16.8	C	AM, restripe the NB approach from
		SB	TR	0.75	28.4	D	TR	0.75	28.6	D	TR	0.75	28.6	D	one left turn lane and two to one left
	L.I.E. North Service Road	WB	LTR	0.48	14.7	B	LTR	0.49	14.8	B	LTR	0.49	14.8	B	turn lane, one shared left/through lane,
															and one through lane.
	Overall Intersection		-	**0.66**	**20.2**	**C**	-	**0.66**	**20.3**	**C**	-	**0.66**	**20.3**	**C**	
38	**Hawkins Avenue & LIE South Service Road**					*									
	Hawkins Avenue	NB	TR	1.29	211.5	F*	TR	1.39	304.7	F*	TR	1.27	196.1	F	- Modify signal timing (shift 2 sec. green
		SB	L	0.72	30.5	D	L	0.72	30.5	D	L	0.79	35.0	D	time from exclusive SB phase to
			T	0.28	14.5	B	T	0.28	14.5	B	T	0.28	14.5	B	NB/SB phase).
	L.I.E. South Service Road	EB	LT	1.19	123.1	F	LT	1.20	125.1	F*	LT	1.20	125.1	F	
	Overall Intersection		-	**1.10**	**125.7**	**F**	-	**1.13**	**148.0**	**F***	-	**1.13**	**125.1**	**F**	
39	**Ronkonkoma Avenue Ramp/LIRR Parking Lot & Railroad Avenue**														
	LIRR Parking Lot	NB	L	0.09	12.4	B	L	0.11	12.4	B					- Mitigation not required.
			TR	0.25	12.9	B	TR	0.29	13.1	B					
	Ronkonkoma Avenue Ramp	SB	L	0.33	13.3	B	L	0.34	13.4	B					
			TR	0.06	12.3	B	TR	0.06	12.3	B					
	Railroad Avenue	EB	L	0.10	2.0	A	L	0.12	2.0	A					
			T	0.52	3.2	A	T	0.54	3.3	A					
			R	0.01	1.9	A	R	0.01	1.9	A					
		WB	L	0.01	1.8	A	L	0.01	1.9	A					
			TR	0.44	2.8	B	TR	0.45	2.9	A					
	Overall Intersection		-	**0.48**	**4.6**	**B**	-	**0.49**	**4.8**	**A**					

Notes

(1) Delay is measured in seconds per vehicle.

(2) Level of service for signalized intersections is based upon average stopped delay per vehicle (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(3) Level of Service for unsignalized intersections is based upon average total delay (sec/veh) for each lane group as listed in the 1994 Highway Capacity Manual -- TRB Special Report 209.

(4) Asterick (*) indicates that Delay and Levels of Service are not meaningful when v/c is greater than 1.2 or 1/PHF. Also it is beyond the scope of HCM to assess delay for an approach which operates at oversaturated conditions.

Appendix E: Noise

APPENDIX E-1

NOISE ASSESSMENT FORMULAS

A. GENERAL NOISE ASSESSMENT FORMULAS

For the General Noise Assessment, noise exposures were calculated at a reference distance of 50 feet from the track using the following equations.

For Locomotives:

$$L_{eq(h)} = SEL_{ref} + 10 \log (N_{locos}) - 10 \log (S/50) + 10 \log (V) - 35.6$$

For Rail Cars:

$$L_{eq(h)} = SEL_{ref} + 10 \log (N_{cars}) + 20 \log (S/50) + 10 \log (V) - 35.6$$

and where:

N_{locos}	=	average number of locomotives per train
N_{cars}	=	average number of cars per train
T	=	average throttle setting of diesel-electric locomotive
S	=	train speed, in miles per hour
V	=	average hourly volume of train traffic, in trains per hour
V_d	=	average hourly daytime volume of traffic, in trains per hour or
	=	number of trains, 7 AM to 10 PM / 15
V_n	=	average hourly nighttime volume of traffic, in trains per hour or
	=	number of trains, 10 PM to 7 AM / 9
SEL_{ref}	=	reference SEL value, which equals 92 dBA for locomotives, and 82 for rail cars

For the General Noise Assessment at Highbridge and Blissville the procedures contained in the FTA guidance manual were used, with calculations for 50 feet from the center of the site as follows:

$$L_{eq(h)} = SEL_{ref} + C_N - 35.6$$

$$L_{dn} = 10 \log [(15) \times 10^{(Leq(day)/10)} + (9) \times 10^{(Leq(night)+10/10)}] - 13.8$$

where

$C_N = 10 \log (N_T/20)$ for rail yards and shops
$C_N = 10 \log (2N_T)$ for layover tracks
N_T = Number of trains per hour
$SEL_{ref} = 118$ for rail yards and shops
$SEL_{ref} = 116$ for layover tracks

These values were adjusted for the appropriate distance.

B. DETAILED NOISE ASSESSMENT FORMULAS

RAIL NOISE PREDICTION METHODOLOGY

The FTA guidance manual procedure and formulas for calculating rail noise were utilized to determine noise from train operations. Using the FTA methodology, $L_{eq(1)}$ and L_{dn}, noise levels for free-field acoustic conditions (no reflections above ground) from fixed-rail sources are calculated at 50 feet, using the following equations:

For Locomotives:

$$L_{eq(h)} = SEL_{ref} + 10 \log (N_{locos}) + C_T - 10 \log (S/50) + 10 \log (V) - 35.6$$

where

$$C_T = \begin{cases} 0 \text{ for } T<6 \\ 2(T-5) \text{ for } T \geq 6 \end{cases}$$

For Rail Cars:

$$L_{eq(h)} = SEL_{ref} + 10 \log (N_{cars}) + C_T - 20 \log (S/50) + 10 \log (V) - 35.6$$

where FTA recommends use of the following adjustments as applicable:

+5 for Jointed Track
+3 for Embedded Track on Grade
+4 for aerial Structure with Slab Track

For Warning Horns:

$$L_{eq(h)} = SEL_{ref} - 10 \log (S/50) + 10 \log (V) - 35.6$$

Combined:

$$L_{eq\,(h)} = 10 \log [10^{(LeqL/10)} + 10^{(LeqC/10)} + 10^{(LeqH/10)}]$$

$$L_{dn} = 10 \log [(15) \times 10^{(Leq(day)/10)} + (9) \times 10^{(Leq(night)+10/10)}]$$

where:

N_{locos} = average number of locomotives per train
N_{cars} = average number of cars per train
T = average throttle setting of diesel-electric locomotive
S = train speed, in miles per hour
V = average hourly volume of train traffic, in trains per hour
V_d = average hourly daytime volume of traffic, in trains per hour
= number of trains, 7 AM to 10 PM / 15
V_n = average hourly nighttime volume of traffic, in trains per hour
= number of trains, 10 PM to 7 AM / 9

SEL_{ref} = 92 dBA for locomotive, 82 for rail cars and 108 for locomotive horn*

Noise levels calculated at 50 feet from the equations above were corrected for distance as follows:

$$(L_{dn} \text{ or } L_{eq(1)})_{at\ D\ feet} = (L_{dn} \text{ or } L_{eq(1)})_{at\ 50\ feet} - 10 \log (D/50) - 10G \log (D/42) - A_{shielding}$$

where

D = the distance from the source to the receptor in feet

G = the ground factor; for hard ground G = 0

for soft ground $G = 0.66 \quad H_{eff} < 5$

$$= 0.75 \left(1 - \frac{H_{eff}}{42}\right) \quad 5 < H_{eff} < 42$$

$$= 0 \quad H_{eff} > 42$$

H_{eff} = sum of average path heights on either side of barrier

$A_{shielding}$ = sound attenuation shielding between source and receiver (see section 6.3.2, FTA)

C. DETAILED NOISE ASSESSMENT CALCULATIONS

The spreadsheets on the following pages detail the noise calculations for each of the 15 LIRR branch receptor sites on Long Island, as well as each of the seven sites at potential new rail yards on Long Island.

* The analysis assumes an SEL_{ref} value of 108 for locomotive warning horn noise for Existing, No Action, and Build alternatives. LIRR has recently started a program to retrofit locomotives with a warning horn that will result in a significantly less-intrusive horn sound that will comply with the minimum 96 dB standard required by the Federal Railroad Administration.

APPENDIX E-2

NOISE ASSESSMENT CALCULATIONS: LIRR BRANCH SEGMENTS

Adjusted to noise values at nearest residences

Site	Distance		Noise	Existing Noise Level		No Build Noise Level		Build Noise Level		Project Noise Level	
	Measured	Residence	Descriptor	Measured	Residence*	Calculated	Residence*	Calculated	Residence*	Calculated	Residence*
1	70	90	Ldn	69.6	68.0	71.3	69.7	71.7	70.1	67.6	66.0
2	94	90	Ldn	71.0	71.3	72.7	73.0	73.2	73.5	69.2	69.5
3	65	95	Ldn	74.7	72.2	76.6	74.1	77.2	74.7	73.4	70.9
3	65	NA	Leq	77.6	NA	78.6	NA	79.3	NA	74.2	NA
4	65	60	Ldn	76.7	77.2	78.4	78.9	77.7	78.2	70.6	71.1
5	65	60	Ldn	75.8	76.3	76.6	77.1	76.7	77.2	69.5	70.0
6	55	55	Ldn	77.2	77.2	78.9	78.9	78.3	78.3	71.6	71.6
7	30	60	Ldn	80.8	76.3	82.8	78.3	81.2	76.7	70.3	65.8
8	70	70	Ldn	75.6	75.6	74.1	74.1	72.8	72.8	60.8	60.8
9	60	NA	Leq	69.0	NA	69.3	NA	70.1	NA	63.5	NA
10	100	NA	Leq	69.3	NA	69.3	NA	69.5	NA	57.1	NA
11	31	90	Ldn	86.1	79.2	87.7	80.8	87.7	80.8	82.8	75.9
12	115	60	Ldn	63.7	67.9	66.2	70.4	66.2	70.4	62.6	66.8
13	61	100	Ldn	70.5	67.3	73.2	70.0	73.2	70.0	69.9	66.7
14	70	80	Ldn	68.2	67.3	71.3	70.4	71.3	70.4	68.4	67.5
15	28	35	Ldn	79.0	77.6	81.9	80.5	81.9	80.5	78.8	77.4

* Approximately 4.5 dBA noise attenuation with doubling distance

dBA dropoff = 14.95log(Distance/50) therefore, Distance=50(10^(dBA dropoff/14.95))

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	69.40	69.40	8709635.9	89.9	79.3	72.1	61.5	55.9
9:00 AM	68.90	68.90	7762471.166	90.1	78.7	72.1	61.1	55.9
10:00 AM	66.40	66.40	4365158.322	88.3	76.3	68.9	58.1	53.5
11:00 AM	66.20	66.20	4168693.835	88.3	76.3	68.1	55.7	52.3
12:00 PM	64.80	64.80	3019951.72	85.5	76.1	66.9	54.7	50.9
1:00 PM	65.80	65.80	3801893.963	86.3	77.7	68.1	56.9	51.9
2:00 PM	66.70	66.70	4677351.413	89.9	77.3	68.1	56.9	52.9
3:00 PM	65.30	65.30	3388441.561	80.9	75.9	68.7	57.7	52.7
4:00 PM	67.60	67.60	5754399.373	89.9	78.1	69.7	58.7	53.1
5:00 PM	66.70	66.70	4677351.413	84.7	77.3	70.7	58.7	54.5
6:00 PM	70.30	70.30	10715193.05	92.9	78.1	71.1	60.9	55.9
7:00 PM	67.00	67.00	5011872.336	84.5	76.9	70.9	59.7	53.5
8:00 PM	65.40	65.40	3467368.505	83.1	76.3	69.1	56.3	52.1
9:00 PM	63.90	63.90	2454708.916	82.7	74.9	66.5	56.1	52.7
10:00 PM	63.50	63.50	2238721.139	83.3	74.7	65.5	54.7	51.7
11:00 PM	62.20	72.20	16595869.07	79.9	73.9	64.7	54.1	51.7
12:00 AM	61.70	71.70	14791083.88	82.1	73.5	62.3	52.7	50.5
1:00 AM	63.30	73.30	21379620.9	88.7	74.5	62.1	52.3	50.1
2:00 AM	63.60	73.60	22908676.53	89.5	73.1	61.9	51.9	50.3
3:00 AM	61.40	71.40	13803842.65	86.3	72.5	57.7	50.7	49.7
4:00 AM	59.00	69.00	7943282.347	79.7	72.5	54.5	51.7	50.5
5:00 AM	57.50	67.50	5623413.252	79.5	68.7	55.7	52.5	51.3
6:00 AM	61.00	71.00	12589254.12	77.7	73.5	62.1	53.1	51.9
7:00 AM	64.70	74.70	29512092.27	85.7	76.1	66.7	55.7	52.5
Sum			219360347.6					
Ldn dBA			69.6					
Ldn dBA at nearest residences			68.0					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	76.84	-	2.92	-	1.25	-	5
	=	67.67						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	79.18	-	2.92	-	1.25	-	5
	=	70.01						

where: $L_{dn\ at\ 50\ ft}$	=	76.84	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.18	with warning horns
D=Distance ft	=	70	
Heff (sum of average path heights)	=	10.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	8	
G=Ground factor	=	0.56	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	5	
R=number of rows of houses	=	1	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 65.18

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 69.61

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 71.24

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.19	-	2.92	-	1.25	-	5
	=	70.02						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	82.83	-	2.92	-	1.25	-	5
	=	73.66						

where:	$L_{dn\ at\ 50\ ft}$	=	79.19	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	82.83	with warning horns
	D=Distance ft	=	70	
	Heff (sum of average path heights)	=	10.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	8	
	G=Ground factor	=	0.56	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	5	
	R=number of rows of houses	=	1	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

N-B L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	71.25
Ldn dBA at nearest residences		69.7
N-B $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	74.24

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.81	-	2.92	-	1.25	-	5
	=	70.64						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	83.21	-	2.92	-	1.25	-	5
	=	74.04						

where: $L_{dn\ at\ 50\ ft}$	=	79.81	without warning horns
$L_{dn\ at\ 50\ ft}$	=	83.21	with warning horns
D=Distance ft	=	70	
Heff (sum of average path heig	=	10.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	8	
G=Ground factor	=	0.56	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	5	
R=number of rows of houses	=	1	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	71.73
Ldn dBA at nearest residenc		70.07
Build $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	74.57

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} + 10^{\wedge}L_{dn\ Existing/10})$
	=	67.59
at nearest residences	=	65.97 IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} + 10^{\wedge}L_{dn\ Existing/10})$
	=	71.85

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	62.89
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	68.12
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	69.10	69.10	8128305.162	85.1	81.1	73.7	56.7	51.6
9:00 AM	68.00	68.00	6309573.445	85.3	80.7	69.7	55.1	50.7
10:00 AM	66.90	66.90	4897788.194	84.3	80.1	69.5	54.5	49.9
11:00 AM	66.40	66.40	4365158.322	84.3	80.5	61.7	51.5	47.5
12:00 PM	69.80	69.80	9549925.86	84.7	80.5	73.9	52.5	46.9
1:00 PM	72.80	72.80	19054607.18	86.1	82.3	75.3	71.7	53.7
2:00 PM	67.00	67.00	5011872.336	84.9	80.7	65.7	55.1	48.5
3:00 PM	65.20	65.20	3311311.215	83.3	80.5	59.3	51.3	46.9
4:00 PM	66.60	66.60	4570881.896	84.9	80.5	63.7	51.9	47.9
5:00 PM	68.80	68.80	7585775.75	86.1	82.3	69.1	52.7	47.9
6:00 PM	71.40	71.40	13803842.65	88.3	84.1	74.7	61.3	57.1
7:00 PM	72.10	72.10	16218100.97	92.9	84.7	74.5	55.7	49.7
8:00 PM	68.00	68.00	6309573.445	84.9	81.9	67.3	54.7	50.1
9:00 PM	65.20	65.20	3311311.215	83.3	79.9	63.7	54.7	50.3
10:00 PM	64.70	64.70	2951209.227	84.3	79.1	61.9	53.1	49.7
11:00 PM	65.10	75.10	32359365.69	82.1	78.7	65.3	55.5	51.3
12:00 AM	63.30	73.30	21379620.9	82.3	78.7	60.1	53.1	51.1
1:00 AM	63.10	73.10	20417379.45	84.7	78.3	58.7	52.7	50.7
2:00 AM	61.80	71.80	15135612.48	81.1	78.1	54.3	50.3	48.7
3:00 AM	61.00	71.00	12589254.12	82.7	76.3	54.5	49.7	47.9
4:00 AM	63.50	73.50	22387211.39	85.1	79.1	51.9	49.9	48.7
5:00 AM	59.50	69.50	8912509.381	81.3	73.7	52.5	50.3	48.9
6:00 AM	63.60	73.60	22908676.53	82.1	78.9	55.1	51.5	50.3
7:00 AM	65.10	75.10	32359365.69	82.7	78.7	60.1	52.5	50.9
Sum			303828232.5					
Ldn dBA			71.0					
Ldn dBA at nearest residences			71.3					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	76.84	-	5.48	-	2.06	- 0
	=	69.30					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.18	-	5.48	-	2.06	- 0
	=	71.64					

where: $L_{dn\ at\ 50\ ft}$	=	76.84	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.18	with warning horns
D=Distance ft	=	94	
Heff (sum of average path heights	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	5	
G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	66.20
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	71.03
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	72.73

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.19	-	5.48	-	2.06	-	0
	=	71.65						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	82.83	-	5.48	-	2.06	-	0
	=	75.29						

where:	$L_{dn\ at\ 50\ ft}$	=	79.19	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	82.83	with warning horns
	D=Distance ft	=	94	
	Heff (sum of average path heights)	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	5	
	G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	72.73
Ldn dBA at nearest residences		72.98
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	75.79

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.81	-	5.48	-	2.06	-	0
	=	72.27						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	83.21	-	5.48	-	2.06	-	0
	=	75.67						

where:	$L_{dn\ at\ 50\ ft}$	=	79.81	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	83.21	with warning horns
	D=Distance ft	=	94	
	Heff (sum of average path heig	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	5	
	G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Build L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	73.22
Ldn dBA at nearest residences		73.48
Build $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	76.13

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	*10log(10^L dn Build/10 - 10^L dn Esisting/10)*
	=	*69.21*
at nearest residences	=	***69.50*** IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	*10log(10^L dn Build/10 - 10^L dn Esisting/10)*
	=	*73.48*

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	65.36
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	70.42
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	72.90	72.90	19498446	91.1	86.5	75.1	57.7	52.7
9:00 AM	72.50	72.50	17782794.1	92.1	85.5	72.5	55.7	50.5
10:00 AM	71.00	71.00	12589254.12	91.5	85.5	68.3	52.7	49.9
11:00 AM	71.20	71.20	13182567.39	94.1	86.3	64.7	50.5	46.9
12:00 PM	70.50	70.50	11220184.54	92.7	85.5	69.7	52.9	48.7
1:00 PM	68.50	68.50	7079457.844	91.5	82.5	63.7	50.9	47.9
2:00 PM	70.80	70.80	12022644.35	92.7	85.5	64.1	51.5	48.5
3:00 PM	70.20	70.20	10471285.48	91.3	84.7	65.5	52.3	48.5
4:00 PM	73.80	73.80	23988329.19	99.1	82.9	68.9	55.3	50.3
5:00 PM	77.60	77.60	57543993.73	106.3	86.3	70.5	54.5	49.7
6:00 PM	72.70	72.70	18620871.37	94.3	86.3	72.9	55.5	51.1
7:00 PM	74.60	74.60	28840315.03	97.5	87.1	71.1	54.9	49.7
8:00 PM	73.60	73.60	22908676.53	99.1	86.3	65.9	53.3	49.7
9:00 PM	67.70	67.70	5888436.554	90.5	80.9	62.3	50.7	48.7
10:00 PM	66.70	66.70	4677351.413	89.1	79.5	66.7	54.9	51.9
11:00 PM	68.10	78.10	64565422.9	90.5	81.5	64.1	51.9	48.5
12:00 AM	65.40	75.40	34673685.05	89.7	78.3	60.1	51.3	48.7
1:00 AM	65.00	75.00	31622776.6	89.7	77.5	56.5	48.9	48.5
2:00 AM	63.40	73.40	21877616.24	85.5	76.7	53.9	52.1	48.7
3:00 AM	59.80	69.80	9549925.86	84.1	71.7	48.3	46.7	45.7
4:00 AM	68.10	78.10	64565422.9	91.3	82.1	54.7	52.3	51.9
5:00 AM	59.90	69.90	9772372.21	83.9	68.3	52.9	51.9	51.5
6:00 AM	70.40	80.40	109647819.6	91.9	83.7	61.3	52.5	49.9
7:00 AM	70.10	80.10	102329299.2	92.5	82.5	64.5	51.9	49.7
Sum			714918948.2					
Ldn dBA			74.7					
Ldn dBA at nearest residences			72.2					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	76.84	-	2.28	-	1.03	- 0
	=	73.53					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.18	-	2.28	-	1.03	- 0
	=	75.87					

where: $L_{dn\ at\ 50\ ft}$	=	76.84	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.18	with warning horns
D=Distance ft	=	65	
Heff (sum of average path heights	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	68.62
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	74.74
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	76.62

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.19	-	2.28	-	1.03	-	0
	=	75.88						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	82.83	-	2.28	-	1.03	-	0
	=	79.52						

where:	$L_{dn\ at\ 50\ ft}$	=	79.19	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	82.83	with warning horns
	D=Distance ft	=	65	
	Heff (sum of average path heights)	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	10	
	G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	76.63
Ldn dBA at nearest residences		74.14
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	79.86

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	79.81	-	2.28	-	1.03	-	0
	=	76.50						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	83.21	-	2.28	-	1.03	-	0
	=	79.90						

where: $L_{dn\ at\ 50\ ft}$	=	79.81	without warning horns
$L_{dn\ at\ 50\ ft}$	=	83.21	with warning horns
D=Distance ft	=	65	
Heff (sum of average path heig	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Build L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.15
Ldn dBA at nearest residence		74.74
Build $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	80.21

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	73.45
at nearest residences	=	70.90 IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	77.71

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	66.07
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	71.08
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM		0.00	1					
9:00 AM		0.00	1					
10:00 AM		0.00	1					
11:00 AM		0.00	1					
12:00 PM		0.00	1					
1:00 PM		0.00	1					
2:00 PM		0.00	1					
3:00 PM		0.00	1					
4:00 PM		0.00	1					
5:00 PM	77.60	77.60	57543993.73	106.3	86.3	70.5	54.5	49.7
6:00 PM		0.00	1					
7:00 PM		0.00	1					
8:00 PM		0.00	1					
9:00 PM		0.00	1					
10:00 PM		0.00	1					
11:00 PM		10.00	10					
12:00 AM		10.00	10					
1:00 AM		10.00	10					
2:00 AM		10.00	10					
3:00 AM		10.00	10					
4:00 AM		10.00	10					
5:00 AM		10.00	10					
6:00 AM		10.00	10					
7:00 AM		10.00	10					
Sum								
Leq dBA			77.60					

Existing

Calculated Leq (Combined Propagation Character)

Leq (without warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	- ***A shielding***
	=	77.26	-	2.28	-	1.03	- 0
	=	73.95					
Leq (with warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	- ***A shielding***
	=	81.22	-	2.28	-	1.03	- 0
	=	77.91					

where: ***Leq at 50 ft***	=	77.26	without warning horns
Leq at 50 ft	=	81.22	with warning horns
D=Distance ft	=	65	
Heff (sum of average path heights	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Traffic L_{eq}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	75.15
Existing L_{eq}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.60
Existing $L_{eq\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	79.75

No Build

Calculated Leq (Combined Propagation Character)

Leq (without warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A shielding***
	=	79.3	-	2.28	-	1.03	-	0
	=	75.99						
Leq (with warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A shielding***
	=	83.8	-	2.28	-	1.03	-	0
	=	80.49						

where:	***Leq at 50 ft***	=	79.3	without warning horns
	Leq at 50 ft	=	83.8	with warning horns
	D=Distance ft	=	65	
	Heff (sum of average path heights)	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	10	
	G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

N-B L eq	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	78.60
N-B L eq with horns	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	81.60

Build

Calculated Leq (Combined Propagation Character)

Leq (without warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A shielding***
	=	80.42	-	2.28	-	1.03	-	0
	=	77.11						
Leq (with warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A shielding***
	=	84.35	-	2.28	-	1.03	-	0
	=	81.04						

where: ***Leq at 50 ft*** = 80.42 without warning horns

Leq at 50 ft = 84.35 with warning horns

D=Distance ft	=	65	
Heff (sum of average path heig	=	11.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{eq} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 79.25

Build $L_{eq\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 82.03

Build Increment

Calculated Ldn

Leq (without warning horns)	=	*10log(10^L dn Build/10 - 10^L dn Esisting/10)*
	=	*74.24* IMPACT
Leq (with warning horns)	=	*10log(10^L dn Build/10 - 10^L dn Esisting/10)*
	=	*78.14*

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3	=	70.62
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3	=	75.26
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	73.00	73.00	19952623.15	90.9	86.5	75.5	59.3	53.3
9:00 AM	74.50	74.50	28183829.31	95.1	87.9	75.3	55.9	50.3
10:00 AM	71.00	71.00	12589254.12	92.3	85.1	68.3	53.9	49.5
11:00 AM	69.80	69.80	9549925.86	90.7	84.1	63.7	51.3	46.9
12:00 PM	76.10	76.10	40738027.78	101.7	86.7	64.3	51.7	47.7
1:00 PM	68.20	68.20	6606934.48	87.9	82.1	67.1	53.9	48.3
2:00 PM	69.20	69.20	8317637.711	88.9	84.1	63.7	51.5	47.9
3:00 PM	69.10	69.10	8128305.162	91.3	82.9	65.5	52.7	48.1
4:00 PM	68.10	68.10	6456542.29	89.5	82.7	65.3	55.3	49.9
5:00 PM	71.50	71.50	14125375.45	90.7	85.1	72.5	54.9	50.1
6:00 PM	74.30	74.30	26915348.04	92.7	86.7	78.5	63.3	54.3
7:00 PM	73.80	73.80	23988329.19	93.7	86.9	74.3	56.7	52.3
8:00 PM	73.30	73.30	21379620.9	93.9	86.3	73.9	55.5	50.7
9:00 PM	71.50	71.50	14125375.45	91.5	85.7	58.3	47.0	43.5
10:00 PM	69.30	69.30	8511380.382	90.7	84.9	59.3	48.3	45.1
11:00 PM	72.10	82.10	162181009.7	94.3	86.5	63.7	48.7	45.3
12:00 AM	67.60	77.60	57543993.73	90.7	81.7	57.5	47.7	44.9
1:00 AM	70.30	80.30	107151930.5	91.5	85.7	58.3	46.9	43.3
2:00 AM	69.50	79.50	89125093.81	92.3	83.5	56.9	45.5	43.1
3:00 AM	64.70	74.70	29512092.27	87.9	80.3	51.1	44.9	40.9
4:00 AM	67.40	77.40	54954087.39	93.5	79.7	54.9	44.9	42.3
5:00 AM	66.00	76.00	39810717.06	89.5	79.5	54.3	46.5	43.1
6:00 AM	69.20	79.20	83176377.11	89.3	84.1	61.1	49.9	45.9
7:00 AM	74.00	84.00	251188643.2	94.9	87.9	74.9	54.5	50.5
Sum			1124212454					
Ldn dBA			76.7					
Ldn dBA at nearest residences			77.2					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.13	-	2.28	-	0.95	- 0
	=	75.90					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	82.54	-	2.28	-	0.95	- 0
	=	79.31					

where:	$L_{dn\ at\ 50\ ft}$	=	79.13	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	82.54	with warning horns
	D=Distance ft	=	65	
	Heff (sum of average path heights	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	15	
	G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	69.00
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	76.71
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	79.70

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	81.1	-	2.28	-	0.95	-	0
	=	77.87						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	84.81	-	2.28	-	0.95	-	0
	=	81.58						

where:	$L_{dn\ at\ 50\ ft}$	=	81.1	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	84.81	with warning horns
	D=Distance ft	=	65	
	Heff (sum of average path heights)	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	15	
	G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	78.40
Ldn dBA at nearest residences		78.92
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	81.82

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	80.26	-	2.28	-	0.95	- 0
	=	77.03					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	84.44	-	2.28	-	0.95	- 0
	=	81.21					

where:	$L_{dn\ at\ 50\ ft}$	=	80.26	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	84.44	with warning horns
	D=Distance ft	=	65	
	Heff (sum of average path heights)	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	15	
	G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Build L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.67
Ldn dBA at nearest residences		78.22
Build $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	81.47

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	70.63
at nearest residences	=	71.10 IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	76.71

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	70.27
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	74.94
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	74.70	74.70	29512092.27	94.6	89.6	63.4	53.6	47.6
9:00 AM	74.50	74.50	28183829.31	96.8	89.0	63.8	55.4	48.8
10:00 AM	74.40	74.40	27542287.03	101.0	85.6	65.4	57.6	48.4
11:00 AM	66.70	66.70	4677351.413	91.6	77.6	58.2	50.4	47.0
12:00 PM	70.20	70.20	10471285.48	91.8	86.2	59.0	51.8	47.4
1:00 PM	73.50	73.50	22387211.39	94.6	90.8	59.6	52.2	47.6
2:00 PM	70.70	70.70	11748975.55	95.2	83.2	59.6	52.8	49.0
3:00 PM	69.30	69.30	8511380.382	93.8	81.0	61.0	54.6	49.6
4:00 PM	64.70	64.70	2951209.227	91.0	79.4	60.6	54.2	49.4
5:00 PM	70.80	70.80	12022644.35	92.0	85.4	61.6	53.4	49.2
6:00 PM	71.60	71.60	14454397.71	94.2	85.0	62.4	55.2	50.0
7:00 PM	71.80	71.80	15135612.48	92.6	86.4	64.0	56.0	50.2
8:00 PM	71.50	71.50	14125375.45	94.4	84.8	61.2	54.2	49.2
9:00 PM	70.60	70.60	11481536.21	94.6	84.0	59.6	52.2	47.6
10:00 PM	69.60	69.60	9120108.394	94.8	81.8	59.8	52.0	47.0
11:00 PM	68.30	78.30	67608297.54	92.4	81.4	59.2	50.6	46.2
12:00 AM	69.80	79.80	95499258.6	93.8	80.2	57.8	49.6	44.8
1:00 AM	71.10	81.10	128824955.2	96.4	80.8	54.2	43.6	41.4
2:00 AM	66.60	76.60	45708818.96	93.6	72.2	52.4	43.0	41.4
3:00 AM	69.30	79.30	85113803.82	95.2	64.2	50.6	43.8	42.2
4:00 AM	68.40	78.40	69183097.09	94.2	80.2	47.8	43.2	42.0
5:00 AM	48.50	58.50	707945.7844	65.4	59.4	51.4	43.4	42.0
6:00 AM	69.60	79.60	91201083.94	94.0	81.0	55.6	45.8	43.0
7:00 AM	70.20	80.20	104712854.8	91.6	85.4	58.8	49.8	45.0
Sum			910885412.4					
Ldn dBA			75.8					
Ldn dBA at nearest residences			76.3					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	77.64	-	2.28	-	0.95	- 0
	=	74.41					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.91	-	2.28	-	0.95	- 0
	=	76.68					

where: $L_{dn\ at\ 50\ ft}$	=	77.64	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.91	with warning horns
D=Distance ft	=	65	
Heff (sum of average path heights	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	15	
G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	70.15
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	75.79
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.55

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	78.73	-	2.28	-	0.95	-	0
	=	75.50						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	79.28	-	2.28	-	0.95	-	0
	=	76.05						

where:	$L_{dn\ at\ 50\ ft}$	=	78.73	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	79.28	with warning horns
	D=Distance ft	=	65	
	Heff (sum of average path heights)	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	15	
	G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	76.61
Ldn dBA at nearest residences		77.12
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.05

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	0Glog(D/4:	-	$A_{shielding}$
	=	78.86	-	2.28	-	0.95	-	0
	=	75.63						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	0Glog(D/4:	-	$A_{shielding}$
	=	79.8	-	2.28	-	0.95	-	0
	=	76.57						

where: $L_{dn\ at\ 50\ ft}$ = 78.86 without warning horns

$L_{dn\ at\ 50\ ft}$ = 79.8 with warning horns

D=Distance ft	=	65	
Heff (sum of average path heigl	=	14	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	15	
G=Ground factor	=	0.50	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 76.71
Ldn dBA at nearest residen 77.22
Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.46

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	*10log(10^L dn Build/10 - 10^L dn Esisting/10)*
	=	*69.52*
at nearest residences	=	*70.00* IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	*10log(10^L dn Build/10 - 10^L dn Esisting/10)*
	=	

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	69.48
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	74.22
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	73.30	73.30	21379620.9	92.1	87.9	68.3	51.7	47.9
9:00 AM	75.20	75.20	33113112.15	95.1	89.7	64.9	50.7	46.3
10:00 AM	72.00	72.00	15848931.92	92.3	88.3	53.9	47.7	43.9
11:00 AM	69.30	69.30	8511380.382	92.1	83.5	53.5	46.7	42.3
12:00 PM	70.00	70.00	10000000	92.3	84.9	55.9	47.1	42.3
1:00 PM	69.60	69.60	9120108.394	91.9	83.9	54.5	47.1	42.3
2:00 PM	69.10	69.10	8128305.162	92.7	80.7	54.9	47.5	43.7
3:00 PM	70.10	70.10	10232929.92	93.1	84.5	55.9	48.5	44.7
4:00 PM	67.20	67.20	5248074.602	89.1	83.5	57.3	49.7	44.7
5:00 PM	70.60	70.60	11481536.21	91.5	85.1	63.1	53.1	47.3
6:00 PM	74.50	74.50	28183829.31	93.1	89.5	69.1	53.1	47.3
7:00 PM	74.60	74.60	28840315.03	94.5	89.5	62.1	50.1	45.7
8:00 PM	74.50	74.50	28183829.31	95.7	88.7	60.7	49.1	45.3
9:00 PM	71.70	71.70	14791083.88	92.3	87.7	56.5	48.5	44.7
10:00 PM	72.50	72.50	17782794.1	95.1	87.7	56.7	46.7	42.9
11:00 PM	71.50	81.50	141253754.5	92.0	88.1	53.0	47.7	43.5
12:00 AM	69.90	79.90	97723722.1	94.5	83.9	50.3	44.9	42.5
1:00 AM	71.10	81.10	128824955.2	93.7	85.7	47.9	41.9	39.7
2:00 AM	71.00	81.00	125892541.2	91.9	85.5	47.9	40.3	38.1
3:00 AM	68.00	78.00	63095734.45	93.7	68.9	45.7	38.7	37.1
4:00 AM	65.40	75.40	34673685.05	87.7	80.9	45.1	39.5	37.3
5:00 AM	65.20	75.20	33113112.15	87.9	77.3	45.9	40.7	38.9
6:00 AM	68.90	78.90	77624711.66	91.1	84.7	51.1	43.9	41.5
7:00 AM	74.80	84.80	301995172	95.3	90.1	57.3	49.1	46.3
Sum			1255043240					
Ldn dBA			77.2					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	- $A_{shielding}$
	=	78.36	-	0.83	-	0.62	- 0
	=	76.92					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	- $A_{shielding}$
	=	82.31	-	0.83	-	0.62	- 0
	=	80.87					

where:	$L_{dn\ at\ 50\ ft}$	= 78.36	without warning horns
	$L_{dn\ at\ 50\ ft}$	= 82.31	with warning horns
	D=Distance ft	= 55	
	Heff (sum of average path heights	= 12.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	= 8	trains with diesel-electric locomotives
	Hr (receiver height)	= 5	
	Hb (barrier height)	= 0	
	Hc (cut or slope height)	= 12	
	G=Ground factor	= 0.53	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	= 0	
	R=number of rows of houses	= 0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row		

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	65.01
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.19
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	80.98

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	80.18	-	0.83	-	0.62	-	0
	=	78.74						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	84.38	-	0.83	-	0.62	-	0
	=	82.94						

where:	$L_{dn\ at\ 50\ ft}$	=	80.18	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	84.38	with warning horns
	D=Distance ft	=	55	
	Heff (sum of average path heights)	=	12.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	12	
	G=Ground factor	=	0.53	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	78.92
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	83.00

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	-	$A_{shielding}$
	=	79.49	-	0.83	-	0.62	-	0
	=	78.05						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	-	$A_{shielding}$
	=	84.11	-	0.83	-	0.62	-	0
	=	82.67						

where: $L_{dn\ at\ 50\ ft}$ = 79.49 without warning horns

$L_{dn\ at\ 50\ ft}$ = 84.11 with warning horns

D=Distance ft	=	55	
Heff (sum of average path	=	12.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	12	
G=Ground factor	=	0.53	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hous	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 78.26

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 82.74

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} . 10^{\wedge}L_{dn\ Esisting/10})$
	=	71.65 IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} . 10^{\wedge}L_{dn\ Esisting/10})$
	=	77.97

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	70.26
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	74.93
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	80.10	80.10	102329299.2	101.1	91.7	79.9	76.1	71.9
9:00 AM	77.90	77.90	61659500.19	101.1	89.7	77.3	71.5	68.3
10:00 AM	75.70	75.70	37153522.91	96.7	88.5	73.1	68.1	65.5
11:00 AM	74.50	74.50	28183829.31	96.9	86.5	72.9	67.7	65.1
12:00 PM	78.00	78.00	63095734.45	103.5	91.1	73.9	68.9	66.3
1:00 PM	71.80	71.80	15135612.48	90.1	85.1	71.9	67.3	64.9
2:00 PM	76.60	76.60	45708818.96	95.9	86.7	78.9	73.1	68.9
3:00 PM	74.80	74.80	30199517.2	95.9	87.1	74.1	68.9	66.7
4:00 PM	74.60	74.60	28840315.03	96.7	86.9	74.1	68.5	66.1
5:00 PM	77.10	77.10	51286138.4	98.9	89.7	76.1	68.3	65.9
6:00 PM	79.20	79.20	83176377.11	99.9	91.9	76.7	68.9	66.7
7:00 PM	78.50	78.50	70794578.44	97.9	91.5	76.7	68.5	66.1
8:00 PM	76.10	76.10	40738027.78	97.3	91.1	73.1	66.7	64.7
9:00 PM	76.80	76.80	47863009.23	101.5	89.1	71.5	65.5	63.3
10:00 PM	74.00	74.00	25118864.32	94.1	87.5	71.3	64.9	62.7
11:00 PM	75.90	85.90	389045145	101.1	86.9	70.5	63.5	61.3
12:00 AM	72.70	82.70	186208713.7	93.9	86.3	70.9	62.7	60.9
1:00 AM	71.30	81.30	134896288.3	92.7	84.1	68.9	62.5	60.5
2:00 AM	73.40	83.40	218776162.4	95.1	87.3	72.3	62.7	60.1
3:00 AM	70.40	80.40	109647819.6	95.7	81.7	68.3	60.7	58.7
4:00 AM	72.70	82.70	186208713.7	97.1	83.9	68.9	60.3	58.3
5:00 AM	70.20	80.20	104712854.8	93.3	83.5	67.1	62.7	60.9
6:00 AM	73.50	83.50	223872113.9	91.9	88.1	71.1	65.7	62.7
7:00 AM	77.80	87.80	602559586.1	100.7	91.3	75.1	68.1	64.3
Sum			2887210542	101.1	91.7	79.9	76.1	71.9
Ldn dBA			80.8					
Ldn dBA at nearest residences			76.3					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	75.24	-	-4.44	-	-0.87	- 0
	=	80.55					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.07	-	-4.44	-	-0.87	- 0
	=	84.38					

where:	$L_{dn\ at\ 50\ ft}$	=	75.24	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	79.07	with warning horns
	D=Distance ft	=	30	
	Heff (sum of average path heights	=	8.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	4	
	G=Ground factor	=	0.60	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	68.34
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	80.80
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	84.49

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	77.3	-	-4.44	-	-0.87	-	0
	=	82.61						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	82.58	-	-4.44	-	-0.87	-	0
	=	87.89						

where:	$L_{dn\ at\ 50\ ft}$	=	77.3	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	82.58	with warning horns
	D=Distance ft	=	30	
	Heff (sum of average path heights)	=	8.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	4	
	G=Ground factor	=	0.60	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	82.77
Ldn dBA at nearest residences		78.30
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	87.94

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	-	$A_{shielding}$
	=	75.63	-	-4.44	-	-0.87	-	0
	=	80.94						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	-	$A_{shielding}$
	=	80.69	-	-4.44	-	-0.87	-	0
	=	86.00						

where: $L_{dn\ at\ 50\ ft}$ = 75.63 without warning horns

$L_{dn\ at\ 50\ ft}$ = 80.69 with warning horns

D=Distance ft	=	30	
Heff (sum of average path	=	8.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	4	
G=Ground factor	=	0.60	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hous	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	81.17
Ldn dBA at nearest residences		76.70
Build $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	86.07

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	70.28
at nearest residences	=	65.80 IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	80.93

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	69.48
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	74.22
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	78.50	78.50	70794578.44	102.1	91.5	69.5	60.7	58.7
9:00 AM	77.50	77.50	56234132.52	102.1	89.9	67.1	57.7	54.7
10:00 AM	70.60	70.60	11481536.21	95.5	83.5	64.5	56.7	54.1
11:00 AM	73.90	73.90	24547089.16	98.7	86.3	61.7	55.3	52.5
12:00 PM	68.60	68.60	7244359.601	94.1	82.9	61.5	55.3	51.9
1:00 PM	68.30	68.30	6760829.754	92.3	81.9	63.1	56.5	53.9
2:00 PM	68.40	68.40	6918309.709	94.3	80.5	62.3	55.7	53.1
3:00 PM	68.00	68.00	6309573.445	93.1	82.9	65.1	58.3	54.9
4:00 PM	69.10	69.10	8128305.162	91.7	82.5	66.1	59.7	56.7
5:00 PM	71.50	71.50	14125375.45	94.3	85.3	56.9	58.7	55.3
6:00 PM	74.90	74.90	30902954.33	98.5	87.5	71.1	56.5	51.9
7:00 PM	73.60	73.60	22908676.53	94.5	87.1	69.3	54.7	50.1
8:00 PM	72.70	72.70	18620871.37	96.1	85.7	65.7	52.3	49.3
9:00 PM	78.60	78.60	72443596.01	105.7	87.5	63.5	51.5	49.3
10:00 PM	70.60	70.60	11481536.21	93.3	85.3	62.1	52.1	49.5
11:00 PM	67.60	77.60	57543993.73	89.3	82.9	60.3	52.9	50.9
12:00 AM	70.00	80.00	100000000	95.9	82.9	55.3	48.5	46.7
1:00 AM	66.20	76.20	41686938.35	88.9	80.3	52.1	47.1	45.7
2:00 AM	66.20	76.20	41686938.35	90.7	79.9	54.9	50.5	49.3
3:00 AM	55.80	65.80	3801893.963	81.7	63.5	49.9	47.1	45.5
4:00 AM	64.20	74.20	26302679.92	87.1	78.7	54.1	49.5	47.7
5:00 AM	68.80	78.80	75857757.5	93.3	82.3	54.9	49.1	47.1
6:00 AM	68.30	78.30	67608297.54	91.5	82.5	60.3	55.7	51.1
7:00 AM	69.20	79.20	83176377.11	89.1	83.3	61.1	56.1	53.1
Sum			866566600.4					
Ldn dBA			75.6					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	75.24	-	2.80	-	1.37	- 0
	=	71.08					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.07	-	2.80	-	1.37	- 0
	=	74.91					

where: $L_{dn\ at\ 50\ ft}$	=	75.24	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.07	with warning horns
D=Distance ft	=	69	
Heff (sum of average path heights	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	67.14
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	72.55
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	75.58

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	77.3	-	2.80	-	1.37	-	0
	=	73.14						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	82.58	-	2.80	-	1.37	-	0
	=	78.42						

where:	$L_{dn\ at\ 50\ ft}$	=	77.3	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	82.58	with warning horns
	D=Distance ft	=	69	
	Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	0	
	G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	74.11
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	78.73

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	-	$A_{shielding}$
	=	75.63	-	2.80	-	1.37	-	0
	=	71.47						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	-	$A_{shielding}$
	=	80.69	-	2.80	-	1.37	-	0
	=	76.53						

where: $L_{dn\ at\ 50\ ft}$ = 75.63 without warning horns

$L_{dn\ at\ 50\ ft}$ = 80.69 with warning horns

D=Distance ft	=	69	
Heff (sum of average path	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hou:	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	72.83
Build $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.00

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	60.80 No Impact
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	71.46

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	68.86
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	73.65
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM		0.00	1					
9:00 AM	68.98	68.98	7906786.28	93.1	78.9	57.3	54.3	52.5
10:00 AM		0.00	1					
11:00 AM		0.00	1					
12:00 PM		0.00	1					
1:00 PM		0.00	1					
2:00 PM		0.00	1					
3:00 PM		0.00	1					
4:00 PM		0.00	1					
5:00 PM		0.00	1					
6:00 PM		0.00	1					
7:00 PM		0.00	1					
8:00 PM		0.00	1					
9:00 PM		0.00	1					
10:00 PM		0.00	1					
11:00 PM		10.00	10					
12:00 AM		10.00	10					
1:00 AM		10.00	10					
2:00 AM		10.00	10					
3:00 AM		10.00	10					
4:00 AM		10.00	10					
5:00 AM		10.00	10					
6:00 AM		10.00	10					
7:00 AM		10.00	10					
Sum			7906890.28					
Leq dBA			69.0					

Existing

Calculated Leq (Combined Propagation Character)

$Leq_{(without\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	- $A_{shielding}$
	=	71.53	-	1.58	-	0.98	- 0
	=	68.96					
$Leq_{(with\ warning\ horns)}$	=	$Leq_{at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	- $A_{shielding}$
	=	72.8	-	1.58	-	0.98	- 0
	=	70.23					

where: $Leq_{at\ 50\ ft}$	=	71.53	without warning horns
$Leq_{at\ 50\ ft}$	=	72.8	with warning horns
D=Distance ft	=	60	
Heff (sum of average path heights	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

$Traffic\ L_{eq}$	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	44.52
$Existing\ L_{eq}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	68.98
$Existing\ L_{eq\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	70.25

No Build

Calculated Leq (Combined Propagation Character)

Leq *(without warning horns)*	=	***Leq*** *at 50 ft*	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A*** *shielding*
	=	71.9	-	1.58	-	0.98	-	0
	=	69.33						
Leq *(with warning horns)*	=	***Leq*** *at 50 ft*	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A*** *shielding*
	=	73.07	-	1.58	-	0.98	-	0
	=	70.50						

where: ***Leq*** *at 50 ft*	=	71.9	without warning horns
Leq *at 50 ft*	=	73.07	with warning horns
D=Distance ft	=	60	
Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

N-B L *eq*	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	69.35
N-B L *eq with horns*	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	70.52

Build

Calculated Leq (Combined Propagation Character)

Leq (without warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A shielding***
	=	72.61	-	1.58	-	0.98	-	0
	=	70.04						
Leq (with warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A shielding***
	=	73.82	-	1.58	-	0.98	-	0
	=	71.25						

where: ***Leq at 50 ft***	=	72.61	without warning horns
Leq at 50 ft	=	73.82	with warning horns
D=Distance ft	=	60	
Heff (sum of average path heig	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{eq} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 70.06

Build $L_{eq\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 71.26

Build Increment

Calculated Ldn

$L_{eq\ (without\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
= 63.47 NO IMPACT

$L_{eq\ (with\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
= 64.46

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	63.60
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	68.78
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM		0.00	1					
9:00 AM	77.30	77.30	53703179.64	84.5	78.5	62.0	52.5	50.0
10:00 AM		0.00	1					
11:00 AM		0.00	1					
12:00 PM		0.00	1					
1:00 PM		0.00	1					
2:00 PM		0.00	1					
3:00 PM		0.00	1					
4:00 PM		0.00	1					
5:00 PM		0.00	1					
6:00 PM		0.00	1					
7:00 PM		0.00	1					
8:00 PM		0.00	1					
9:00 PM		0.00	1					
10:00 PM		0.00	1					
11:00 PM		10.00	10					
12:00 AM		10.00	10					
1:00 AM		10.00	10					
2:00 AM		10.00	10					
3:00 AM		10.00	10					
4:00 AM		10.00	10					
5:00 AM		10.00	10					
6:00 AM		10.00	10					
7:00 AM		10.00	10					
Sum			53703283.64					
Leq dBA			77.3					
Leq dBA at nearest receptor at 100 ft			69.3					

Existing

Calculated Leq (Combined Propagation Character)

Leq (without warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	- ***A shielding***
	=	67.89	-	6.02	-	2.05	- 0
	=	59.82					
Leq (with warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	- ***A shielding***
	=	68.96	-	6.02	-	2.05	- 0
	=	60.89					

where:	***Leq at 50 ft***	=	67.89	without warning horns
	Leq at 50 ft	=	68.96	with warning horns
	D=Distance ft	=	100	
	Heff (sum of average path heights)	=	11.5	
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	10	
	G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

Traffic L eq	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	68.78
Existing L eq	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	69.30
Existing L eq with horns	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	69.43

No Build

Calculated Leq (Combined Propagation Character)

Leq *(without warning horns)*	=	***Leq*** *at 50 ft*	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A*** *shielding*
	=	68.12	-	6.02	-	2.05	-	0
	=	60.05						
Leq *(with warning horns)*	=	***Leq*** *at 50 ft*	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A*** *shielding*
	=	69.14	-	6.02	-	2.05	-	0
	=	61.07						

where: ***Leq*** *at 50 ft*	=	68.12	without warning horns
Leq *at 50 ft*	=	69.14	with warning horns
D=Distance ft	=	100	
Heff (sum of average path heights)	=	11.5	
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

N-B L *eq*	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	69.33
at 29 feet		77.40
N-B L *eq with horns*	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	69.46

Build

Calculated Leq (Combined Propagation Character)

Leq (without warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A shielding***
	=	69.73	-	6.02	-	2.05	-	0
	=	61.66						
Leq (with warning horns)	=	***Leq at 50 ft***	-	***20log(D/50)***	-	***10Glog(D/42)***	-	***A shielding***
	=	70.84	-	6.02	-	2.05	-	0
	=	62.77						

where: ***Leq at 50 ft***	=	69.73	without warning horns
Leq at 50 ft	=	70.84	with warning horns
D=Distance ft	=	100	
Heff (sum of average path heig	=	11.5	
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	10	
G=Ground factor	=	0.54	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L eq = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 69.55

Build L eq with horns = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 69.75

Build Increment

Calculated Ldn

$L_{eq\ (without\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
= ***57.04*** No Impact

$L_{eq\ (with\ warning\ horns)}$ = $10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
= ***58.23***

Threshold of Impact - Land Use Category 1 and 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	63.84
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

L_E<44	Lp=	17.322+0.940LE		
44<=L_E<=77	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	69.00
L_E >77	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	86.00	86.00	398107170.6	110.7	98.7	72.5	58.9	53.3
9:00 AM	80.50	80.50	112201845.4	108.1	79.7	67.7	57.7	53.5
10:00 AM	78.10	78.10	64565422.9	104.9	81.9	67.9	57.3	52.9
11:00 AM	84.00	84.00	251188643.2	108.9	97.5	68.9	55.5	50.1
12:00 PM	63.90	63.90	2454708.916	82.1	75.7	66.7	54.9	49.5
1:00 PM	77.60	77.60	57543993.73	103.7	80.5	67.5	55.5	50.3
2:00 PM	79.90	79.90	97723722.1	107.9	78.5	67.5	55.9	50.3
3:00 PM	78.70	78.70	74131024.13	102.9	83.9	69.1	56.5	51.5
4:00 PM	65.60	65.60	3630780.548	85.7	76.9	67.9	57.1	52.9
5:00 PM	78.10	78.10	64565422.9	103.7	82.1	68.9	56.7	51.7
6:00 PM	84.30	84.30	269153480.4	108.5	96.3	70.5	57.7	52.9
7:00 PM	81.90	81.90	154881661.9	102.7	97.9	71.1	57.7	53.1
8:00 PM	81.40	81.40	138038426.5	106.7	85.5	65.9	54.5	49.5
9:00 PM	80.20	80.20	104712854.8	106.3	77.7	62.3	54.3	49.7
10:00 PM	76.90	76.90	48977881.94	102.5	80.5	61.7	53.1	48.7
11:00 PM	75.60	85.60	363078054.8	102.7	73.5	61.5	55.5	50.9
12:00 AM	78.00	88.00	630957344.5	104.5	77.1	58.1	50.1	44.1
1:00 AM	54.90	64.90	3090295.433	77.1	64.1	55.7	48.3	42.7
2:00 AM	75.20	85.20	331131121.5	103.5	69.1	53.3	46.9	42.9
3:00 AM	75.20	85.20	331131121.5	103.7	64.1	50.1	44.9	42.5
4:00 AM	78.00	88.00	630957344.5	105.1	70.3	50.9	45.5	41.7
5:00 AM	78.00	88.00	630957344.5	105.0	70.2	50.8	45.6	42.0
6:00 AM	83.00	93.00	1995262315	111.3	78.5	54.9	47.1	44.3
7:00 AM	84.70	94.70	2951209227	111.7	93.7	65.3	54.3	47.1
Sum			9709651208					
Ldn dBA			86.1					
Ldn dBA at nearest residences			79.2					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	71.75	-	-4.15	-	-0.84	- 0
	=	76.74					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.84	-	-4.15	-	-0.84	- 0
	=	84.83					

where: $L_{dn\ at\ 50\ ft}$	=	71.75	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.84	with warning horns
D=Distance ft	=	31	
Heff (sum of average path heights	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	80.03
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	81.70
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	86.07

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	75.21	-	-4.15	-	-0.84	-	0
	=	80.20						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	81.9	-	-4.15	-	-0.84	-	0
	=	86.89						

where:	$L_{dn\ at\ 50\ ft}$	=	75.21	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	81.9	with warning horns
	D=Distance ft	=	31	
	Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	0	
	G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	83.13
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	87.70
Ldn dBA at nearest residences		80.78

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	75.21	-	-4.15	-	-0.84	- 0
	=	80.20					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	81.94	-	-4.15	-	-0.84	- 0
	=	86.93					

where: $L_{dn\ at\ 50\ ft}$ = 75.21 without warning horns

$L_{dn\ at\ 50\ ft}$ = 81.94 with warning horns

D=Distance ft	=	31	
Heff (sum of average path	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hous	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 83.13

Build $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 87.74

Ldn dBA at nearest residences 80.78

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	77.60
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	82.76
at nearest residences	=	75.90 SEVERE IMPACT

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	72.07
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	76.58
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	63.90	63.90	2454708.916	87.9	75.1	60.3	51.7	48.9
9:00 AM	61.60	61.60	1445439.771	85.7	71.9	61.9	52.3	48.3
10:00 AM	62.50	62.50	1778279.41	83.5	75.1	60.7	49.3	46.1
11:00 AM	58.00	58.00	630957.3445	79.7	67.3	60.1	48.9	45.9
12:00 PM	64.50	64.50	2818382.931	90.7	74.7	55.1	48.7	45.9
1:00 PM	54.90	54.90	309029.5433	77.9	66.5	53.5	47.7	44.3
2:00 PM	51.70	51.70	147910.8388	73.7	60.5	51.9	46.7	43.3
3:00 PM	56.70	56.70	467735.1413	80.9	66.1	56.3	48.7	45.1
4:00 PM	57.90	57.90	616595.0019	79.7	68.3	59.7	50.3	45.9
5:00 PM	62.40	62.40	1737800.829	79.1	74.1	58.9	51.1	47.9
6:00 PM	59.70	59.70	933254.3008	85.1	69.1	57.5	50.9	48.3
7:00 PM	63.40	63.40	2187761.624	87.3	77.5	58.1	51.9	49.7
8:00 PM	69.70	69.70	9332543.008	81.1	80.5	77.7	51.5	48.7
9:00 PM	54.40	54.40	275422.8703	74.7	66.1	54.5	50.1	47.5
10:00 PM	61.70	61.70	1479108.388	84.7	74.3	61.1	44.7	40.7
11:00 PM	52.20	62.20	1659586.907	77.1	62.7	48.1	42.5	39.7
12:00 AM	56.00	66.00	3981071.706	81.3	67.1	53.3	42.1	38.5
1:00 AM	41.60	51.60	144543.9771	56.5	53.5	42.5	38.3	36.1
2:00 AM	47.10	57.10	512861.384	73.3	55.3	41.7	37.7	35.3
3:00 AM	39.80	49.80	95499.2586	51.9	48.9	41.5	37.7	35.9
4:00 AM	54.60	64.60	2884031.503	80.5	62.1	45.1	37.7	35.7
5:00 AM	51.00	61.00	1258925.412	77.3	59.7	42.5	38.3	35.9
6:00 AM	48.70	58.70	741310.2413	75.9	49.7	42.5	39.3	35.9
7:00 AM	62.60	72.60	18197008.59	86.3	75.1	56.9	47.7	43.1
Sum			56089768.89					
Ldn dBA			63.7					
Ldn dBA at nearest residences			67.9					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	71.75	-	7.23	-	2.77	- 0
	=	61.74					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.84	-	7.23	-	2.77	- 0
	=	69.83					

where: $L_{dn\ at\ 50\ ft}$	=	71.75	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.84	with warning horns
D=Distance ft	=	115	
Heff (sum of average path heights	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	1	
0 for gaps more than 65 percent of the length of the row			

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	59.27
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	63.69
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	70.20

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	75.21	-	7.23	-	2.77	-	0
	=	65.20						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	81.94	-	7.23	-	2.77	-	0
	=	71.93						

where:	$L_{dn\ at\ 50\ ft}$	=	75.21	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	81.94	with warning horns
	D=Distance ft	=	115	
	Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	0	
	G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	1	
	0 for gaps more than 65 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	66.19
Ldn dBA at nearest residences		70.42
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	72.16

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	75.21	-	7.23	-	2.77	- 0
	=	65.20					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	- $A_{shielding}$
	=	81.94	-	7.23	-	2.77	- 0
	=	71.93					

where: $L_{dn\ at\ 50\ ft}$ = 75.21 without warning horns

$L_{dn\ at\ 50\ ft}$ = 81.94 with warning horns

D=Distance ft	=	115	
Heff (sum of average path	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hous	=	1	
0 for gaps more than 65 percent of the length of the row			

Build L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	66.19
Ldn dBA at nearest residences		70.42
Build $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	72.16

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	62.60
at nearest residences	=	66.80 IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	67.77

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	62.82
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	68.05
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	71.00	71.00	12589254.12	94.9	83.9	60.3	52.9	49.9
9:00 AM	68.50	68.50	7079457.844	94.3	74.7	57.5	51.5	48.7
10:00 AM	62.30	62.30	1698243.652	84.5	68.5	64.7	53.7	49.3
11:00 AM	61.70	61.70	1479108.388	85.3	70.7	58.7	55.1	50.9
12:00 PM	61.90	61.90	1548816.619	83.1	76.3	57.9	53.1	49.9
1:00 PM	61.60	61.60	1445439.771	85.5	67.1	57.9	52.9	50.3
2:00 PM	54.10	54.10	257039.5783	67.9	60.3	56.5	52.9	49.3
3:00 PM	63.00	63.00	1995262.315	88.7	71.9	58.3	52.9	49.7
4:00 PM	62.20	62.20	1659586.907	90.1	66.1	56.5	51.1	48.5
5:00 PM	64.90	64.90	3090295.433	91.7	71.3	56.7	50.3	48.1
6:00 PM	67.80	67.80	6025595.861	91.5	76.9	55.9	51.5	50.1
7:00 PM	66.80	66.80	4786300.923	92.3	74.9	59.3	51.5	49.5
8:00 PM	69.60	69.60	9120108.394	94.3	82.3	54.7	49.9	48.3
9:00 PM	69.60	69.60	9120108.394	95.9	77.5	53.5	47.9	45.9
10:00 PM	59.20	59.20	831763.7711	86.1	60.5	53.9	46.1	44.7
11:00 PM	60.20	70.20	10471285.48	85.7	66.5	48.1	44.9	41.9
12:00 AM	57.90	67.90	6165950.019	80.5	71.3	48.7	43.3	39.7
1:00 AM	46.90	56.90	489778.8194	68.9	58.3	44.3	40.5	37.3
2:00 AM	56.60	66.60	4570881.896	83.3	60.3	45.9	40.5	37.5
3:00 AM	43.20	53.20	208929.6131	49.7	48.9	46.5	41.3	38.5
4:00 AM	56.40	66.40	4365158.322	82.9	57.1	50.5	44.5	39.9
5:00 AM	63.80	73.80	23988329.19	89.5	68.1	46.3	41.9	38.7
6:00 AM	58.80	68.80	7585775.75	85.3	60.7	45.9	42.5	39.9
7:00 AM	71.80	81.80	151356124.8	95.7	85.9	56.3	47.7	44.5
Sum			271928595.9					
Ldn dBA			70.5					
Ldn dBA at nearest residences			67.3					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	71.75	-	1.73	-	1.03	- 0
	=	69.00					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.84	-	1.73	-	1.03	- 0
	=	77.09					

where: $L_{dn\ at\ 50\ ft}$	=	71.75	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.84	with warning horns
D=Distance ft	=	61	
Heff (sum of average path heights	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn} = 10log(10^Ldn Measured/10-10^Ldn Calculated/10)
= 65.32

Existing L_{dn} = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 70.54

Existing $L_{dn\ with\ horns}$ = 10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
= 77.37

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	75.21	-	1.73	-	1.03	-	0
	=	72.46						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	81.94	-	1.73	-	1.03	-	0
	=	79.19						

where:	$L_{dn\ at\ 50\ ft}$	=	75.21	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	81.94	with warning horns
	D=Distance ft	=	61	
	Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	0	
	G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	73.22
Ldn dBA at nearest residences		69.99
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	79.36

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	-	$A_{shielding}$
	=	75.21	-	1.73	-	1.03	-	0
	=	72.46						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/4:	-	$A_{shielding}$
	=	81.94	-	1.73	-	1.03	-	0
	=	79.19						

where: $L_{dn\ at\ 50\ ft}$ = 75.21 without warning horns

$L_{dn\ at\ 50\ ft}$ = 81.94 with warning horns

D=Distance ft	=	61	
Heff (sum of average path height	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	73.22
Ldn dBA at nearest residences		69.99
Build $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	79.36

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	69.85
at nearest residences	=	66.70 IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	75.02

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	62.39
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	67.66
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	69.20	69.20	8317637.711	92.7	82.9	60.9	55.7	54.3
9:00 AM	58.30	58.30	676082.9754	81.3	65.1	59.1	54.9	52.9
10:00 AM	59.60	59.60	912010.8394	83.5	65.5	57.7	53.3	51.5
11:00 AM	58.90	58.90	776247.1166	81.1	67.3	58.7	53.5	51.9
12:00 PM	58.70	58.70	741310.2413	74.5	69.9	62.3	53.5	51.5
1:00 PM	63.10	63.10	2041737.945	82.9	73.3	66.7	54.1	51.9
2:00 PM	57.20	57.20	524807.4602	73.9	69.7	57.7	52.9	51.3
3:00 PM	66.00	66.00	3981071.706	83.3	77.5	70.3	55.3	51.5
4:00 PM	55.90	55.90	389045.145	71.9	64.7	57.5	53.7	51.3
5:00 PM	59.50	59.50	891250.9381	81.5	70.7	56.7	53.9	52.3
6:00 PM	68.10	68.10	6456542.29	93.1	78.9	57.3	54.3	52.5
7:00 PM	64.60	64.60	2884031.503	89.3	69.3	56.9	54.1	52.9
8:00 PM	65.80	65.80	3801893.963	91.1	77.9	56.5	53.7	52.1
9:00 PM	58.70	58.70	741310.2413	82.9	65.5	55.3	53.1	52.1
10:00 PM	56.60	56.60	457088.1896	82.1	57.9	54.7	52.9	51.9
11:00 PM	57.10	67.10	5128613.84	80.9	62.7	54.3	52.1	50.5
12:00 AM	58.30	68.30	6760829.754	82.3	62.3	55.3	52.5	51.1
1:00 AM	52.00	62.00	1584893.192	60.7	56.3	53.7	51.1	50.1
2:00 AM	56.10	66.10	4073802.778	81.5	58.3	53.9	50.9	49.9
3:00 AM	51.50	61.50	1412537.545	55.3	54.3	53.7	50.5	49.7
4:00 AM	64.70	74.70	29512092.27	91.5	68.9	54.5	50.7	49.3
5:00 AM	57.20	67.20	5248074.602	82.9	59.1	55.3	52.1	50.1
6:00 AM	54.80	64.80	3019951.72	76.1	58.9	55.3	52.5	50.9
7:00 AM	68.40	78.40	69183097.09	91.9	80.3	57.3	55.3	52.7
Sum			159515961.1					
Ldn dBA			68.2					
Ldn dBA at nearest residences			67.3					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	71.75	-	2.92	-	1.31	-	0
	=	67.52						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	-	$A_{shielding}$
	=	79.84	-	2.92	-	1.31	-	0
	=	75.61						

where: $L_{dn\ at\ 50\ ft}$	=	71.75	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.84	with warning horns
D=Distance ft	=	70	
Heff (sum of average path heights	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	5	
G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	60.00
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	68.23
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	75.73

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	- $A_{shielding}$
	=	75.21	-	2.92	-	1.31	- 0
	=	70.98					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50)	-	10Glog(D/42)	- $A_{shielding}$
	=	81.94	-	2.92	-	1.31	- 0
	=	77.71					

where:	$L_{dn\ at\ 50\ ft}$	=	75.21	without warning horns
	$L_{dn\ at\ 50\ ft}$	=	81.94	with warning horns
	D=Distance ft	=	70	
	Heff (sum of average path heights)	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
	Hs (source Height)	=	8	trains with diesel-electric locomotives
	Hr (receiver height)	=	5	
	Hb (barrier height)	=	0	
	Hc (cut or slope height)	=	5	
	G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
	A = Shielding at receiver	=	0	
	R=number of rows of houses	=	0	
	1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

$N\text{-}B\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	71.31
Ldn dBA at nearest residences		70.43
$N\text{-}B\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.78

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	10log(D/50	-	10Glog(D/4	-	$A_{shielding}$
	=	75.21	-	2.92	-	1.31	-	0
	=	70.98						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	10log(D/50	-	10Glog(D/4	-	$A_{shielding}$
	=	81.94	-	2.92	-	1.31	-	0
	=	77.71						

where: $L_{dn\ at\ 50\ ft}$ = 75.21 without warning horns

$L_{dn\ at\ 50\ ft}$ = 81.94 with warning horns

D=Distance ft	=	70	
Heff (sum of average path height	=	9	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomot
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	5	
G=Ground factor	=	0.59	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

$Build\ L_{dn}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	71.31
Ldn dBA at nearest residences		70.43
$Build\ L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	77.78

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	68.38
at nearest residences	=	67.50 IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	73.55

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	62.39
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

tives

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	67.66
$L_E>77$	Lp=	75		

Existing

Meaured Noise levels in dBA

Hour	Leq	Leq+10 dB	10^Leq/10	L0.1	L1	L10	L50	L90
8:00 AM	79.20	79.20	83176377.11	107.7	77.7	61.5	51.5	47.1
9:00 AM	65.70	65.70	3715352.291	92.5	68.5	53.5	48.9	44.9
10:00 AM	67.80	67.80	6025595.861	93.9	78.7	54.3	48.9	45.7
11:00 AM	62.40	62.40	1737800.829	89.1	67.1	51.3	46.5	43.3
12:00 PM	73.00	73.00	19952623.15	101.5	72.3	51.9	46.5	42.9
1:00 PM	60.00	60.00	1000000	83.9	69.5	51.3	46.9	43.7
2:00 PM	67.20	67.20	5248074.602	94.3	69.5	53.1	48.5	44.9
3:00 PM	61.90	61.90	1548816.619	88.7	64.9	58.3	47.7	43.7
4:00 PM	75.10	75.10	32359365.69	103.5	77.3	60.9	55.5	51.9
5:00 PM	66.30	66.30	4265795.188	93.9	66.9	57.5	52.9	49.9
6:00 PM	76.50	76.50	44668359.22	104.1	80.1	58.9	53.3	50.1
7:00 PM	69.10	69.10	8128305.162	94.1	81.1	57.7	51.9	47.7
8:00 PM	71.10	71.10	12882495.52	94.7	82.5	55.3	49.5	46.1
9:00 PM	72.40	72.40	17378008.29	99.1	78.7	52.9	49.7	48.5
10:00 PM	66.50	66.50	4466835.922	91.9	77.5	53.1	50.3	48.7
11:00 PM	68.20	78.20	66069344.8	96.7	69.7	53.5	50.3	48.5
12:00 AM	66.70	76.70	46773514.13	93.5	74.1	54.9	51.9	49.5
1:00 AM	50.40	60.40	1096478.196	71.5	55.7	52.1	48.5	45.1
2:00 AM	61.60	71.60	14454397.71	87.3	70.7	46.1	40.7	39.1
3:00 AM	41.80	51.80	151356.1248	57.5	49.7	43.7	39.9	38.1
4:00 AM	72.50	82.50	177827941	100.9	72.3	50.5	48.7	38.3
5:00 AM	70.40	80.40	109647819.6	95.3	82.1	54.7	49.3	47.9
6:00 AM	75.80	85.80	380189396.3	103.5	78.5	50.7	48.5	40.3
7:00 AM	79.30	89.30	851138038.2	105.1	91.5	62.5	48.5	41.7
Sum			1893902092					
Ldn dBA			79.0					
Ldn dBA at nearest residences			77.6					

Existing

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	71.75	-	-5.04	-	-1.12	- 0
	=	77.90					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	- $A_{shielding}$
	=	79.84	-	-5.04	-	-1.12	- 0
	=	85.99					

where: $L_{dn\ at\ 50\ ft}$	=	71.75	without warning horns
$L_{dn\ at\ 50\ ft}$	=	79.84	with warning horns
D=Distance ft	=	28	
Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Traffic L_{dn}	=	10log(10^Ldn Measured/10-10^Ldn Calculated/10)
	=	72.37
Existing L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	78.97
Existing $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	86.18

No Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	75.21	-	-5.04	-	-1.12	-	0
	=	81.36						
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	*20log(D/50)*	-	*10Glog(D/42)*	-	$A_{shielding}$
	=	81.94	-	-5.04	-	-1.12	-	0
	=	88.09						

where: $L_{dn\ at\ 50\ ft}$	=	75.21	without warning horns
$L_{dn\ at\ 50\ ft}$	=	81.94	with warning horns
D=Distance ft	=	28	
Heff (sum of average path heights)	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of houses	=	0	
1.5(R-1)+5 for gaps less than 35 percent of the length of the row			

N-B L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	81.88
Ldn dBA at nearest residences		80.45
N-B $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	88.21

Build

Calculated Ldn (Combined Propagation Character)

$L_{dn\ (without\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/42	- $A_{shielding}$
	=	75.21	-	-5.04	-	-1.12	- 0
	=	81.36					
$L_{dn\ (with\ warning\ horns)}$	=	$L_{dn\ at\ 50\ ft}$	-	20log(D/50,	-	0Glog(D/42	- $A_{shielding}$
	=	81.94	-	-5.04	-	-1.12	- 0
	=	88.09					

where: $L_{dn\ at\ 50\ ft}$ = 75.21 without warning horns

$L_{dn\ at\ 50\ ft}$ = 81.94 with warning horns

D=Distance ft	=	28	
Heff (sum of average path	=	6.5	Heff = (Hs+2Hb+Hc+Hr)/2
Hs (source Height)	=	8	trains with diesel-electric locomotives
Hr (receiver height)	=	5	
Hb (barrier height)	=	0	
Hc (cut or slope height)	=	0	
G=Ground factor	=	0.63	0.75(1-Heff/42) for 5<Heff<42
A = Shielding at receiver	=	0	
R=number of rows of hous	=	0	

1.5(R-1)+5 for gaps less than 35 percent of the length of the row

Build L_{dn}	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	81.88
Ldn dBA at nearest residences		80.45
Build $L_{dn\ with\ horns}$	=	10log(10^Ldn Calculated/10+10^Ldn Traffic/10)
	=	88.21

Build Increment

Calculated Ldn

$L_{dn\ (without\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	78.76
at nearest residences	=	77.40 SEVERE IMPACT
$L_{dn\ (with\ warning\ horns)}$	=	$10log(10^{\wedge}L_{dn\ Build/10} - 10^{\wedge}L_{dn\ Esisting/10})$
	=	83.93

Threshold of Impact - Land Use Category 1 and 2

$L_E<42$	Lp=	11.450+0.953LE		
$42<=L_E<=71$	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	70.62
$L_E>71$	Lp=	65		

Threshold of Severe Impact - Land Use Category 1 and 2

$L_E<44$	Lp=	17.322+0.940LE		
$44<=L_E<=77$	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043xx10^{-4}L_E^3$	=	75.26
$L_E>77$	Lp=	75		

APPENDIX E-3

NOISE ASSESSMENT CALCULATIONS
LIRR STORAGE YARDS

Site 1 - Cerro Wire Yard

Existing Measured noise levels

$Leq_{(measred)}$	58.9
$Ldn_{(estimated)}$	56.9

Build Increment

Computation of Noise Exposure for Yards General Assessment - Day/Night
SEL ref (Rail Yards)

Daytime L_{eq}	$L_{eq\ (day)}$	=	*SEL ref*	+	*10log(NT/20)*	-	*35.6*	-	*20log(D/50)*
		=	116.00	+	-10.78	-	35.60	-	25.11
		=	44.51						
Nighttime L_{eq}	$L_{eq\ (night)}$	=	*SEL ref*	+	*10log(NT/20)*	-	*35.6*	-	*20log(D/50)*
		=	116.00	+	-14.09	-	35.60		25.11
		=	41.21						

L_{dn} $L_{dn\ (increment)}$ = *10log* *[(15)x10^($L_{eq(day)}$/10) +(9)x10^($L_{eq(night)}$+10/10)] -* *13.8*
= 48.27
NO IMPACT

where:	SELref (20 train in peak hour)	=	118.00	N/A
	SELref (1 train with diesel loc. Idling for 1h)	=	116.00	
	NT = average number of train per hour	=	1.67	d
	NT = average number of train per hour	=	0.78	n
	D = distance to yard center (feet)	=	900	

Build

Computation of Total Build Noise Level - Day/Night

$L_{dn\ (total)}$ = *10LOG(10^($L_{dn(Existing)}$/10+10^($L_{dn(Build\ Increment)}$/10)*
= 57.46

Threshold of Impact - Land Use Category 2

L_E<42	**Lp=**	**11.450+0.953LE**	
42<=L_E<=71	**Lp=**	**71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3**	**= 56.18**
L_E >71	**Lp=**	**65**	

Threshold of Severe Impact - Land Use Category 2

L_E<42	**Lp=**	**17.322+0.953LE**	
42<=L_E<=71	**Lp=**	**96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043x10^{-4}L_E^3**	= 61.94
L_E >71	**Lp=**	**75**	

Site 2 - Babylon Yard

Existing Measured noise levels

$Leq_{(measred)}$	74.5
$Ldn_{(estimated)}$	72.5

Build Increment

Computation of Noise Exposure for Yards General Assessment - Day/Night
SEL ref (Rail Yards)

Daytime L_{eq}	$L_{eq\ (day)}$	=	*SEL ref*	+	*10log(NT/20)*	-	*35.6*	-	*20log(D/50)*
		=	116.00	+	-15.23	-	35.60	-	9.54
		=	55.63						
Nighttime L_{eq}	$L_{eq\ (night)}$	=	*SEL ref*	+	*10log(NT/20)*	-	*35.6*	-	*20log(D/50)*
		=	116.00	+	-17.78	-	35.60		9.54
		=	53.08						

L_{dn} $L_{dn\ (increment)} = 10log\ [\ (15)x10^{\wedge}(L_{eq(day)}/10) + (9)x10^{\wedge}(L_{eq(night)}+10/10)\ ] - 13.8$

= 59.96
No IMPACT

where:	SELref (20 train in peak hour)	=	118.00	N/A
	SELref (1 train with diesel loc. Idling for 1h)	=	116.00	
	NT = average number of train per hour	=	0.60	d
	NT = average number of train per hour	=	0.33	n
	D = distance to yard center (feet)	=	150	

Build

Computation of Total Build Noise Level - Day/Night

$L_{dn\ (total)} = 10LOG(10^{\wedge}(L_{dn(Existing)}/10+10^{\wedge}(L_{dn(Build\ Increment)}/10)$

= 72.74

Threshold of Impact - Land Use Category 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	$71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3$	=	66.31
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 2

L_E<42	Lp=	17.322+0.953LE		
42<=L_E<=71	Lp=	$96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043x10^{-4}L_E^3$	=	71.30
L_E >71	Lp=	75		

Site 3 - Yaphank East

Existing Measured noise levels

Leq *(measred)*	72.9	Warning horn	52.4	No Warning horn
Ldn *(estimated)*	70.9		50.4	

Build Increment

Computation of Noise Exposure for Yards General Assessment - Day/Night
SEL ref (Rail Yards)

Daytime L_{eq}	$L_{eq\ (day)}$	=	***SEL ref***	+	***10log(NT/20)***	-	***35.6***	-	***20log(D/50)***
		=	116.00	+	-16.99	-	35.60	-	24.08
		=	39.33						
Nighttime L_{eq}	$L_{eq\ (night)}$	=	***SEL ref***	+	***10log(NT/20)***	-	***35.6***	-	***20log(D/50)***
		=	116.00	+	-16.53	-	35.60		24.08
		=	39.79						

L_{dn} $L_{dn\ (increment)}$ = ***10log*** [***(15)x10^($L_{eq(day)}$/10) +'9)x10^($L_{eq(night)}$+10/10)] -*** ***13.8***

= 46.13
NO IMPACT

where:	SELref (20 train in peak hour)	=	118.00	N/A
	SELref (1 train with diesel loc. Idling for 1h)	=	116.00	
	N_T = average number of train per hour	=	0.40	d
	N_T = average number of train per hour	=	0.44	n
	D = distance to yard center (feet)	=	800	

Build

Computation of Total Build Noise Level - Day/Night

$L_{dn\ (total)}$ = ***10LOG(10^($L_{dn(Existing)}$/10+10^($L_{dn(Build\ Increment)}$/10)***

= 70.91 Warning horn
51.78

Threshold of Impact - Land Use Category 2

L_E<42	**Lp=**	**11.450+0.953LE**			
42<=L_E<=71	**Lp=**	**71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3**	=	65.05	53.49
L_E >71	**Lp=**	**65**		Warning horn	

Threshold of Severe Impact - Land Use Category 2

L_E<42	**Lp=**	**17.322+0.953LE**			
42<=L_E<=71	**Lp=**	**96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043x10^{-4}L_E^3**	=	70.13	59.69
L_E >71	**Lp=**	**75**		Warning horn	

Site 4 - Ronkonkoma

Existing Measured noise levels

$L_{eq\ (measred)}$	56.4
$L_{dn\ (estimated)}$	54.4

Build Increment

Computation of Noise Exposure for Yards General Assessment - Day/Night
SEL ref (Rail Yards)

Daytime L_{eq}	$L_{eq\ (day)}$	=	*SEL ref*	+	*10log(NT/20)*	-	*35.6*	-	*20log(D/50)+B*
		=	116.00	+	-18.75	-	35.60	-	27.28
		=	34.37						
Nighttime L_{eq}	$L_{eq\ (night)}$	=	*SEL ref*	+	*10log(NT/20)*	-	*35.6*	-	*20log(D/50)+B*
		=	116.00	+	-19.54	-	35.60		27.28
		=	33.58						

L_{dn}	$L_{dn\ (increment)}$	=	*10log*	*[(15)x10^($L_{eq(day)}$/10) +'9)x10^($L_{eq(night)}$ +10/10)] -*		*13.8*
		=	40.11			
			NO IMPACT			

where:	SELref (20 train in peak hour)	=	118.00	N/A
	SELref (1 train with diesel loc. Idling for 1h)	=	116.00	
	N_T = average number of train per hour	=	0.27	d
	N_T = average number of train per hour	=	0.22	n
	D = distance to yard center (feet)	=	650	
	B = Sound barrier close to residences	=	5	

Build

Computation of Total Build Noise Level - Day/Night

$L_{dn\ (total)}$	=	*10LOG(10^($L_{dn(Existing)}$/10+10^($L_{dn(Build\ Increment)}$/10)*
	=	54.56

Threshold of Impact - Land Use Category 2

L_E<42	Lp=	11.450+0.953LE		
42<=L_E<=71	Lp=	71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3	=	55.03
L_E >71	Lp=	65		

Threshold of Severe Impact - Land Use Category 2

L_E<42	Lp=	17.322+0.953LE		
42<=L_E<=71	Lp=	96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043x10^{-4}L_E^3	=	60.94
L_E >71	Lp=	75		

Site 5 - Pilgrim Hospital Yard

Existing Measured noise levels

$Leq_{(measred)}$	58.3
$Ldn_{(estimated)}$	56.3

Build Increment

Computation of Noise Exposure for Yards General Assessment - Day/Night
SEL ref (Rail Yards)

Daytime L_{eq}	$L_{eq\ (day)}$	=	***SEL ref***	+	***10log(NT/20)***	-	***35.6***	-	***20log(D/50)***
		=	116.00	+	-18.75	-	35.60	-	27.60
		=	34.05						
Nighttime L_{eq}	$L_{eq\ (night)}$	=	***SEL ref***	+	***10log(NT/20)***	-	***35.6***	-	***20log(D/50)***
		=	116.00	+	-19.54	-	35.60		27.60
		=	33.25						

L_{dn}	$L_{dn\ (increment)}$	=	***10log***	***[(15)x10^($L_{eq(day)}$/10) +(9)x10^($L_{eq(night)}$+10/10)] -***		***13.8***
		=	39.79			
			NO IMPACT			

where:	SELref (20 train in peak hour)		=	118.00	N/A
	SELref (1 train with diesel loc. Idling for 1h)		=	116.00	
	N_T =	average number of train per hour	=	0.27	d
	N_T =	average number of train per hour	=	0.22	n
	D =	distance to yard center (feet)	=	1200	

Build

Computation of Total Build Noise Level - Day/Night

	$L_{dn\ (total)}$	=	***10LOG(10^($L_{dn(Existing)}$/10+10^($L_{dn(Build\ Increment)}$/10)***
		=	56.40

Threshold of Impact - Land Use Category 2

L_E<42	**Lp=**	**11.450+0.953LE**		
42<=L_E<=71	**Lp=**	**71.662 - 1.164L_E + 0.018L_E^2 - 4.088x10^{-5}L_E^3**	=	55.89
L_E >71	**Lp=**	**65**		

Threshold of Severe Impact - Land Use Category 2

L_E<42	**Lp=**	**17.322+0.953LE**		
42<=L_E<=71	**Lp=**	**96.725 - 1.992L_E + 3.02x10^{-2}L_E^2 - 1.043x10^{-4}L_E^3**	=	61.69
L_E >71	**Lp=**	**75**		

Site 6 - Riverhead Yard

Existing Measured noise levels

$Leq_{(measred)}$	52.9
$Ldn_{(estimated)}$	50.9

Build Increment

Computation of Noise Exposure for Yards General Assessment - Day/Night
SEL ref (Rail Yards)

Daytime L_{eq}	$L_{eq\ (day)}$	=	***SEL ref***	+	***10log(NT/20)***	-	***35.6***	-	***20log(D/50)+B***
		=	116.00	+	-20.00	-	35.60	-	24.96
		=	35.44						
Nighttime L_{eq}	$L_{eq\ (night)}$	=	***SEL ref***	+	***10log(NT/20)***	-	***35.6***	-	***20log(D/50)+B***
		=	116.00	+	-17.78	-	35.60		24.96
		=	37.65						

L_{dn} $L_{dn\ (increment)}$ = ***10log*** ***[(15)x10^($L_{eq(day)}$/10) + (9)x10^($L_{eq(night)}$ +10/10)] - 13.8***

= 43.81
NO IMPACT

where:	SELref (20 train in peak hour)	=	118.00	N/A
	SELref (1 train with diesel loc. Idling for 1h)	=	116.00	
	N_T = average number of train per hour	=	0.20	d
	N_T = average number of train per hour	=	0.33	n
	D = distance to yard center (feet)	=	280	
	B = Sound barrier close to residences	=	10	

Build

Computation of Total Build Noise Level - Day/Night

$L_{dn\ (total)}$ = ***10LOG(10^($L_{dn(Existing)}$/10+10^($L_{dn(Build\ Increment)}$/10)***

= 51.68

Threshold of Impact - Land Use Category 2

L_E<42	Lp=	11.450+0.953LE	
42<=L_E<=71	Lp=	71.662 - 1.164L_E + 0.018L_E^2 - 4.088x$10^{-5}$$L_E^3$	= 53.66
L_E >71	Lp=	65	

Threshold of Severe Impact - Land Use Category 2

L_E<42	Lp=	17.322+0.953LE	
42<=L_E<=71	Lp=	96.725 - 1.992L_E + 3.02x$10^{-2}$$L_E^2$ - 1.043x$10^{-4}$$L_E^3$	= 59.82
L_E >71	Lp=	75	

Appendix E-4

CONSTRUCTION NOISE ANALYSIS AT NEWCOMERS HIGH SCHOOL

Appendix E-4: Analysis of Construction Noise at Newcomers High School

A. INTRODUCTION

Newcomers High School faces 29th Street and is located on the block bounded by 29th Street on the south, 28th Street on the north, 41st Avenue on the south, and 40th Avenue on the north. The school is directly across 29th Street from the site proposed as part of the Long Island Rail Road East Side Access Project as a staging area for tunneling and other construction activities. The proposed construction site is currently used as a staging site for construction as part of the New York City Transit (NYCT) 63rd Street Connector Project.

To address concerns about possible noise impacts from construction activities of the East Side Access Project at Newcomers High School, a detailed construction noise assessment was undertaken. This assessment involved taking noise measurements at Newcomers High School to determine existing noise levels at the school and the level of attenuation provided by the building structure and windows for both open-window and closed-window conditions. Using this information, an analysis of the effects of construction noise was performed using estimates of the equipment expected on-site.

B. EXISTING CONDITIONS

SITE AND WINDOW DESCRIPTION

Newcomers High School is a 4-story building with a basement. The school building is relatively old, but most of the original windows have been replaced with new single-glazed, multipaned windows. According to building personnel, it is expected that shortly any parts of the building containing old windows will be retrofitted with new windows. For safety, the new windows have stops that allow them to be opened only approximately 8 inches from the bottom. Some of the classrooms and offices have through-the-window air conditioning units. Typically, two large units are installed in a classroom.

As described above, Newcomers High School is located directly across 29th Street from the proposed East Side Access staging area. Just south of the open staging area is Northern Boulevard, a busy arterial street. Northern Boulevard is also the route of an elevated New York City Transit (NYCT) subway.

APPROACH AND METHODOLOGY

Measurements were performed to determine existing noise levels and to determine the level of attenuation provided by the window/wall. To accomplish this, two noise monitors were used to measure noise levels. All measurements were made on the side of the school building facing 29th Street.

A continuous 24-hour measurement was made using one instrument approximately 6 feet outside of a second-floor office (Room 221) on the northern edge of the building on 29th Street

(Receptor Site A). Measured values were tabulated every 20 minutes, and this location served as a control point room for the measurement program.

Spot 20-minute measurements were made at two adjacent classrooms on the second floor of the building facing 29th Street. At Room 219B, a classroom with new windows and no air conditioning, noise-level measurements were made approximately 6 feet outside the building (Receptor Site B1), and approximately 8 feet from the windows within the building (Receptor Site B2) for two conditions—with the windows open and with the windows closed. The noise-level measurements outside the building at Site B1 allowed comparison with the control point measurements at Receptor Site A, to account for differences in noise levels due to the location of construction equipment operations. At Room 217B, a classroom with new windows and two window air conditioners, noise level measurements were made approximately 6 feet outside the building (Receptor Site C1), and approximately 8 feet from the window within the building (Receptor Site C2) for conditions with the windows closed only. Again, the noise-level measurements outside the building at Site C1 allowed comparison with the control point measurements at Receptor Site A, to account for differences in noise levels due to the location of construction equipment operations.

The continuous 24-hour noise measurement at Site A was performed on July 11 and 12, 2000. The 20-minute spot measurements at Sites B1, B2, C1, and C2 were performed during the afternoon on July 11, 2000. The time available for spot measurements was limited to the time when classes were not in session (i.e., after 1 PM), and when noise from school construction projects (i.e., asbestos removal) did not bias the measurements.

The continuous 24-hour noise monitoring at Site A was conducted using a Brüel & Kjær Noise Level Analyzer Type 4427, a Brüel & Kjær Sound Level Calibrator Type 2431, a Brüel & Kjær ½-inch microphone Type 4189, and a Brüel & Kjær microphone preamplifier Type 2669. Measurements at this location were made on the A-scale (dBA) for a sampling period of 20 minutes. The data were digitally recorded by the noise analyzer and displayed at the end of the measurement period in units of dBA.

The 20-minute spot measurements at Sites B1, B2, C1, and C2 were conducted using a Larson Davis Labs (LDL) Sound Level Meter Type 700, a Brüel & Kjær ½-inch microphone Type 4176, and a Larson Davis microphone preamplifier Type 785. The meter was calibrated before and after readings with a Larson Davis Type CAL200 sound level calibrator using the appropriate adaptor. Measurements at each location were made on the A-scale (dBA) for a sampling period of 20 minutes at each site. The data were digitally recorded by the noise analyzer and displayed at the end of the measurement period in units of dBA.

At Sites A, B1, and C1, located outside the building, the microphone was approximately 6 feet away from any large sound-reflecting surface to avoid interference with sound propagation. A windscreen was used during sound measurements, except for calibration. At Sites B2 and C2, located within the building, the microphone was mounted at a height of approximately 5 feet above the floor surface on a tripod and 8 feet away from windows. Both the B&K analyzer and the Larson Davis meter were calibrated before and after readings. Measured quantities included L_{eq}, L_1, L_{10}, L_{50}, L_{90}, and L_{max}. All measurement procedures conformed with the requirements of ANSI Standard S1.13-1971 (R1976).

RESULTS OF MEASUREMENTS

Table 1 summarizes the continuous 24-hour measurements taken outside the second-floor room on the 29th Street side of the school building on July 11 and 12, 2000 (Site A). The table shows hourly values of $L_{eq(1)}$, $L_{1(1)}$, $L_{10(1)}$, $L_{50(1)}$, and $L_{90(1)}$ noise levels. These values were obtained by calculating the equivalent sound levels of the three 20-minute measurements for each hour. In general, noise on the 29th Street side of the building is a function of three noise sources—traffic on 29th Street and on Northern Boulevard, noise from the elevated NYCT trains above Northern Boulevard, and noise from construction operations from the NYCT 63rd Street Connector Project taking place across 29th Street (on and adjacent to the site bounded by 40th Avenue, 29th Street, 40th Road, and Northern Boulevard). Construction activities included cement braking operations, use of backhoe and front loader equipment, and trucking operations.

Table 1

Measured Existing Exterior Noise Levels at Second Floor of Newcomers High School (Site A)

Hour Ending	$L_{eq(1)}$	L_1	L_{10}	L_{50}	L_{90}
1 AM	61.4	73.5	63.9	55.9	52.3
2 AM	60.6	73.9	60.7	56.1	52.3
3 AM	63.4	75.5	67.9	56.7	52.5
4 AM	61.1	74.1	63.3	55.7	52.7
5 AM	61.6	74.5	62.9	56.7	53.1
6 AM	64.3	75.5	67.9	57.7	53.7
7 AM	65.0	74.3	69.1	61.7	58.1
8 AM	69.4	75.5	71.9	68.7	64.9
9 AM	70.3	75.7	72.9	69.9	63.7
10 AM	70.9	76.5	73.1	70.3	66.9
11 AM	71.1	75.5	73.5	70.7	66.7
Noon	72.0	79.3	73.5	70.9	68.3
1 PM	71.9	81.5	74.1	69.5	66.1
2 PM	72.7	81.5	75.5	70.9	65.9
3 PM	71.6	79.3	74.5	69.7	65.9
4 PM	69.2	77.1	71.7	67.3	64.9
5 PM	67.0	73.5	69.7	65.9	61.5
6 PM	71.8	78.3	74.5	69.9	68.3
7 PM	64.8	75.5	68.3	60.5	58.3
8 PM	64.9	75.5	69.1	60.1	56.5
9 PM	64.6	75.5	68.3	59.1	56.3
10 PM	65.2	75.9	69.1	59.7	55.1
11 PM	62.8	71.7	67.1	59.1	54.3
Midnight	62.3	73.5	64.9	57.5	53.5

As shown in the table, existing exterior one-hour equivalent ($L_{eq(1)}$) noise levels during school hours are relatively high, with $L_{eq(1)}$ values during typical school hours ranging from approximately 69 to 73 dBA, and $L_{10(1)}$ noise levels (the noise levels exceed 10 percent of the time) generally approximately 3 dBA higher than the $L_{eq(1)}$ values. Based on these measured values, the L_{dn} value is 71.2 dBA. Peak noise levels during this time period range as high as approximately 85 dBA. Train passby noise ranged from approximately 71 to 76 dBA, depending on a number of factors such as whether there were one or two simultaneous train passbys, and whether the train was on the near or far track, the train speed, etc. Truck activities, such as garbage truck operation on 29th Street, produced noticeable noise levels in the low 80's. Between noon and 12:30, when construction workers at the NYCT 63rd Street Connector Project were having lunch and construction activity had stopped, noise levels dropped to approximately 68 dBA, 4 dBA lower than noise levels with construction activities. Therefore, without existing construction activities, existing exterior $L_{eq(1)}$ noise levels during school hours would be expected to generally range from approximately 63 to 69 dBA, and $L_{10(1)}$ noise levels generally would be expected to range from approximately 66 to 72 dBA.

In addition to the exterior noise level measurements shown in Table 1, simultaneous indoor-outdoor measurements were made to determine the level of attenuation provided by the window/ wall of the building for both open- and closed-window conditions. Table 2 shows the results of the 20-minute spot measurements at Site B1, B2, C1, and C2, and for comparison purposes, the corresponding 20-minute measurement made at Site A. For each site and measurement condition, 20-minute L_{eq}, L_1, L_{10}, L_{50}, and L_{90} noise levels are shown. The measured noise levels at Site C were made with the two window air-conditioners in the classroom not operating. These two units were relatively noisy, and their operation would be expected to result in noise levels in the classrooms that would making teaching difficult. The measurements indicate that for open-window conditions, the window/wall provides approximately 13 dBA of attenuation, and for closed window conditions, the window/wall provides approximately 21 dBA of attenuation in classrooms with air conditioners and 25 dBA of attenuation in classrooms without air conditioners (see Table 3).

Table 2

20-Minute Measured Noise Levels

Site	Location	Time	L_{eq}	L_1	L_{10}	L_{50}	L_{90}
A	Outside R221	14:20	73.6	80.1	76.1	72.5	68.3
B1	Outside R219B	14:20	72.6	80.0	75.0	71.0	67.0
A	Outside R221	13:40	71.2	79.9	73.9	69.3	64.5
B2	Inside R219B (window opened)	13:40	57.2	65.5	60.0	55.0	50.5
A	Outside R221	13:20	72.7	81.5	75.5	70.9	65.9
B2	Inside R219B (window closed)	13:20	46.9	55.0	49.0	45.0	42.0
A	Outside R221	14:40	71.6	79.3	74.5	69.7	65.9
C1	Outside R217	14:40	69.9	77.5	73.0	67.5	64.0
A	Outside R221	15:00	69.2	77.1	71.7	67.3	64.9
C2	Inside R217 (window closed)	15:00	46.9	53.0	49.5	45.0	43.0

Note: Field measurements were performed by Allee King Rosen & Fleming, Inc., on July 11 and 12, 2000.

Table 3
Window/Wall Attenuation

Window Condition	Window Air-Conditioners?	Attenuation
Open	No	13 dBA
Closed	No	25 dBA
Closed	Yes	21 dBA

NOISE STANDARDS AND CRITERIA

There are no noise standards or impact criteria directly applicable to construction noise. The FTA's noise guidance manual (*Transit Noise and Vibration Impact Assessment*, April 1995) talks about construction noise, but does not provide any specific levels that should not be exceeded. The FTA guidance document discusses the need for detailed construction noise assessment when daytime $L_{eq(1)}$ values exceed 90, 100, or 100 dBA for residential, commercial, or industrial land uses, respectively, or when nighttime $L_{eq(1)}$ values exceed 80, 100, or 100 dBA for residential, commercial, or industrial land uses, respectively. However, no guidance is provided on what constitutes an impact or significant impact, or when mitigation is necessary.

The State Education Law, Section 155.5, Uniform Safety Standards for School Construction and Maintenance Projects, mandates that school construction and maintenance projects implement acoustical abatement measures when school construction operations produce noise in excess of 60 dBA. However, the East Side Access Project is not a school construction or maintenance project, and consequently this standard is not applicable.

New York City, as part of the City Environmental Quality Review (CEQR) process, as detailed in the *CEQR Technical Manual*, requires interior $L_{10(1)}$ values of 45 dBA or less. However, this does not apply to temporary construction-related noise levels. The School Construction Authority (SCA) has been designing new school in New York City with double-glazed windows and central air condition to achieve interior $L_{10(1)}$ noise levels of 45 dBA.

C. NOISE LEVELS WITH EAST SIDE ACCESS CONSTRUCTION ACTIVITIES

A preliminary analysis of construction noise was performed to determine the approximate noise levels at both the exterior and interior of Newcomers High School during construction of the East Side Access Project. This analysis was based on estimates of the equipment on-site, equipment utilization rates, and approximately noise reference levels. The results of this analysis are summarized in Table 4, and show a worst-case exterior noise level of approximately 78.1 dBA at the school as a result of East Side Access Project construction activities alone (i.e., without noise from other local noise sources, such as traffic), assuming the maximum numbers of construction equipment operating simultaneously.

Table 4

Noise Due to East Side Access Construction Activities Alone at Newcomers High School (in dBA)

Equipment	Reference at 50 feet	No. on site	Utilization	Noise level at 50 feet	Distance attenuation	Barrier/ building shielding attenuation	Nearest receptor site
1,200-CFM tunnel ventilation fan	80	4	1.00	86	19	5	62
1,200 CFM electric air compressor	81	2	1.00	84	19	5	60
150-ton diesel crawler crane	93	1	1.00	93	20	5	68
980 Caterpillar diesel loader	84	1	1.00	84	19	5	60
Electric man elevator	76	1	1.00	76	19	5	52
Heavy equipment repair shop	75	1	1.00	75	19	5	51
100-ton rock crusher	90	1	1.00	90	20	5	65
Conveyor	80	1	1.00	80	19	5	56
Truck	88	6	0.33	91	14		77
Total Noise Level							**78.1**

Note: These are estimated values based on noise drop-off rate of 6 dBA with each doubling of distance away from the source, and 5 dBA with barrier/building shielding effects.

Table 5 presents the results and conclusions of this analysis. As shown in Table 1, with current construction activities, existing exterior $L_{eq(1)}$ noise levels at Newcomers High School range from 67.0 to 72.7 dBA. Using the 72.7 dBA value, without current construction activities, exterior $L_{eq(1)}$ noise levels are estimated to be 68.7 dBA, and interior noise levels are estimated to be 55.7 and 43.7 dBA for open- and closed-window conditions, respectively. With East Side Access construction activities, exterior $L_{eq(1)}$ noise levels are estimated to be 78.6 dBA, and interior noise levels are estimated to be 65.6 and 53.6 dBA for open- and closed-window conditions, respectively. Therefore, East Side Access construction activities would result in an increase of up to approximately 10 dBA in interior $L_{eq(1)}$ noise levels (compared to noise levels without any East Side Access or other construction activities). An increase of this magnitude would subjectively be a doubling of loudness, and typically be construed as a significant increase in noise levels. While this increase would be temporary, lasting approximately 2½ years, the magnitude of the increase could potentially affect the learning environment in the classroom, and mitigation is warranted.

Table 5

Comparison of Predicted Noise Levels (in dBA)

Location	Existing with Existing Construction Noise L_{eq}	Existing without Existing Construction Noise L_{eq}	ESA Construction Noise only L_{eq}	Prediction Noise Level with ESA Construction Activities L_{eq}
Outside building	72.7	68.7	78.1	78.6
Inside building (window opened)	59.7	55.7	65.1	65.6
Inside building (single-glazed window closed)	47.7	43.7	53.1	53.6
Inside building (double-glazed window closed)	NA	NA	NA	48.6
Note: Most equipment would contain sound attenuation devices such as mufflers. Noise levels reflect effect of truck operations and other mobile equipment.				

D. MITIGATION MEASURES

A noise wall would effectively mitigate project-related noise impacts for the ground-floor classrooms, providing up to 15 dBA of attenuation. For other classrooms, noise mitigation could consist of providing better (double-glazed) windows and/or air conditioning, principally on the side of the building where construction operations would occur. Air conditioning would allow windows to be kept closed, providing approximately 12 dBA of attenuation. ❖

Appendix F: Vibration

APPENDIX F-1

AMBIENT VIBRATION MONITORING DATA

1 INTRODUCTION

Ambient vibrations measurements were made at 14 locations along the planned alignment. The vibration velocity levels were measured over a 24 hour period using a data logger using a slow rms detector. The vibrations were recorded using two methods, 1 second samples and 1 minute intervals. In general the vibration sensor was located in the building basement as near as possible to the planned alignment.

The 1 second sample data was used to identify train passes from existing rail traffic.

The 1 minute interval data was used to evaluate the overall vibration environment at each site. The interval data is presented in the accompanying figures. In the figures, L(99) is the vibration level that was exceeded 99% of the time in each interval, which is indicative of the background vibration levels (the levels that are usually present). L(50) is the vibration that is present 50% of the time. L(50) can be thought of as the average vibration level at the site. L(1) is the vibration level that is exceeded 1% of the time in each interval. L(1) is indicative of the greatest vibration levels that were measured during the interval.

These figures indicate that the vibration has a distinct day/night variation. Typically, the nighttime vibration levels are 5-10 dB lower than those measured during the daytime.

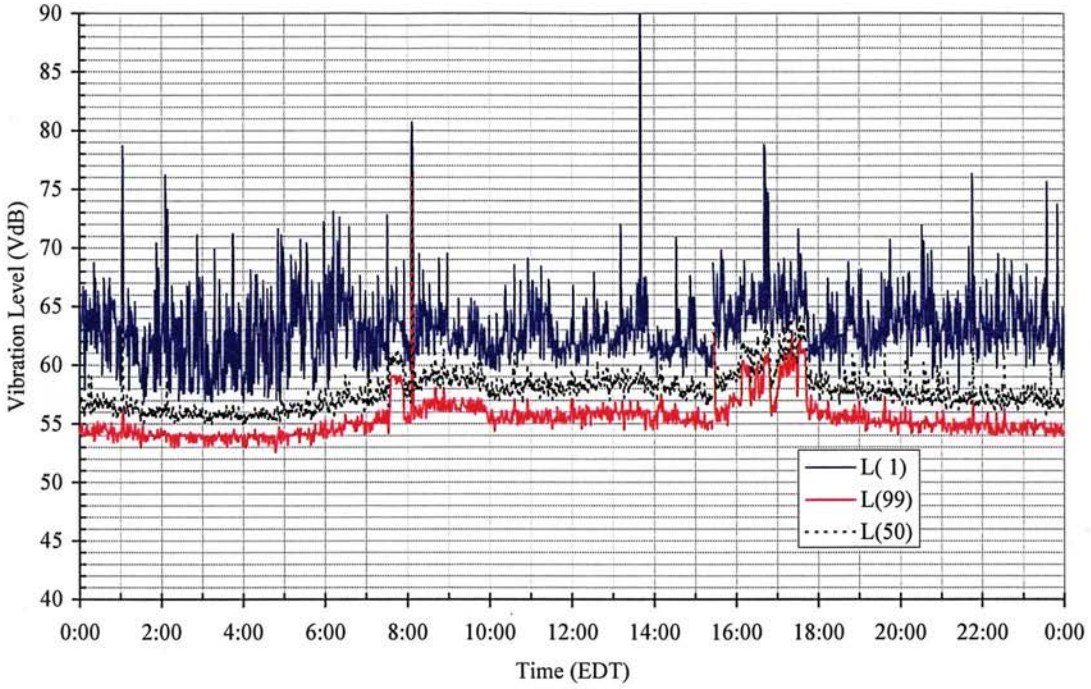


Figure A1: Ambient Vibrations - 466 Lexington Avenue - May 5-6, 1999

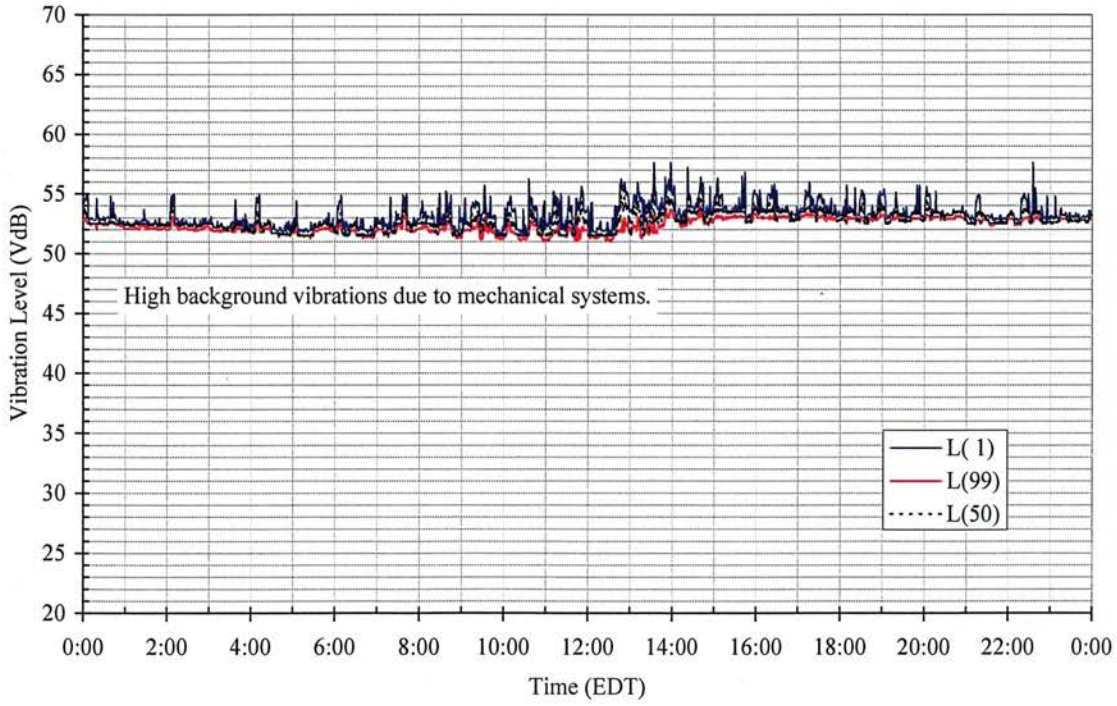


Figure A2: Ambient Vibrations - 270 Park Avenue - May 4-5, 1999

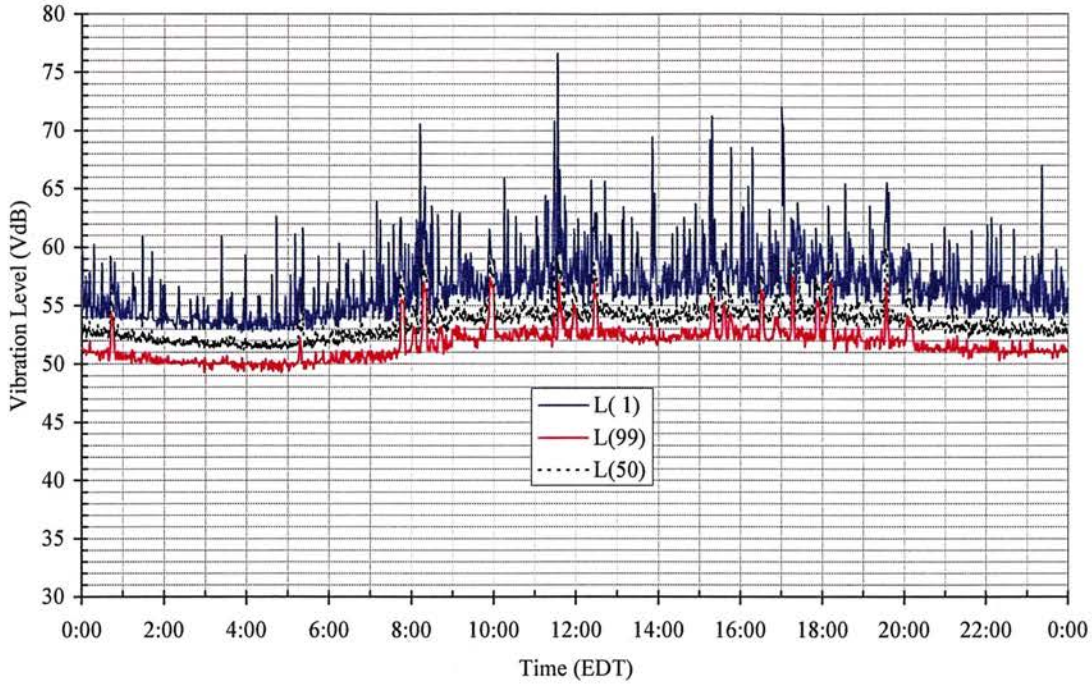


Figure A3: Ambient Vibrations - 301 Park Avenue (Waldorf Astoria) - July 27-28, 1999

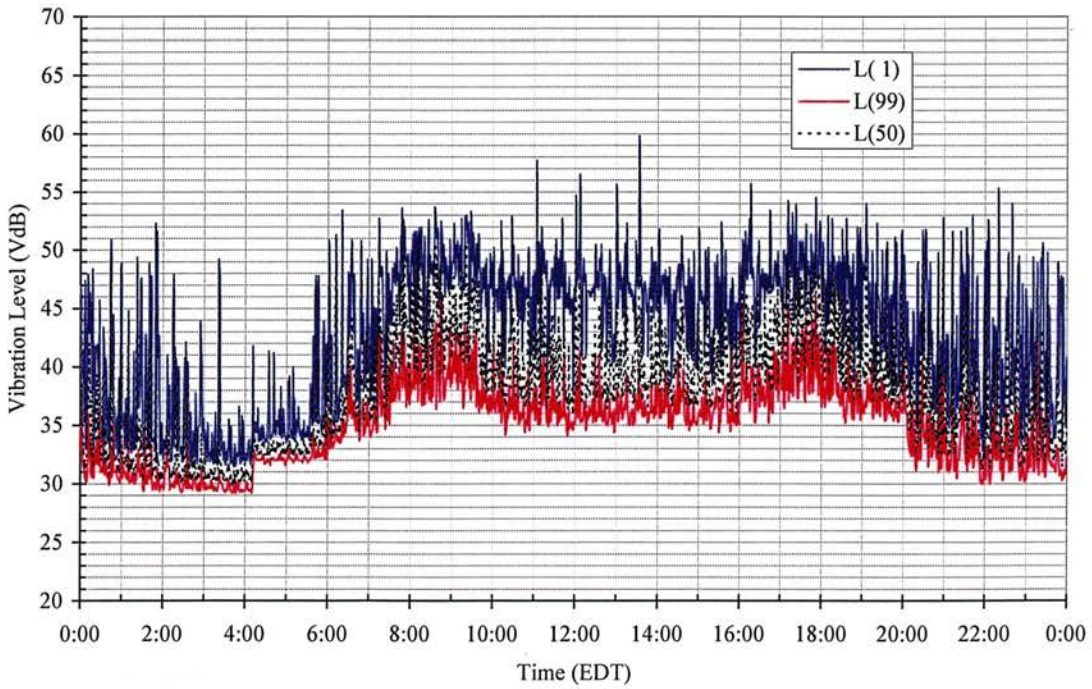


Figure A4: Ambient Vibrations - 350 Park Avenue - May 5-6, 1999

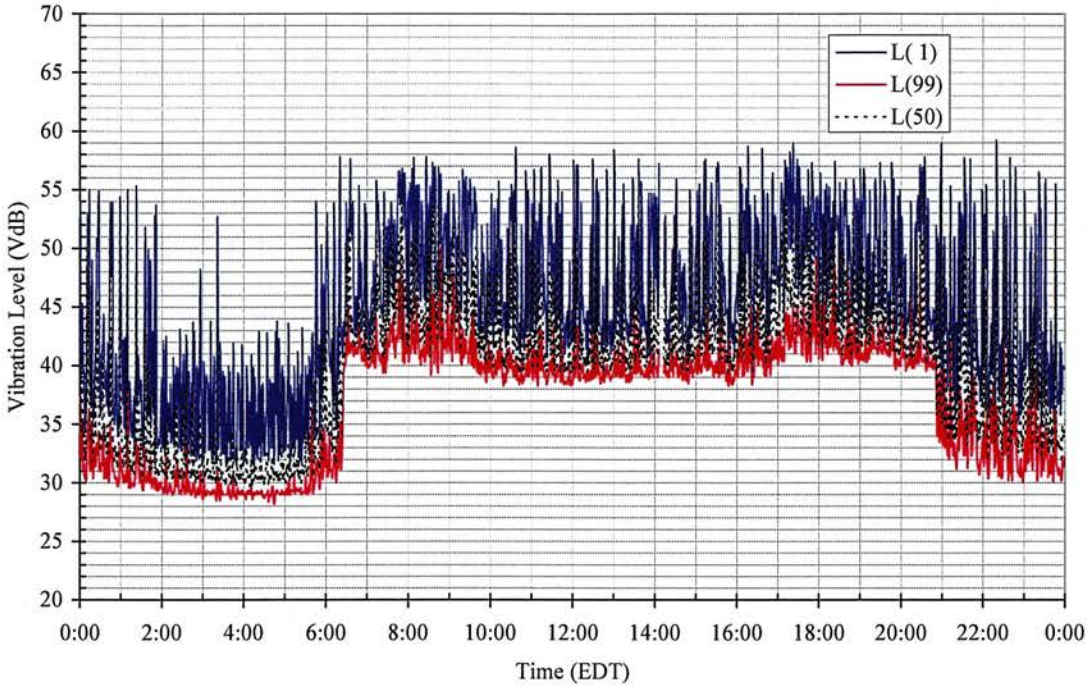


Figure A5 - Ambient Vibrations - 370 Park Avenue - May 5-6, 1999

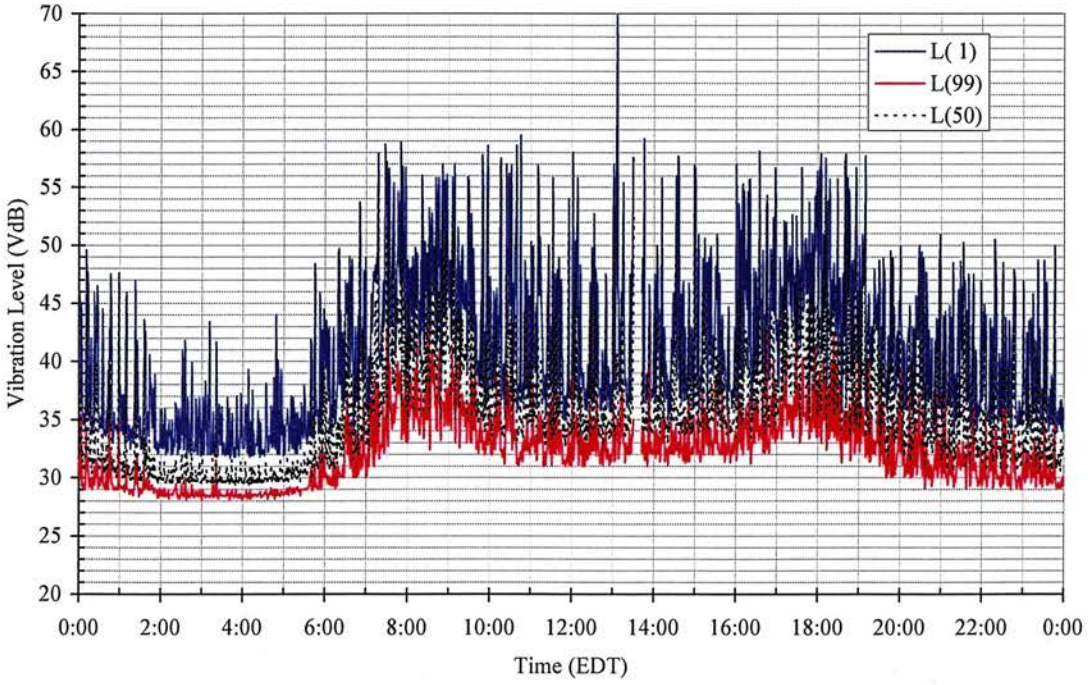


Figure A6: Ambient Vibrations - 390 Park Avenue (Lever House) - May 5-6, 1999

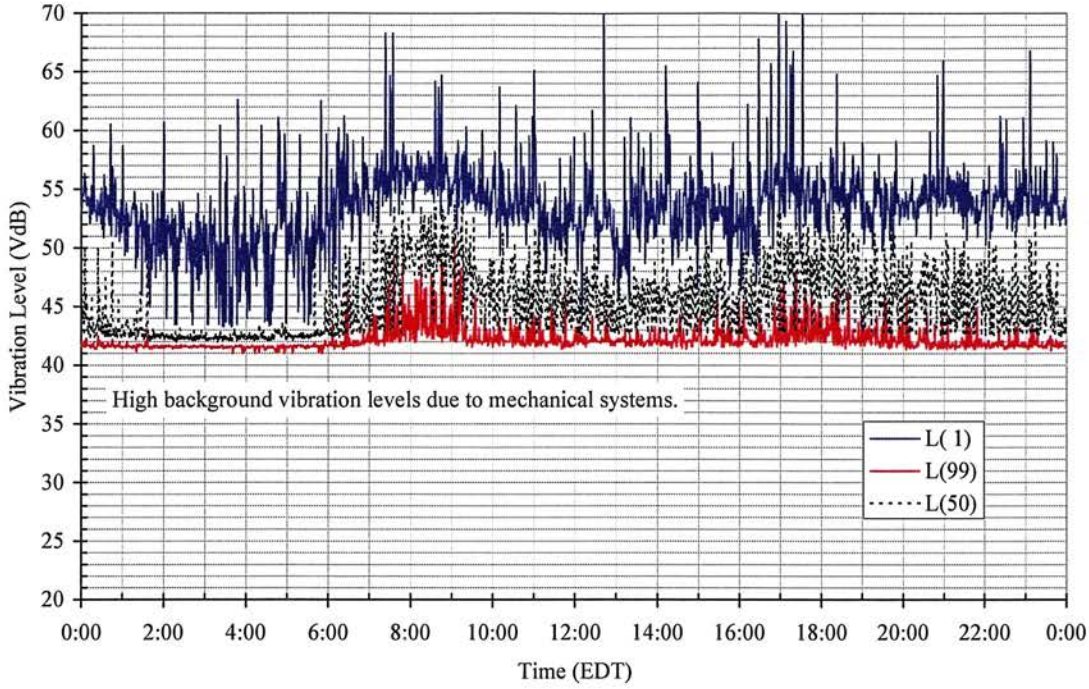


Figure A7: Ambient Vibrations - 425 Park Avenue - May 4-5, 1999

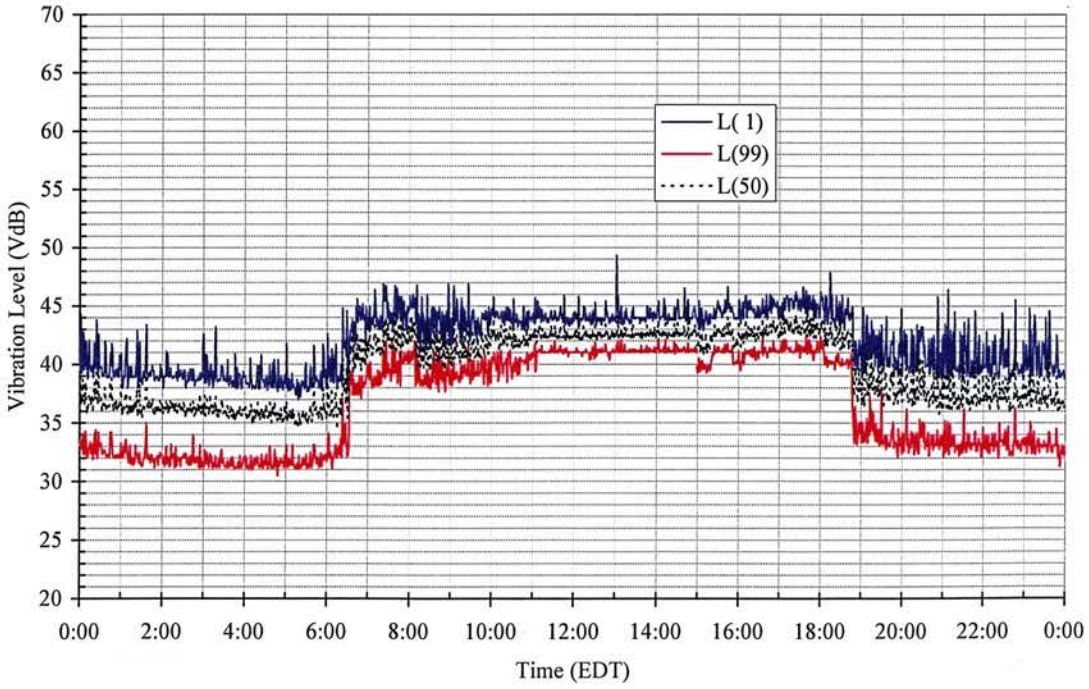


Figure A8: Ambient Vibrations - 500 Park Avenue - May 6-7, 1999

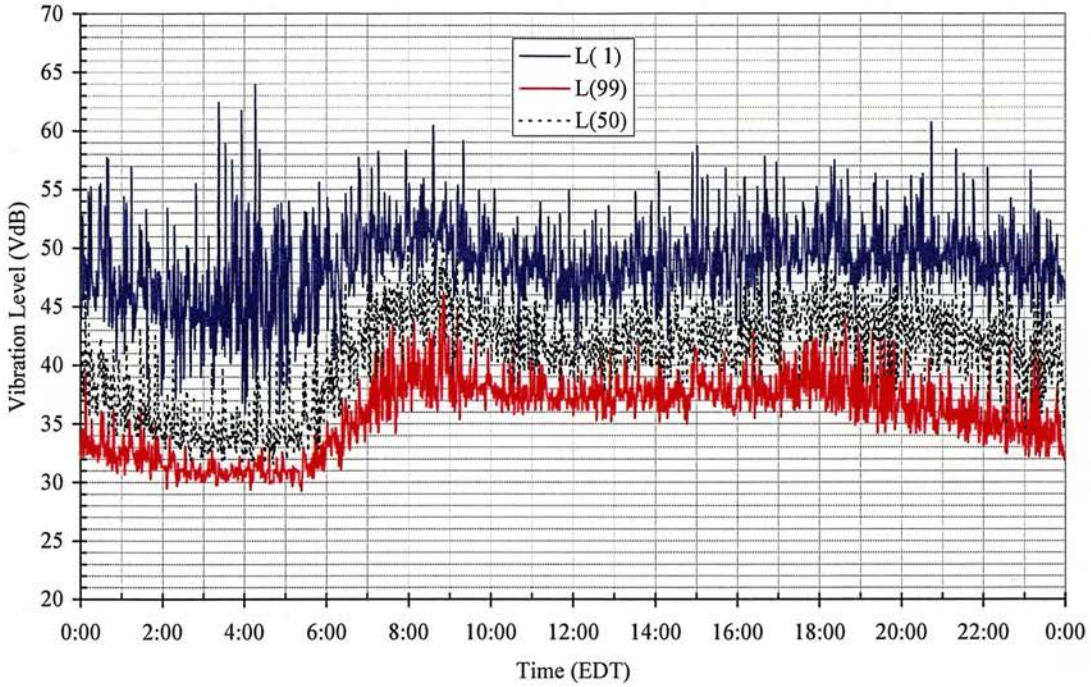


Figure A9: Ambient Vibrations - 521 Park Avenue - July 28-29, 1999

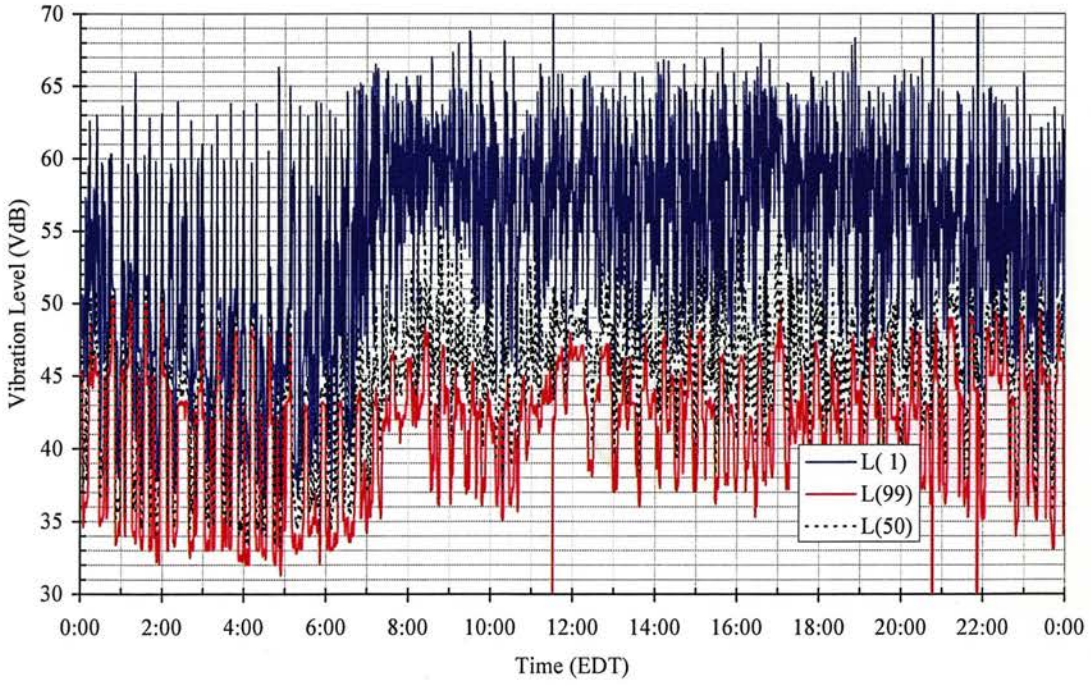


Figure A10: Ambient Vibrations - 786 Lexington Avenue - September 22-23, 1999

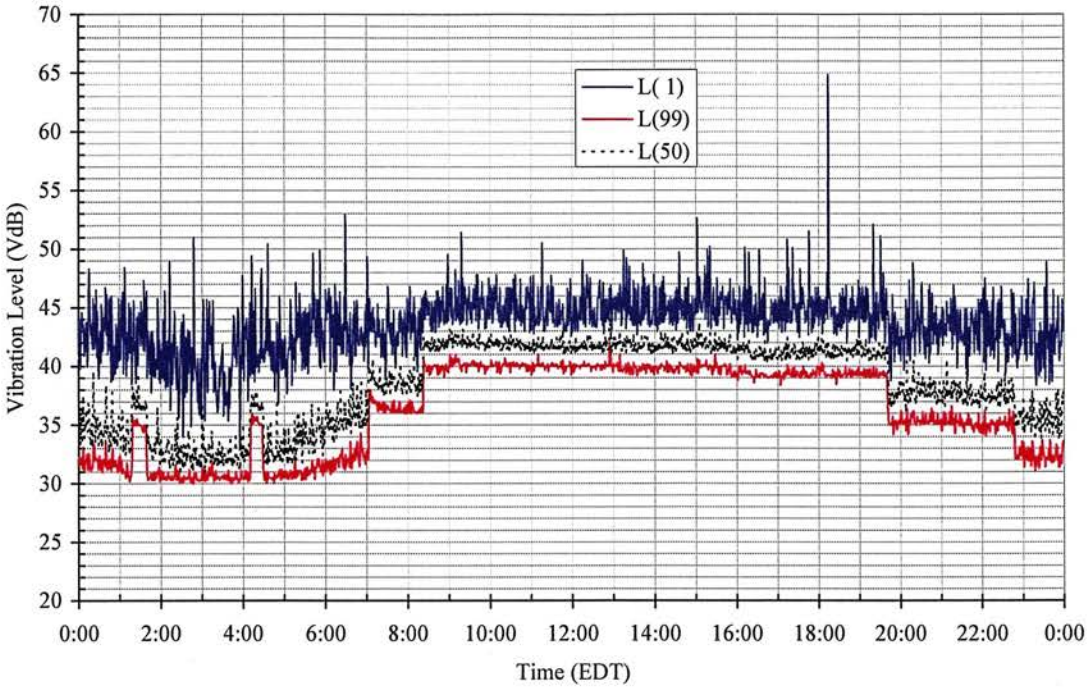


Figure A11: Ambient Vibrations - 166 East 63rd Street - May 6-7, 1999

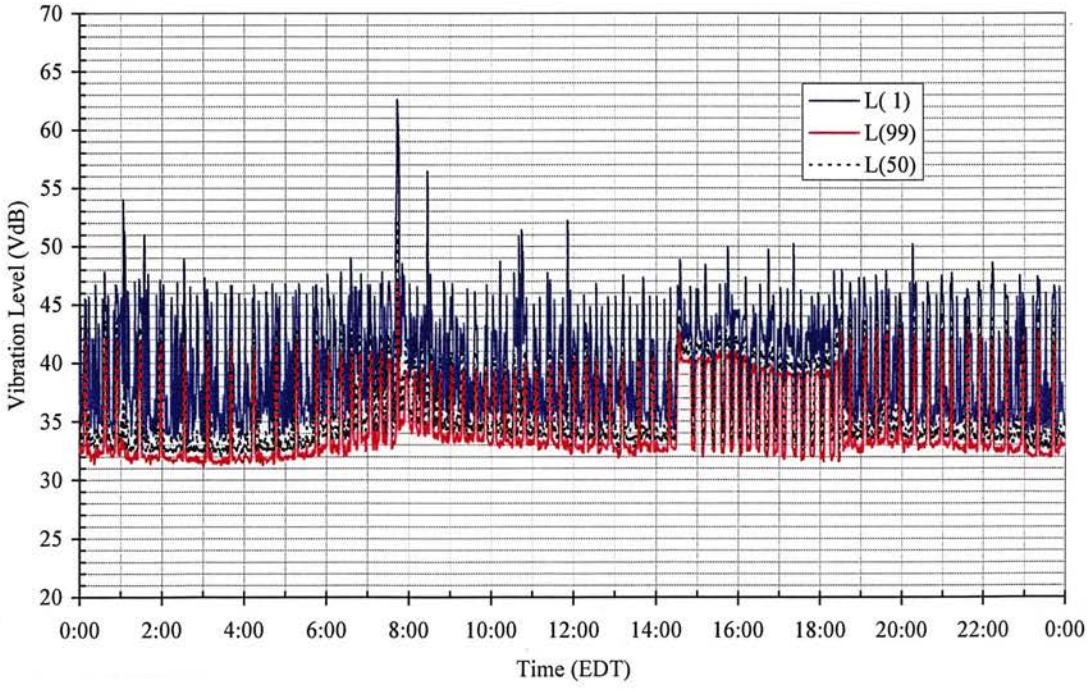


Figure A12: Ambient Vibrations - 250 East 63rd Street - May 6-7, 1999

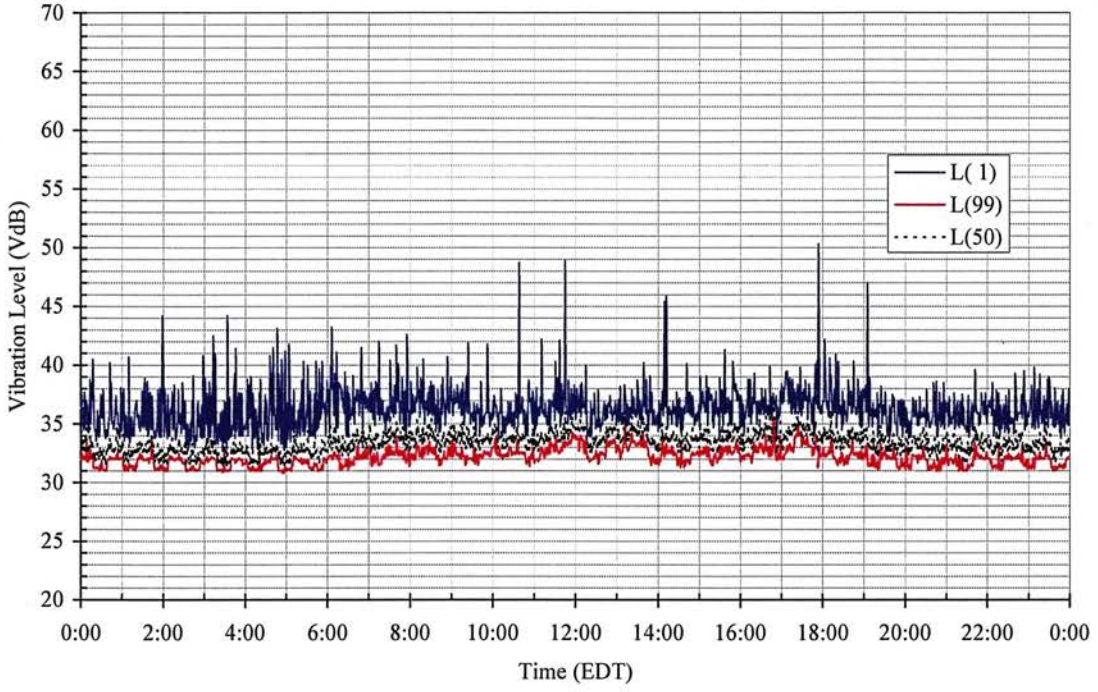


Figure A13: Ambient Vibrations - 201 East 62nd Street - May 6-7, 1999

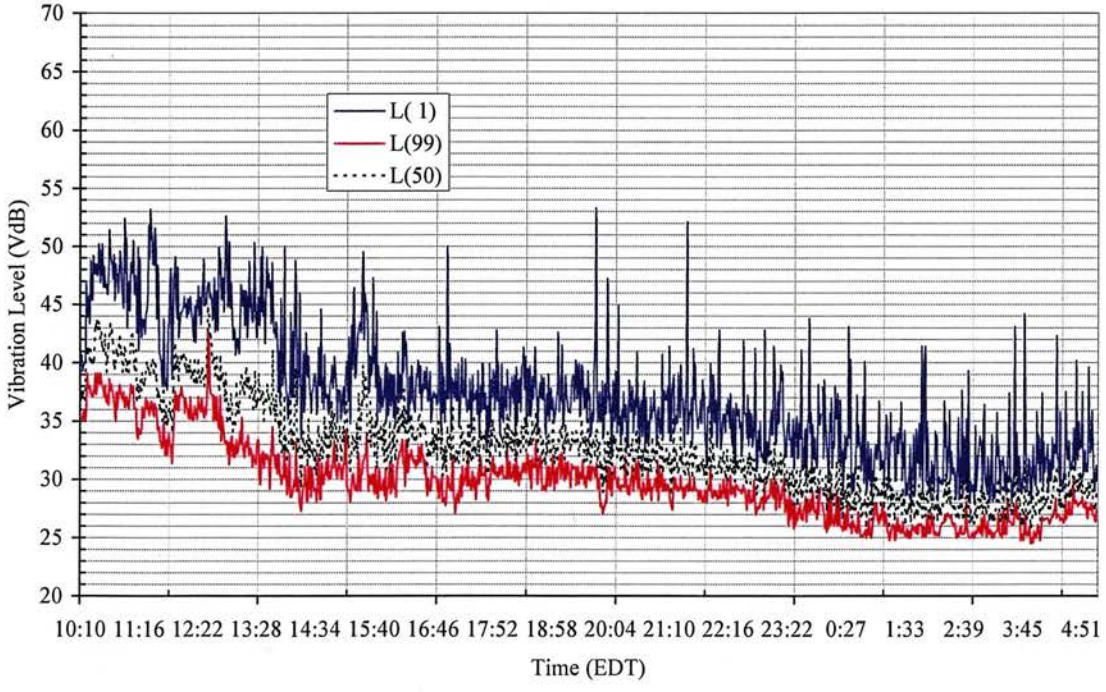


Figure A14: Ambient Vibrations - Newcomer High School - July 29-30, 1999

APPENDIX F-2

VIBRATION PREDICTIONS USING THE TRANSFER MOBILITY METHOD

1 INTRODUCTION

The propagation of vibration through the ground is a complex phenomenon that is affected by a number of factors, including the soil type, moisture content, location of the water table, soil layering, discontinuities such as trenches or caverns, and topography. In cases where only rough estimates of transmitted vibration are required, simple models can be used to predict propagation through the ground. The FTA general vibration assessment is an example of such a simple model. However, in cases where more precise estimates are required, or where the ground conditions preclude the use of simple models, a more rigorous approach is needed. In the present study, the complex subterranean structure on Manhattan consisting of myriad tunnels, building foundations and utility lines, suggested a rigorous approach to vibration prediction, even at the EIS stage.

Transfer mobility testing is an empirical method for measuring the vibration characteristics of the ground at a specific location. In the transfer mobility method, the vibration propagation characteristics of the ground are measured using a calibrated vibration source and an array of vibration sensors. Having determined the vibration propagation characteristics, it is then possible to predict the vibrations produced by other sources simply by comparing the new source to the calibrated source.

The improved accuracy of the transfer mobility method comes from the fact that the test vibrations travel over the same path as do the vibrations of the real vibration source, in this case, a train in a tunnel.

The transfer mobility method is described in general in Section 11 of the FTA manual. The purpose of this Appendix is to describe in detail the method and assumptions that were used in this study.

2 BACKGROUND

Most people are familiar with a time domain representation of vibration. For example, during an earthquake, the needle on a seismograph oscillates back and forth across the paper giving a time history of the magnitude of the vibrations in the ground. From a time history plot, one can readily observe the duration of the earthquake and determine the greatest magnitude of the vibrations. However, it is difficult to determine the frequency character of the vibration energy; that is, whether or not the vibration energy is comprised of slowly oscillating motions or of high frequency rapid oscillations.

Frequency domain analysis is a method used to break down the time signal into its principal frequency components. In the frequency domain, for example, it is very easy to see whether the vibration energy is predominantly low frequency, high frequency, or something in-between.

Frequency domain analysis is the backbone of the transfer mobility method. In effect, the transfer mobility measurement determines to what extent vibrations of different frequencies propagate through the ground. In fact, one way to measure transfer mobility is to simply vibrate the ground at a known frequency and measure the response. By changing the frequency of the vibrator, it is possible to obtain the ground propagation characteristics over a range of frequencies. In the present study, a large hammer was used to excite the ground. The hammer excites many frequencies at once, which speeds up the test process.

3 BASIC EQUATIONS AND DEFINITIONS

3.1 Point Source Transfer Mobility

The source-path-receiver concept applies equally well to vibration as it does to airborne noise. In this case, the vibration source is a train or piece of construction equipment; the path is the ground; and, the receiver is the occupied space where the people and/or equipment reside who may be potentially affected by the vibration.

In the frequency domain, a point source, path and receiver are linked by the equation,

$$V(f) = Tm_{point}(f) * F_{point}(f), \qquad (B1)$$

where V is the vibration velocity in units of inches/second, Tm_{point} is the transfer mobility (propagation) in units of inches/second/lb_f and F is the vibrating force in units of pounds force (lb_f). The f in parentheses is meant to indicate that all three quantities are functions frequency. Equation B1 pertains to the point transfer mobility, that is the vibration that results from a point vibration source, such as a pile-driver. Similar expressions can be developed for other force distributions, such as a line-source which is used to model the vibrations produced by a train.

It is common to re-write Equation B1 using decibel notation, where the quantities are referenced to standard quantities. In decibel notation, Equation B1 becomes,

$$L_v(VdB) = TM_{point}(dB) + L_F^{point}(dB), \qquad (B2)$$

where, $L_v = 20 \log(V/V_{ref})$ is the vibration velocity level. V_{ref}, the reference velocity level is equal to 10^{-6} inches/second. The units of velocity level are denoted VdB to avoid confusion with acoustic decibels. TM_{point} is the point transfer mobility level in decibels referenced to 10^{-6} inches/second/lb_f. L_F^{point} is the force level in decibels referenced to 1 lb_f.

3.2 Line Source Transfer Mobility and Force Density

The point source transfer mobility is used to predict the vibration velocity due to a point excitation. A similar approach can be used to predict the vibration velocity due to a line source like a train. In decibel notation, the line source transfer mobility is given by,

$$L_v(VdB) = TM_{line}(dB) + L_F(dB) + C(dB), \qquad (B3)$$

where TM_{line} is the line source transfer mobility level in decibels, referenced to 10^{-6} inches/second/(lb_f/ft) and L_F is the force density level in decibels referenced to 1 lb_f/ft. C is a correction term used to account for factors like the building/soil coupling loss and track fixation method.

In the form presented in Equation B3, the transfer mobility and force density are used to predict the vibration level. Equation B3 can also be rearranged in order to estimate the force density of a line source based on measured propagation and vibration data,

$$L_F(dB) = L_v(VdB) - TM_{line}(dB). \qquad (B4)$$

4 TEST and ANALYSIS EQUIPMENT

Figure B4.1 shows a schematic representation of the test equipment used to measure transfer mobility and force density in the present study. Each component is described in detail in the following sections.

Seismic Hammer

The seismic hammer imparts a force pulse to the ground. The hammer was fashioned out of a "safety hammer" that is commonly used for soil sampling tests. The hammer consists of a 300 lb_m steel mass that is dropped approximately 30 inches onto a steel anvil. A mechanical winch and quick release hook are used to lift and drop the mass. The force pulse is measured using four strain gages, configured in a full bridge arrangement that is designed to give bending and temperature compensation.

The strain gages are connected to a signal conditioning box that provides a voltage signal proportional to the applied force.

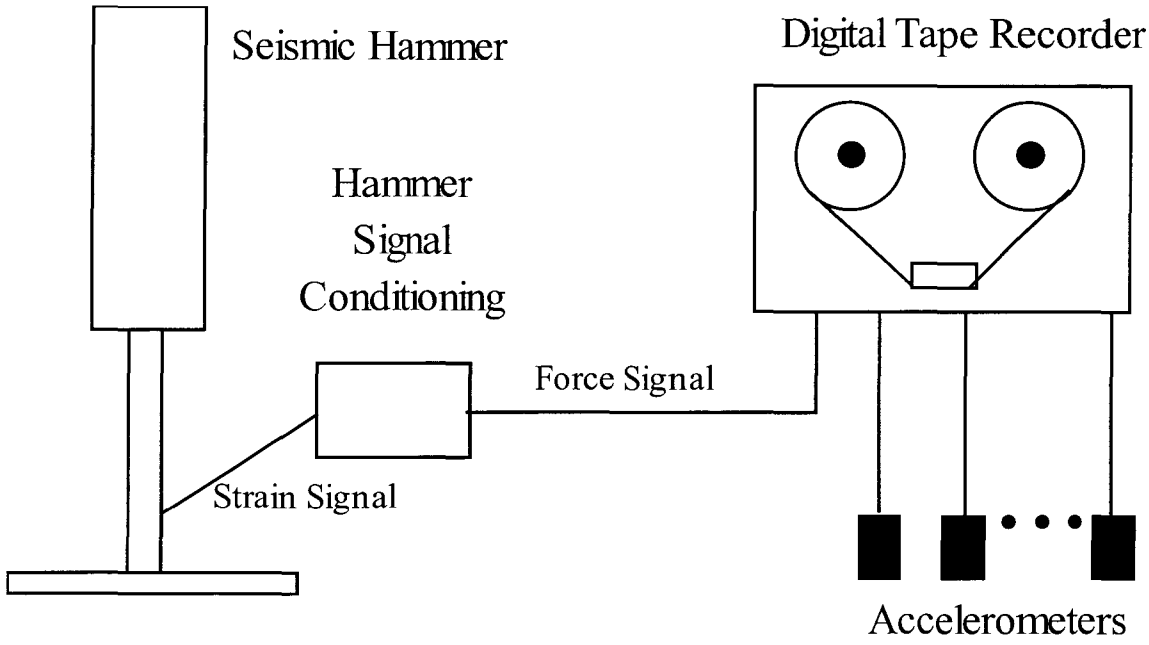


Figure B4.1: Data Acquisition Setup

Accelerometers

The ground vibration acceleration is measured using an array of accelerometers. The acceleration data is converted to velocity as required during a post processing operation.

Digital Tape Recorder

The hammer force signal and accelerometer response signals were recorded using a 16 channel digital tape recorder.

5 AT GRADE FORCE DENSITY TEST

The force density of a 6 car LIRR M3 train was measured on March 27, 1999. The measurements were made in a storage yard near the Belmont Park racetrack on Long Island. At this location, the alignment has 4 parallel tracks, all supported by tie on ballast. The measurements were done on Track #4.

5.1 Point Source Transfer Mobility

The point transfer mobility was measured from Track #4 to seven vibration sensors located at distances of 25', 50', 75', 100' 200' and 300' from the track centerline. The impact hammer was

located on a tie, centered between the rails. The vibration data was recorded as vibration acceleration, measured in the vertical direction.

Figure B5.1 shows a sample force pulse and the vibration response measured at the 50' sensor. In this case, the vibration pulse took approximately 50 milliseconds to reach the sensor.

Approximately 40 impacts were averaged to determine the acceleration/force transfer function. All of the data was tape recorded.

The force/response transfer functions were evaluated with a narrow band signal analyzer. The transfer functions were initially determined as the ratio of the measured acceleration to the applied force and then converted to narrow band velocity/force (transfer mobility). The narrow band transfer mobility transfer functions were then condensed into 1/3 octave bands by a suitable combination of the narrow band data.

Figure B5.2 shows the narrow band and 1/3 octave band point transfer mobility for the 100' sensor position. Here, the most efficient vibration transmission occurred between about 15 Hz and 40 Hz.

Coherence

The third trace on Figure B5.2 is the coherence of the narrow band transfer function. Coherence gives an indication of the quality of the measured data. By using artificial random noise superimposed on the recorded data, it was determined that good estimates of the transfer function were possible with coherence values as low as 0.2 (with 40 averages). As can be seen from this figure, the measured coherence was generally above 0.75, even at high frequencies. This indicates that the seismic hammer has adequate high frequency energy content and, further, that the high frequency portion of the transfer function has a high level of confidence associated with it. (When impacting on soft surfaces like soil, it is often difficult to obtain sufficient high frequency content in the impact pulse.)

5.2 Point Source Transfer Mobility – Attenuation with Distance

Generally, the vibrations induced by the hammer decrease with increasing distance from the source. This is caused both by geometric spreading and by energy absorption in the soil.

Figure B5.3 shows the variation of the 100 Hz point transfer mobility component with distance. As the figure shows, the point transfer mobility data has a linear dependence on the logarithm of the distance from the track. The slope of the curve is equivalent to a 9 dB drop for each doubling of distance. This is approximately 6 dB more than the theoretical 3 dB attenuation rate for surface Rayleigh waves (with no soil dissipation).

A linear curve fit was used to model the point transfer mobility data for each 1/3 octave band. (In cases where the coherence of the transfer function was poor at a given frequency, the curve fit parameters from an adjacent frequency band were used in the model.)

The linear curve fit coefficients for the Long Island point source transfer mobility data are shown in Table B5.1.

Table B5.1 - Point Source Transfer Mobility Model Coefficients for Long Island

1/3 Octave Band Center Frequency (Hz)	a_0*	a_1*
8	28	-14
10	34	-14
12.5	58.61941	-25.00174
16	68.89712	-28.9118
20	76.34807	-32.42563
25	43.10594	-12.77196
31.5	43.10594	-12.77196
40	57.446	-23.1388
50	38.63559	-17.12976
63	38.63559	-17.12976
80	17.8855	-9.533762
100	48.37664	-29.74355
125	28.28073	-22.50879
160	32.99259	-30.7296
200	46.79834	-40.39494
250	34.96992	-38.60573
315	23.9208	-33.95278
400	21.31648	-32.83701
500	10.60994	-27.64251

* $TM_{point} = a_0 + a_1 * \log_{10}[d(ft)]$

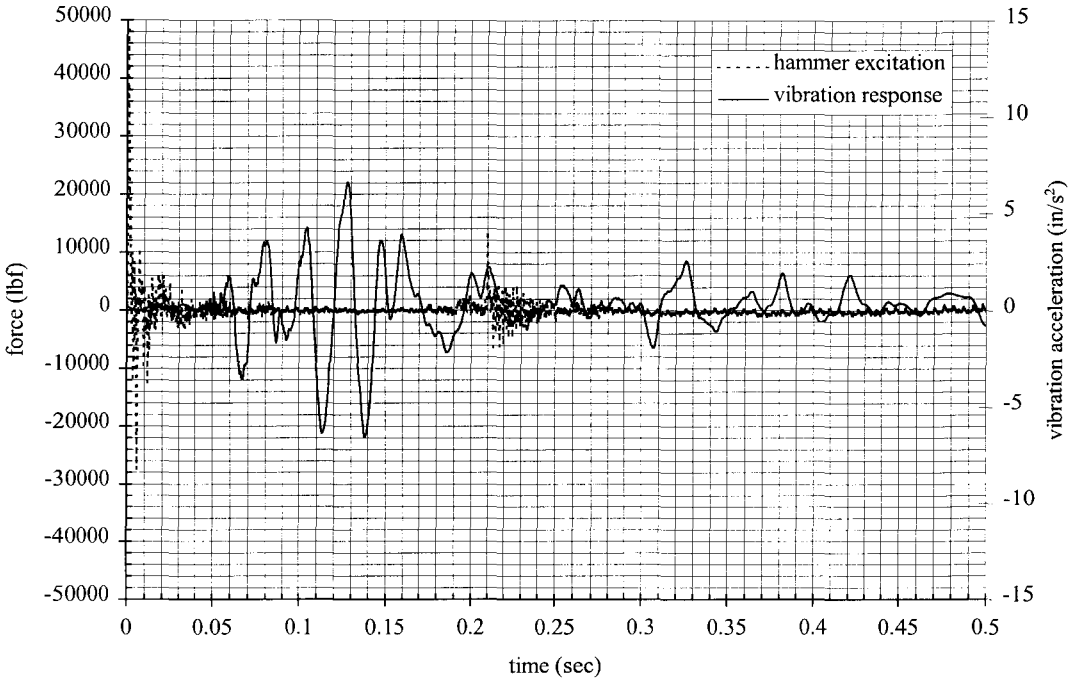


Figure B5.1: Hammer Induced Vibration Waveform at 50' Sensor

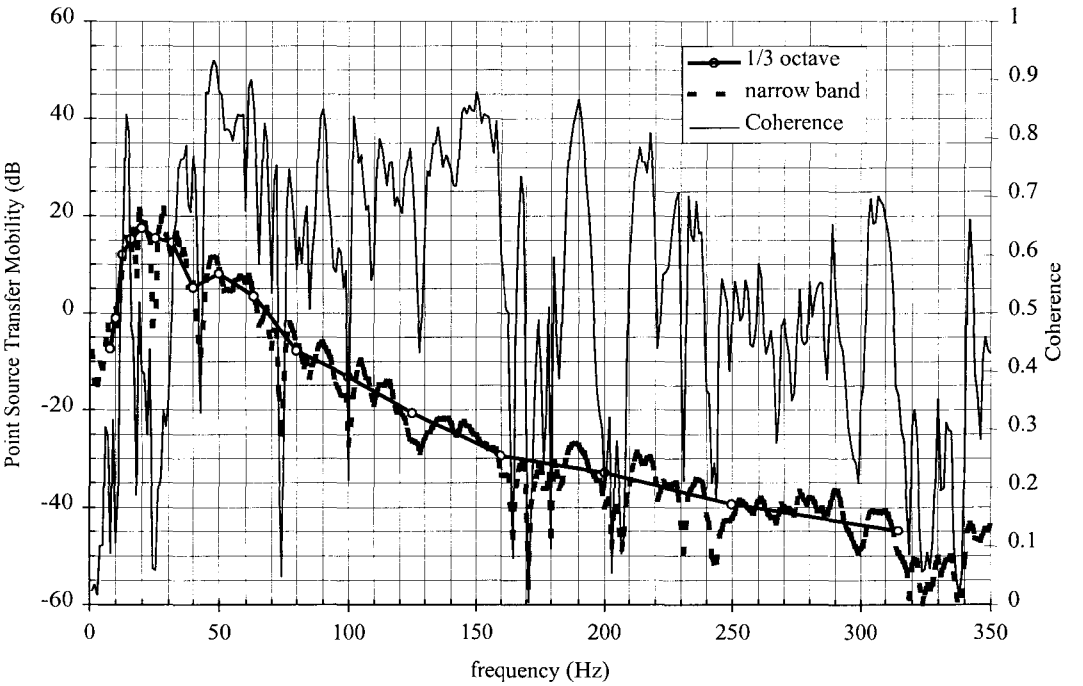


Figure B5.2: Point Source Transfer Mobility at 100 ft

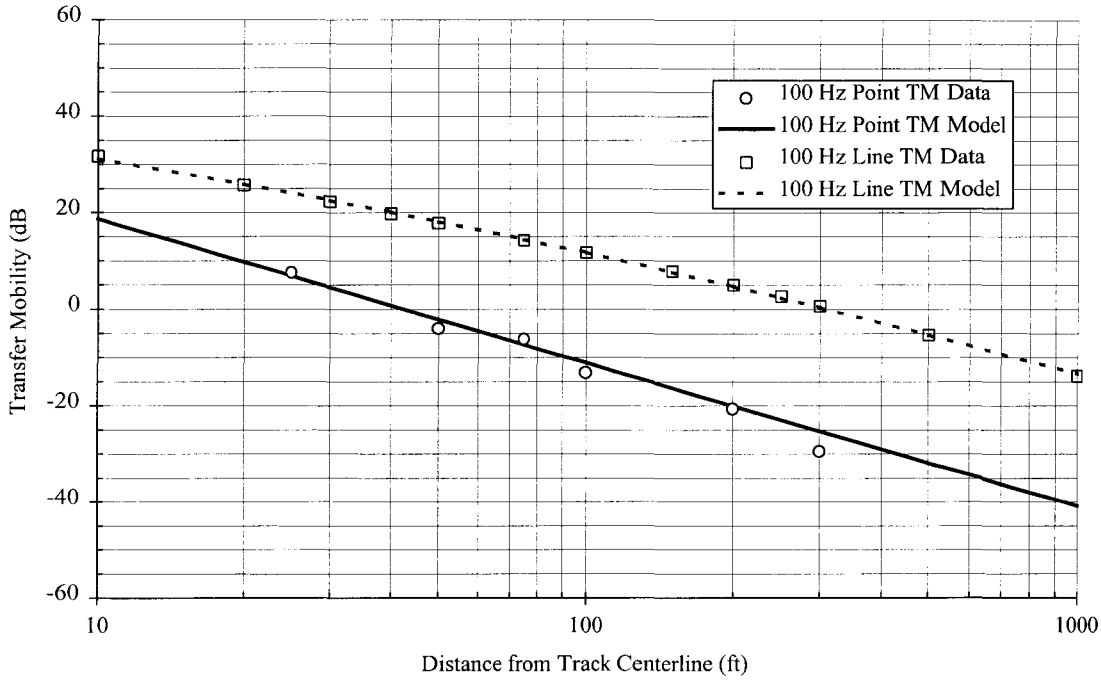


Figure B5.3: Variation of 100 Hz Transfer Mobility Component with Distance

5.3 Line Source Transfer Mobility

The six car train for the Long Island force density test was 510 ft long. Numerical integration was used to determine the line source transfer mobility from the point source model. The line source transfer mobility, evaluated at a perpendicular distance y_0, is given by the line integral,

$$TM^2_{line}(y_0) = \int_{-L/2}^{L/2} TM^2_{point}(y_0, x)\, dx, \qquad \text{(B5)}$$

where the point source transfer mobility is used in its dimensional form,

$$TM^2_{point}(y_0, x) = TM^2_{ref} * 10^{\frac{a_0 + a_1 \log[(y_0^2 + x^2)^{1/2}]}{10}}, \qquad \text{(B6)}$$

where x is the distance along the track from the center of the train, a_0 and a_1 are the linear curve fit coefficients for the point source transfer mobility, and $TM_{ref} = 10^{-6}$ in/s/lbf. Once the line source transfer mobility is calculated it can be converted to decibel notation using,

$$TM_{line}(dB) = 10 \log(TM^2_{line}) - 20\log(TM_{ref}), \qquad \text{(B7)}$$

where $TM_{ref} = 10^{-6}$ in/s/(lbf/ft).

The line source transfer mobility, calculated at discrete distances, y_0, from the track centerline is shown on Figure B5.3 for the 100 Hz 1/3 octave band. To facilitate the calculations, a quadratic curve fit was used to model the calculated line source data.

5.4 Vibrations due to Train Passes

After the transfer mobility tests were done, the track was cleared and the test train was run by the test site at 15 mph, 30 mph, 45,mph and 50 mph. At each speed, four passes were recorded, two in each direction. The train direction had no significant effect on the measured vibrations.

The 1/3 octave vibration spectra were measured at each accelerometer location for each train pass. The spectra were measured using the peak hold function in the spectrum analyzer. In peak hold mode, the analyzer records the maximum vibration level that occurred in each 1/3 octave band during the passby. Figure B5.4 shows the vibration spectra measured at the 100' sensor position during four train passes at 30 mph. The solid curve represents the average spectrum that was used for further analysis.

Figure B5.5 shows the average spectra for a 30 mph train speed at each measurement distance. As one would expect, the vibrations decrease with increasing distance from the track. Also, one can see that the high frequency components attenuate with distance at a faster rate than do the low frequency vibrations.

Figure B5.6 shows the average vibration spectra measured at the 100' sensor for various train speeds. Interestingly, the vibration spectra are similar at frequencies between 63 Hz and 200 Hz. The greatest difference in the spectra occurs at frequencies around 20 Hz.

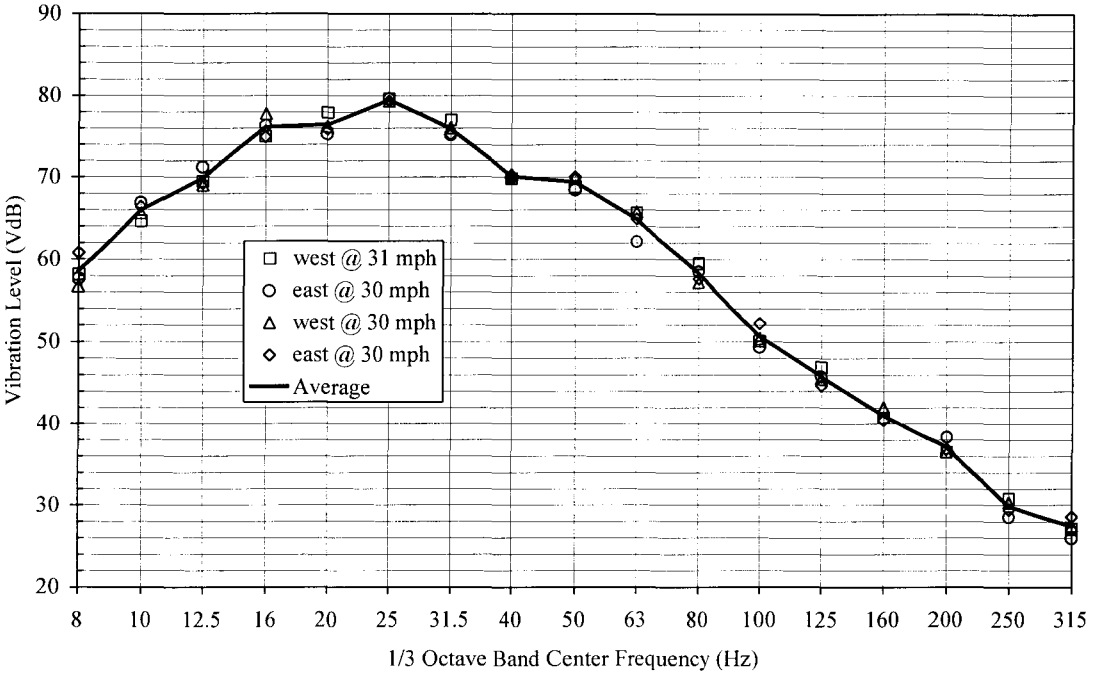


Figure B5.4: Vibration Spectra due to Train Passages at 30 mph - 100 ft Sensor

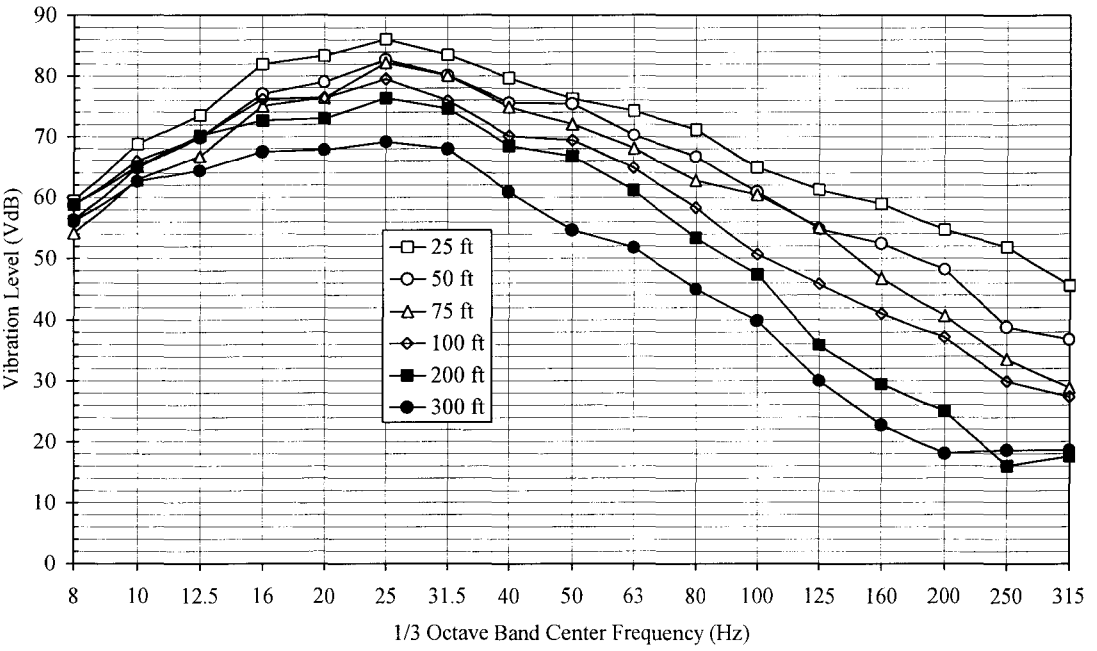


Figure B5.5: Variation of Average Vibration Spectra with Distance
for 30 mph Train Passes

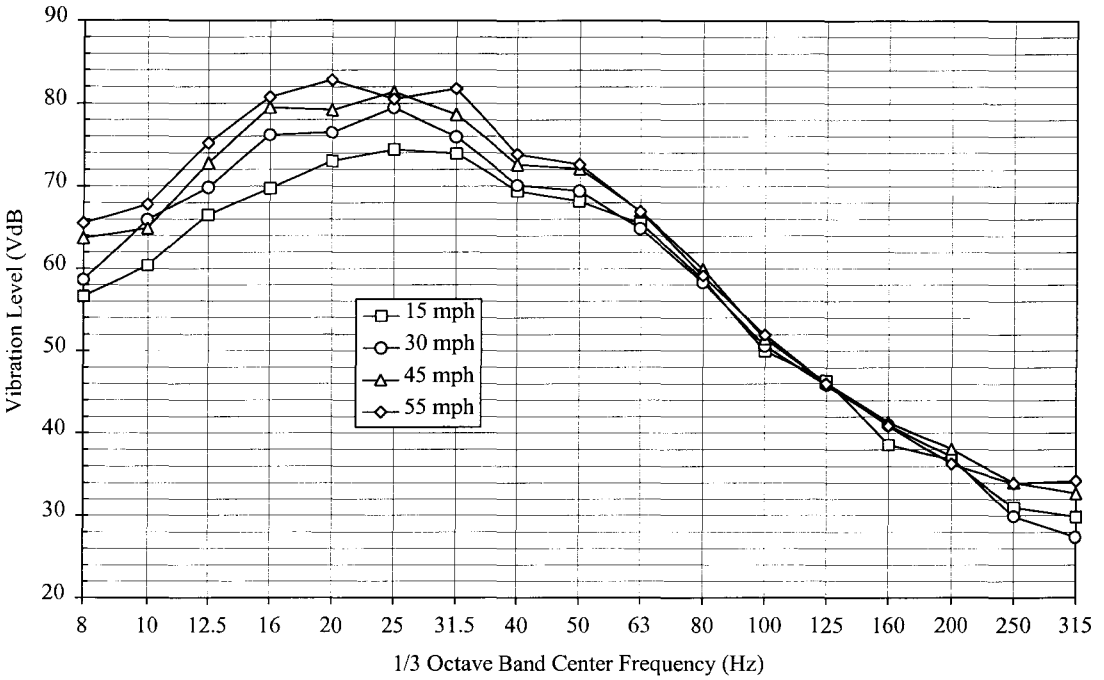


Figure B5.6: Average Train Induced Vibration Spectra - 100' Sensor

5.5 Force Density

Given the line source transfer mobilities (derived from the point source transfer mobility measurements) and the train induced vibration spectra, the line source Force Density Level (FDL) can be calculated using Equation B4.

The FDL is based on the train induced vibrations and transfer mobility at each measurement point. Because the same train is responsible for the induced vibrations, the FDL's from each measurement distance should be similar. Figure B5.8 shows the calculated FDL's from the 25', 50', 75', 100', 200' and 300' measurement distances for a 30 mph train speed. While there is generally good agreement between these data sets, the FDL spectra from the shorter distances (<100') are more closely grouped together. This is due primarily to higher quality (better coherence) transfer functions at the shorter distances. The average FDL was determined by a power average of the FDL's from the 25', 50', 75' and 100' sensors.

Figure B5.9 shows the average FDL calculated for the four test train speeds, 15 mph, 30 mph, 45 mph and 55 mph. In general, the FDL increases with train speed, although in the frequency band between 63 Hz and 123 Hz, the FDL's are all very similar.

Comparison of FDL to other Data

In the present project, the FDL's were based on a transfer mobility measurement referenced to the top of the tie. Other researchers reference FDL to the ground; that is they measure the transfer mobility by impacting the ground beside the alignment. Each method is equally valid, provided the FDL's are used correctly. At low frequencies (typically below the characteristic resonance of the wheel truck on the track support) both methods will predict the same FDL. However, at high frequencies, the tie based method will give a higher FDL than will the ground referenced method. This effect can be shown using relatively simple lumped parameter models. Therefore, it is reasonable that the FDL's shown here have more high frequency content than those determined using a ground based approach. Again, the final answers (the predicted vibration level at the location of the proposed alignment) should be the same, provided the data is used correctly.

6 PREDICTED VIBRATION LEVELS

The vibration levels in Manhattan and Queens can be predicted according to Equation B3 using the force density levels and the measured transfer mobility data for Manhattan and Queens.

6.1 Point Source Transfer Mobility Locations

The point source transfer mobility was measured at 5 locations on Manhattan; 52nd Street near Park Avenue (May 17, 1999); 47th Street near Lexington Avenue (loop track area, May 18, 1999); the Manhattan end of the 63rd Street tunnel near 2nd Avenue (June 3, 1999); 61st Street near Park Avenue (July 28, 1999); and, 57th Street near Park Avenue (September 17 & 18, 1999). The measurements at 52nd Street and the Loop track were done on existing track structure. The 63rd Street tunnel measurements were done on the existing tunnel invert (there are no tracks at the present time). The measurements at 61st Street and 57th Street were made using boreholes; the 61st Street borehole test was done at a 125' depth and the 57th Street test was done at two depths, 52' and 114'.

In Queens, the transfer mobility was measured at the Queens end of the East River tunnel near the ventilation shaft at Vernon Boulevard (June 2, 1999).

No data were obtained at the 63rd Street tunnel in Manhattan due to very poor signal to noise ratios. The tunnel is approximately 156' deep at this point.

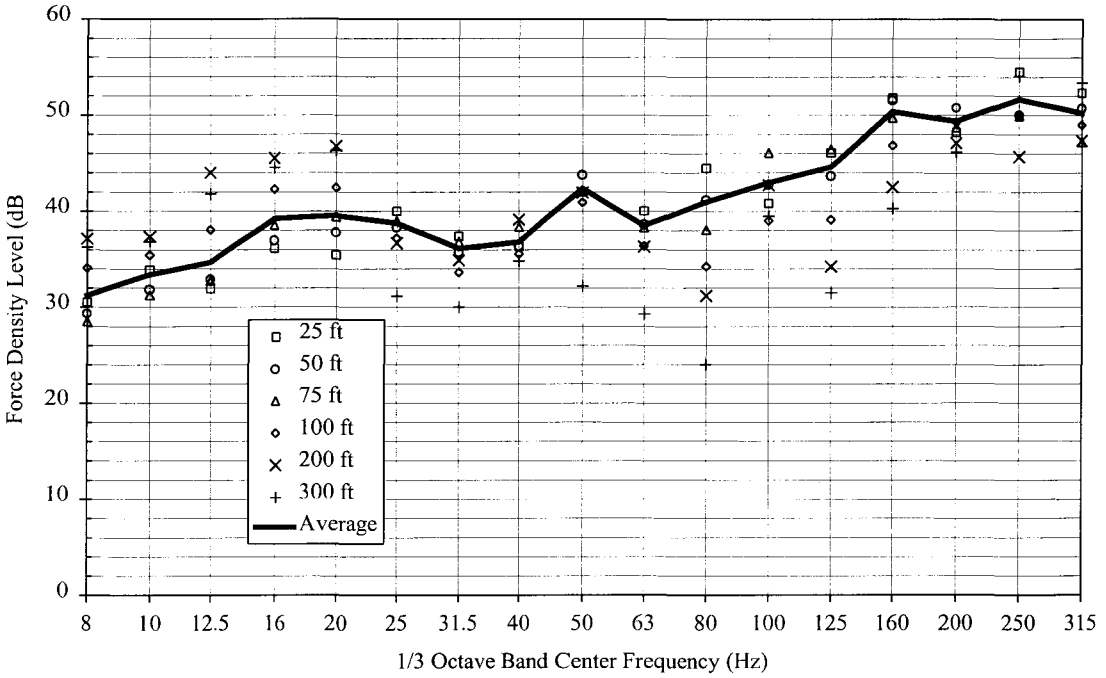


Figure B5.8: Calcualted Force Density Level at 30 mph

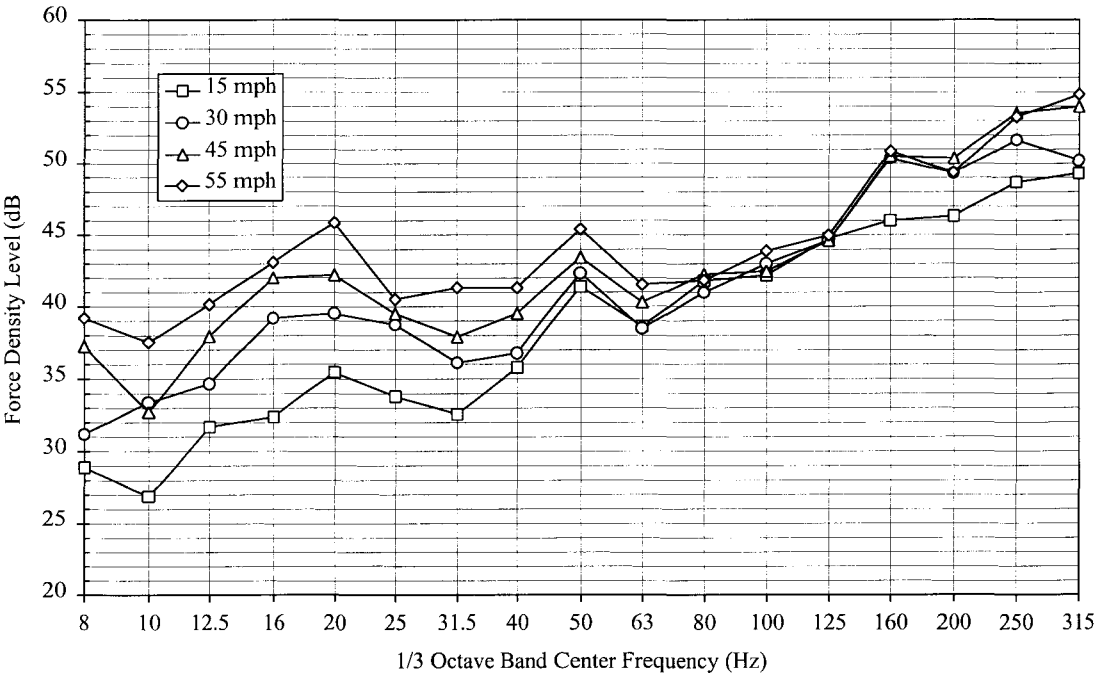


Figure B5.9: Variation of Force Density Level with Speed

6.2 Point Transfer Mobility Test Method

At the three borehole sites (61st Street, 57th Street - 2 depths) a downhole force sensor was used to measure the force imparted to the ground at the bottom of the borehole. The sensor was attached to the end of the drill stem and lowered to the bottom of the hole. The seismic hammer was attached to the top of the drill stem and was used to impart the force excitation. The transfer functions were based on the force signal from the downhole sensor, although the force signal from the seismic hammer was also recorded. The cable from the downhole sensor passed through the center of the drill stem which minimized cable abrasion during testing. For the borehole tests, the drill rig was used to lift and drop the 300 lbm seismic hammer weight. Approximately 150 impacts were recorded during each borehole test. The transfer functions were based on the best 100 impacts.

The full seismic hammer rig with gantry and electric winch (to lift the weight) was used in the other locations.

6.3 Point Source Transfer Mobility Data

In general, the quality of the transfer mobility measurements was not as high in Manhattan and Queens as it was on Long Island, due to the depth of the impact point and the relatively high ambient vibrations levels. The same difference in propagation that will cause the below-grade trains to be less intrusive than trains at-grade (at the same slant distance from the track) also makes it more difficult to measure the transfer mobility transfer function.

Figure B6.1 shows the transfer mobility that was measured at the 57th Street borehole (52' depth) at a distance of 88' (102' slant). The coherence was generally not as good as it was on Long Island, although between 130 Hz and 170 Hz it approached 0.7, which is remarkable given the high ambient vibration levels in New York City. The transfer mobility expressed in 1/3 octave bands is also shown on the figure.

Figure B6.2 shows the variation in transfer mobility at the 57th Street borehole with slant distance. As with Long Island, a linear model accurately fits the data. The line source TM for a 12 car train is also shown on the figure.

Linear polynomials were also sufficient to model the point source data for the other Manhattan test locations. In Queens, however, a quadratic model was required to reproduce the relatively low TM directly above the tunnel.

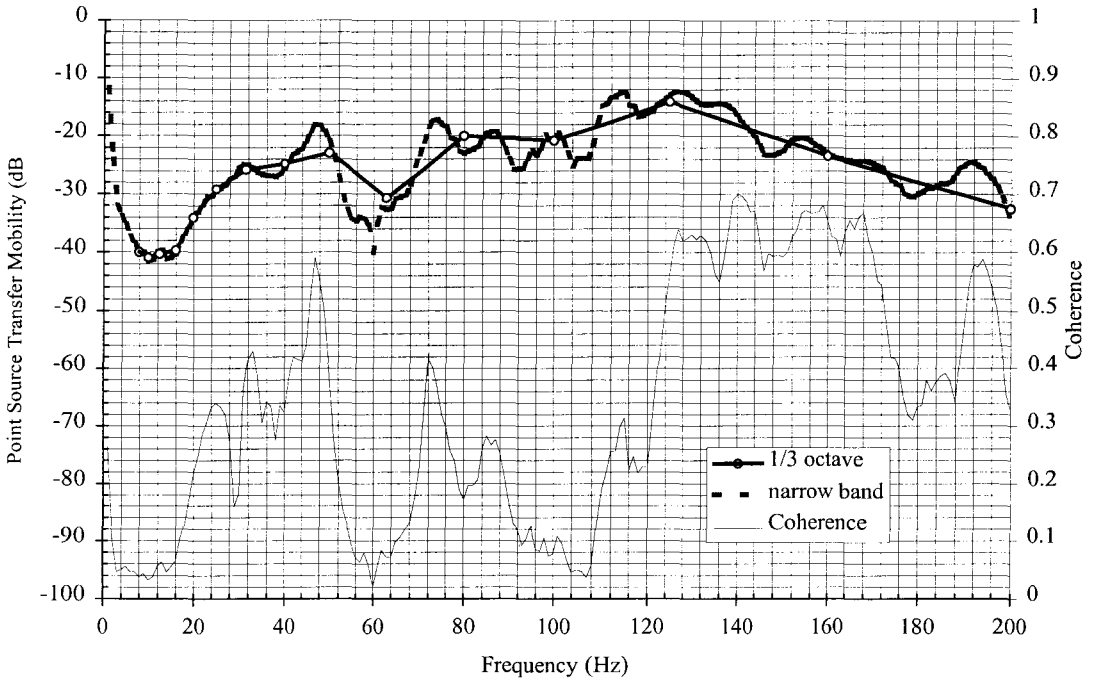


Figure B6.1: Point Transfer Mobility at 88' - 57th Street Borehole, 52' Deep

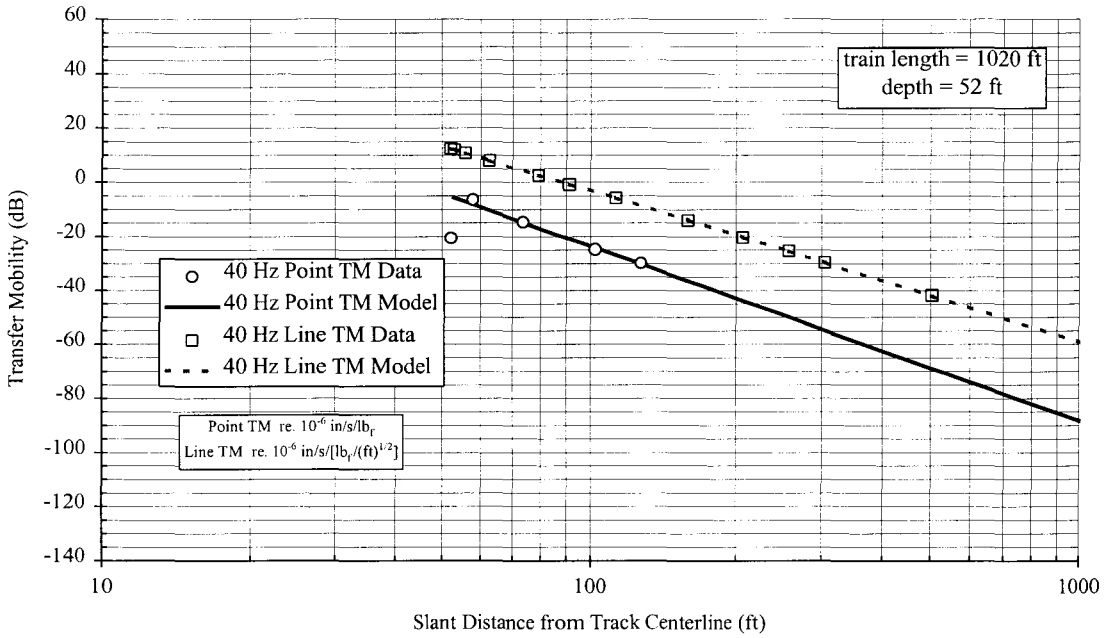


Figure B6.2: Line Source and Point Source Transfer Mobility
57th St. Borehole 52' Deep

The general form of the polynomial curve fit to the point source TM data is,

$$TM_{point}(dB) = a_0 + a_1 \log(d_{slant}) + a_2 * [\log(d_{slant})]^2 , \qquad (B8)$$

where d_{slant} is the slant distance from the impact point to the measurement point on the surface, in feet. The curve fit coefficients for the various test locations are summarized in Table B6.1.

When performing the curve fits, where the coherence was poor for a given 1/3 octave-band frequency, the coefficients from an adjacent band were used instead.

The point source transfer mobility models were used in a numerical integration routine to calculate the line source transfer mobility at a given distance from the track, for each 1/3 octave band frequency. Again, to facilitate the prediction procedure, a quadratic polynomial was then used to model line source TM as a function of slant distance from the track. A 12 car train (1020') was used to calculate the line source TM.

Figure B6.3 shows the 40 Hz line source transfer mobilities models for each test location. The figure shows a number of interesting aspects about the TM models:

1) The highest TM levels (and most efficient vibration propagation) were recorded on Long Island. This would be expected since vibration sources located on the surface generate Rayleigh waves which propagate efficiently.

2) There is a dramatic difference in the 52nd Street, Loop Track and 57th Street borehole models, even though all three tests were done at approximately the same depth below the surface. The differences can be attributed to the extensive underground structure that was present at 52nd Street and the Loop track. The underground structure creates a unique and complicated path for the vibration energy. Because of this effect from the underground structure, it was decided that the 52nd Street and Loop track data would not be used for predictions. It was felt that a more conservative approach would be to use the borehole data, even for these locations.

3) The TM attenuation rate with distance increases as the test point gets deeper.

4) The deeper hole does not necessarily produce lower TM at the same slant distance. Consider the 57th Street borehole for example, the TM directly above the impact point for the 114' deep hole is higher than the TM for the 52' deep hole, 101' away (same slant distance). This suggests that, at this frequency at least, horizontal distance from the impact point is more important than depth for vibration attenuation.

6.4 Track Support Correction to the Force Density Level

The wheel/rail interaction is responsible for the vibration forces that propagate through the rail, the rail trackbed and then into the ground. The forces produced by the wheel/rail interaction are primarily dependent on the quality of the running surface where the wheel meets the rail. Smooth wheels and rails produce much less vibration than wheels with flat spots running over

Table B6.1 - Point Source Transfer Mobility Curve Fit Coefficients for the Entire Project

Frequency (Hz)	52nd Street depth = 46.5'		47th Street (Loop) depth = 45'		61st Street depth = 125'		57th Street depth = 52'		57th Street depth = 114'		Queens depth = 84'		
	a_0	a_1	a_0	a_1	a_0	a_1	a_0	a_1	a_0	a_1	a_0	a_1	a_2
8	-19.022	-12.553	-6.375	-14.109	260.675	-128.474	75.0	-55.314	123.0	-70.0	-142.136	133.024	-36.241
10	40.330	-43.617	-6.375	-14.109	260.675	-128.474	75.0	-55.314	123.0	-70.0	-142.136	133.024	-36.241
12.5	41.938	-42.370	-6.375	-14.109	260.675	-128.474	75.0	-55.314	123.0	-70.0	-142.136	133.024	-36.241
16	23.111	-29.810	-6.375	-14.109	260.675	-128.474	76.0	-55.314	123.0	-70.0	-142.136	133.024	-36.241
20	25.820	-28.577	-6.375	-14.109	256.228	-126.542	80.0	-55.314	128.0	-70.0	-142.136	133.024	-36.241
25	-8.853	-9.852	-6.375	-14.109	256.228	-126.542	85.129	-55.314	132.0	-70.0	-142.136	133.024	-36.241
31.5	-9.096	-8.555	-6.375	-14.109	256.228	-126.542	125.276	-73.272	138.0	-70.0	-142.136	133.024	-36.241
40	12.273	-13.434	-6.375	-14.109	256.228	-126.542	106.152	-64.848	135.0	-70.0	-142.136	133.024	-36.241
50	11.865	-10.629	-6.375	-14.109	124.806	-70.509	61.004	-40.340	135.0	-62.62	-142.136	133.024	-36.241
63	29.601	-20.928	3.142	-19.673	98.044	-61.225	69.0	-44.121	116.0	-62.62	-313.593	284.317	-68.560
80	2.109	-10.622	22.651	-31.141	98.044	-61.225	69.0	-44.121	116.0	-62.62	-486.816	437.464	-99.710
100	24.458	-25.503	20.686	-29.597	219.944	-120.249	71.953	-44.121	118.0	-62.62	-353.389	323.065	-75.272
125	57.408	-47.914	22.472	-30.101	186.370	-105.942	71.953	-44.121	112.0	-62.62	-353.389	323.065	-75.272
160	94.230	-67.135	28.596	-33.709	186.370	-105.942	41.296	-31.763	106.406	-62.62	-484.662	406.119	-90.667
200	132.851	-91.117	28.779	-34.281	186.370	-105.942	42.853	-36.963	106.406	-62.62	-200.258	166.050	-41.731

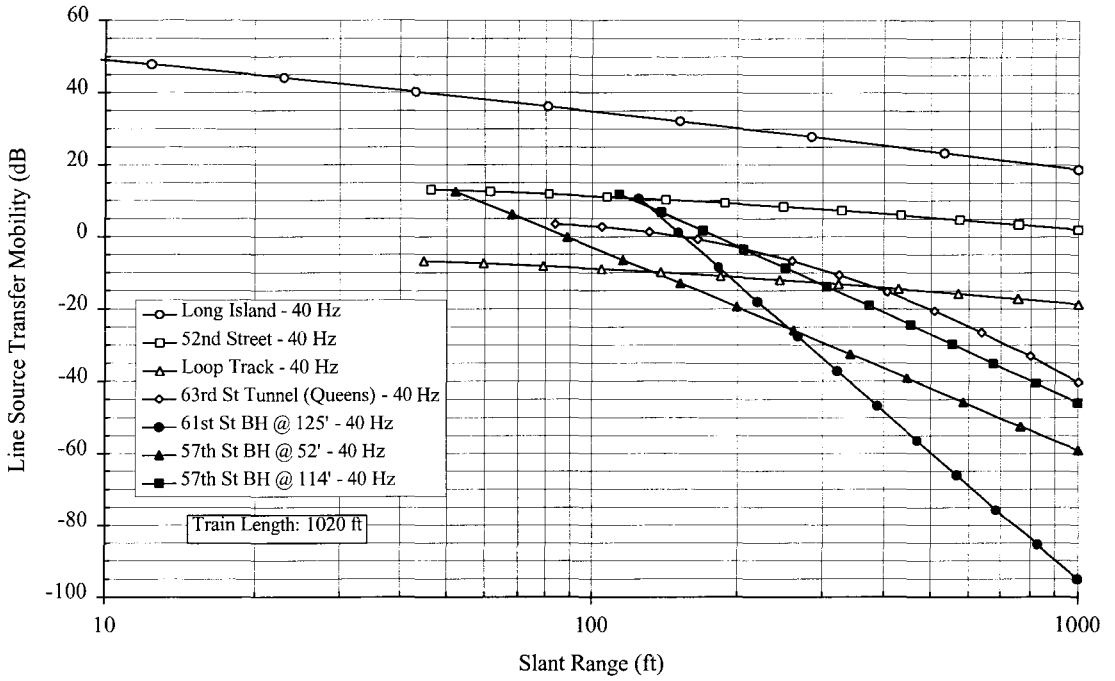


Figure B6.3: Comparison of Line Source Transfer Mobility Models - 40 Hz

jointed track, for example. Another important factor that affects the vibration level is the track support system. Rails that are rigidly supported produce more vibration than those with resilient track supports. Reference 3 states that groundborne vibrations are directly proportional to the track support modulus, so the difference in the vibration level (and hence the force density level) between two track support conditions is,

$$\Delta FDL\ (dB) = 20 \log(\frac{k_1}{k_2}), \qquad (B9)$$

where k_1/k_2 is the ratio of the two support moduli.

Because the Long Island force density test was done with a tie on ballast support system, while the project will use direct fixation on concrete, a track support correction was introduced to account for the differences in the track support modulus. According to Reference 3, the difference between direct fixation and tie on ballast track supports is approximately 17 dB. However, recent test data from the Bay Area Rapid Transit system (BART) has indicated that tie on ballast is stiffer than first thought and a 7 dB correction is more appropriate. A 7 dB correction has been used for the present project.

A simple analytical model can be used to show that the relationship of Equation B9 only holds above the primary resonance associated with the wheel truck mass and the driving point impedance of the rail. The BART data suggests that this characteristic frequency is around 20 Hz. In the present study, 7 dB has been added only for frequencies of 20 Hz and above.

6.5 Building Vibration Response Corrections

The Manhattan and Queens transfer mobility measurements were made with respect to vibration levels at street level, not in specific buildings. A building's response to vibration depends on three principal factors; 1) how efficiently ground vibration is transferred to the building foundation (termed the coupling loss), 2) amplification due to structural resonances of the floor, walls and ceiling, and 3) vibration attenuation for higher floors in the building.

The FTA[1] manual provides standard building coupling loss factors that are based on the size of the building and the frequency of the vibration. Figure B6.4 shows the FTA coupling loss factors that are appropriate for buildings in the present study. The FTA factors are specified for buildings founded in soil, which is appropriate for the buildings in Queens and for smaller buildings on Manhattan. A zero coupling loss has been used for buildings on Manhattan that are five or more stories high, because, generally such buildings are founded in rock.

The floors, walls and ceilings in a building all have a characteristic resonant frequency. For wood frame buildings, the primary floor resonance will typically range from 15 Hz to 20 Hz. For concrete slab floor, the resonance will typically range from 20 Hz to 30 Hz. At frequencies near the fundamental resonance, the vibrations in the center of the floor can actually be higher than those near the supporting walls. The FTA manual recommends that 6 dB be added to the predicted vibration level in the frequency bands where a resonance is likely to occur. Because the construction methods in the study area differ, the 6 dB correction has been added to the predicted vibration spectrum between 10 Hz and 31 Hz, this is shown in Figure B6.4.

It has been conservatively assumed that the lowest occupied level of the building is on the 1st floor, hence, a floor to floor attenuation factor has not been used to adjust the predicted vibration spectra.

6.6 Groundborne Noise

The vibrating floors, walls and ceilings in a building radiate noise much like giant loudspeakers. The noise in a room can be estimated knowing the vibration velocities of the radiating surfaces and the amount of sound absorption in the room. The FTA manual states that a 0 dB radiation adjustment is appropriate for typical rooms.

Because people's perceptions of loudness depends on the frequency of the noise, an additional adjustment is made (the A weighting factor) to account for the response of the human ear. The A weight noise corrections are shown on Figure B6.4. The FTA manual gives the following formula to predict the 1/3 octave band noise levels in a room based on the vibration levels,

$$L_A = L_V + K_{A\text{-}wt}, \qquad \text{(B10)}$$

where L_A is the noise level, L_V is the vibration level and $K_{A\text{-}wt}$ is the A weighting factor.

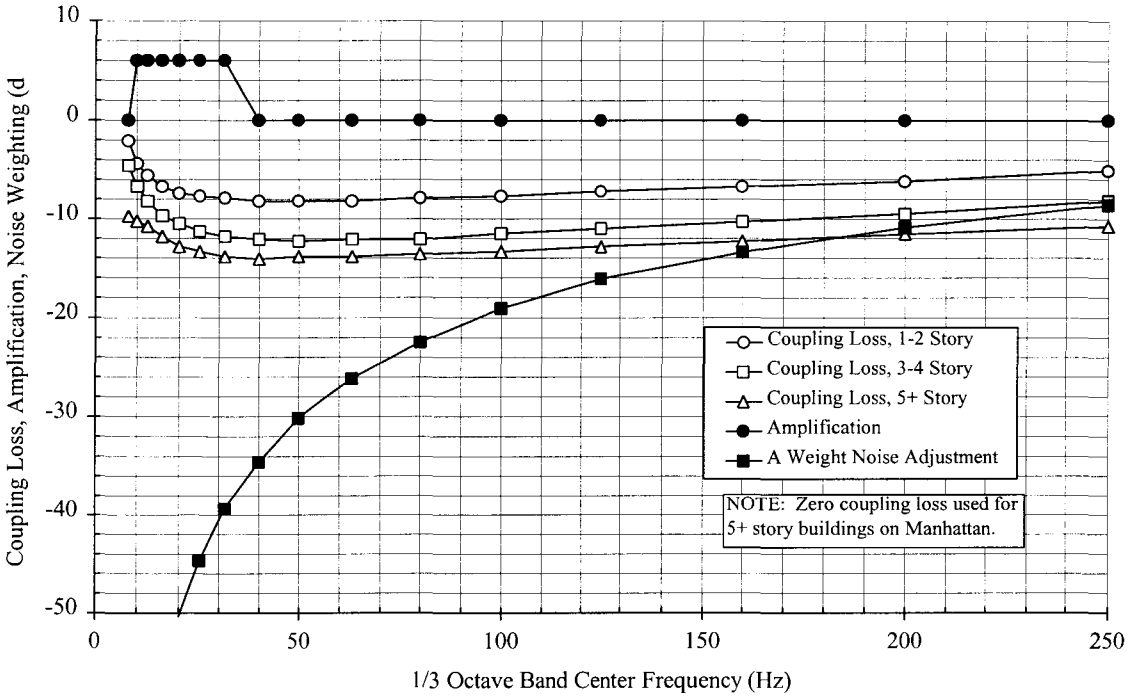


Figure B6.4 - Building Coupling, Ampliciation and Noise Weighting Factors

6.7 Overall Vibration and Noise Levels

A vibration and noise spectrum is predicted for each building in the study area. The overall vibration and noise levels are found by adding all of the 1/3 octave vibration and noise components. The addition is done as a power sum according to the formula,

$$L_{V,A}^{total} = 10\ Log\Big(\sum_{1/3\ octave\ bands} 10^{0.1*L_{V,A}^{i}}\Big), \qquad (B11)$$

where $L^{i}_{V,A}$ is the vibration and noise level in the ith 1/3 octave band.

6.8 Track Depth Corrections

On Manhattan, borehole transfer mobility data was collected for test depths of 52' (57th Street), 114' (57th Street) and 125' (61st Street). For each building, the vibration and noise level was predicted for a tunnel depth equal to each of the three reference depths. A linear interpolation procedure was then used to predict the vibrations for the actual track depth. For depths greater than 125', the data at 125' was used for the prediction. For depths shallower than 52', the linear interpolation between 52' and 114' was projected past 52'.

In Queens, only 1 test depth was measured, 84'. To extrapolate to other depths, an adjustment factor of -0.07 dB/ft was used. This factor was determined based on the predicted vibration levels in Manhattan at 52' and 114' depth, directly above the alignment (0' map range). The -0.07 dB/ft adjustment factor corresponds reasonably well to the theoretical attenuation rate of -0.17 dB/ft for Rayleigh waves in an elastic half-space.

6.9 Multiple Tracks

For Manhattan Option 1, the vibration and noise predictions were done for each track in the alignment (5 main tracks and loop track). The greatest vibration and noise levels were then used to characterize that property. In Queens and for Manhattan Option 2, a single line down the center of the alignment was used to calculate the distance from the building to the track.

6.10 Special Trackwork Corrections

The FTA manual recommends adding 10 dB to the vibration predictions for special trackwork such as crossovers. Reference 3 indicates that the 10 dB correction is appropriate for a slant distance of 30' from the track. For distances greater than 30', a r^{-1} attenuation referenced to 30' was used, where r is the slant distance.

6.11 Worn Wheels/Rails

No specific adjustment was used for worn wheels and rails. However, the peak hold spectral analyses for the Long Island test typically gave total vibration levels that were 5 dB higher than the corresponding RMS values. This 5 dB "safety factor" was retained in the analysis to account for future worn wheels/rail.

6.12 Prediction Procedure Flow Chart

Figure B6.5 depicts the steps that were taken to generate the estimated vibration and noise levels.

Building Data

In the GIS database, a point was placed at the approximate geometric center of each building in the study area. This point was used to calculate the distances to each of the tracks and to the trackwork locations. Each point carried the unique property ID associated to it in the database. The unique ID was used to lookup the number of stories and the building classification in the GIS database.

Track Iteration Loop

The following steps were taken for each track in the database. This was particularly necessary in Manhattan because of the complex routing of the alignment for Option 1.

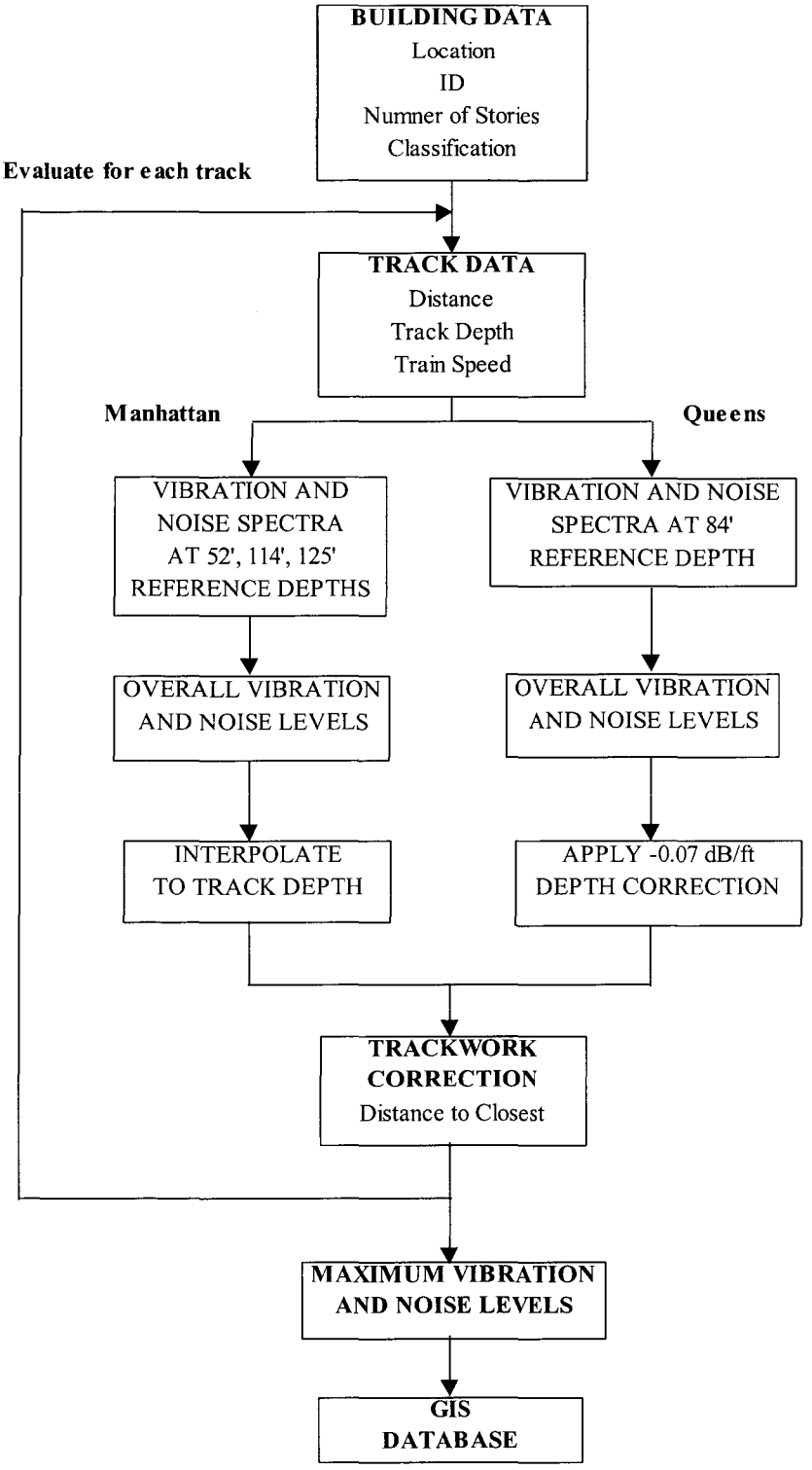


FIGURE B6.5: Groundborne Vibration and Noise Prediction Procedure

Track Data

The track routings in the database were first broken up into small segments where each segment was assigned a depth and train speed. The GIS program was then used to calculate the map distance to the closest track segment for the particular track being analyzed. The GIS program also recorded the track depth and the train speed.

Vibration Level

The predicted ground vibration spectrum was calculated using the line source transfer mobility models and the force density spectrum corresponding to the train speed.

On Manhattan, the vibration spectra were calculated for the three reference depths (52', 114' and 125') using the calculated map range from the GIS. The vibration spectra were corrected for building coupling and amplification. The noise spectra were calculated from the vibration spectra using the A weighting factors. The overall vibration and noise levels were then calculated for each reference depth by summing the contributions from the individual 1/3 octave bands. The vibration and noise levels for the property (for the actual track depth) were then calculated by interpolating between the reference levels. For track depths less than 114', the vibration and noise levels at 52' and 114' were used for the interpolation; for depths between 114' and 125', the levels at 114' and 125' were used; and, for depths greater than 125', the vibration and noise levels at the 125' depth were used.

In Queens, the vibration and noise spectra were calculated for an 84' track depth using the map range from the GIS. The 1/3 octave band levels were then combined into overall vibration and noise levels which were then corrected by –0.07 dB/ft to account for the difference between the track depth and the reference depth.

Trackwork Correction

The locations of special trackwork were identified in the GIS as points. The GIS program was then used to calculate the map distance to the closest trackwork site for each property. Based on the map distance to the trackwork and the depth of the track, an adjustment was made based on +10 dB at a 30' reference distance.

Maximum Vibration Level

For each of the tracks in the alignment, the greatest vibration and noise levels were selected as the overall groundborne vibration and noise levels for the property.

GIS Database

The groundborne vibration and noise predictions were re-attached to the GIS database for presentation.

7 COMPARISON - PREDICTED VIBRATION LEVELS AND MEASURED DATA

During the transfer mobility testing in Queens, the vibrations from a number of subway passes were recorded. At the Queens test location, the subway tracks are supported on the roof of the LIRR tunnel.

Figure B7.1 shows the predicted vibration spectrum directly above the tunnel using the LIRR model. The spectrum corresponds to a tunnel depth of 84' and a train speed of 30 mph. No corrections were made for building coupling. The second curve is the actual vibration spectrum that was measured when a subway passed the Queens test location. This spectrum was measured by the 0' sensor that was located directly above the tunnel. The predicted and measured vibration levels are comparable, however, the measured data has more low frequency energy. This is most likely an artifact of the support structure. The subway structure has a characteristic resonance, at which the subway train vibrations are actually amplified. Above the resonance, the structure tends to attenuate the vibrations. The third curve on Figure B7.1 shows the vibration spectrum that was measured near the MBTA's Red Line in Boston. This spectrum was measured for a comparable train speed, at a comparable tunnel depth. As can be seen from this figure, the MBTA data has much more high frequency content, which supports the premise that the lack of high frequency energy in the Queens subway spectrum is likely caused by the track support structure. Comparison of the MBTA spectrum with the TM Model predictions indicates good agreement up to about 150 Hz, lending credence to the LIRR predictions.

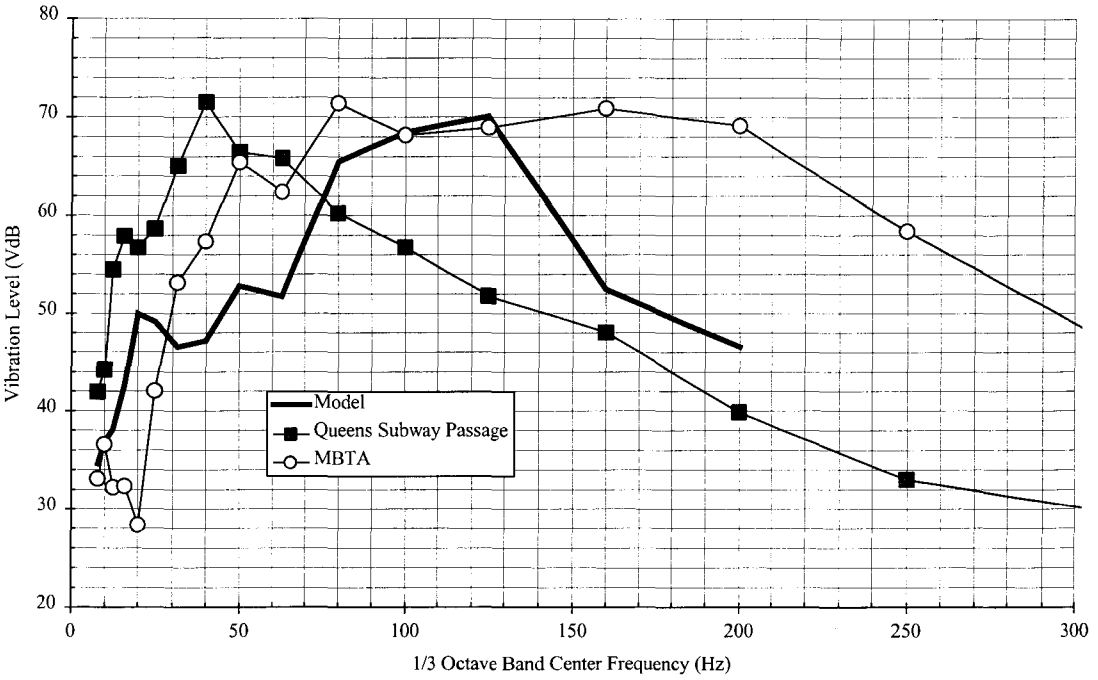


Figure B7.1: Predicted and Measured Vibration Spectra in Queens

Appendix G: Natural Resources

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

April 13, 1999

Mr. John Ferguson
Division of Environmental Permits
New York State Department of Environmental Conservation
Region 2
Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101

RE: Long Island Rail Road East Side Access Project EIS

Dear Mr. Ferguson:

I am writing to request information about any permit applications or consultation with the NYS DEC that may be required for this project. The East Side Access study includes six study areas located in New York, Bronx, and Queens Counties, New York that may be affected by the proposed project. The study areas are depicted on the enclosed applicable portions of the Central Park and Brooklyn, New York USGS topographical quadrangles and are labeled as follows:

1. Manhattan - Tunnel to Grand Central Terminal
2. Bronx - Highbridge Yard
3. Queens - Sunnyside Yard/Yard A
4. Queens - Maspeth Yard
5. Queens - Blissville Yard
6. Queens - Fresh Pond Yard

Proposed activities include excavation in the Grand Central and Sunnyside Yard/Yard A areas, and construction or expansion of existing railyards in the remaining four study areas.

We would appreciate a response from your department stating whether permitting is required for this scope of work. If permitting, is required, please include details of the requirements in your response. If we receive no response we shall assume that no permitting or consultation is required with the New York State Department of Environmental Conservation for this project.

Sincerely,
AKRF, INC.

Cara E. Lindsley
Environmental Analyst

New York State Department of Environmental Conservation
Division of Fish, Wildlife & Marine Resources
Wildlife Resources Center – New York Natural Heritage Program
700 Troy-Schenectady Road, Latham, New York 12110-2400
Phone: (518) 783-3932 FAX: (518) 783-3916

John P. Cahill
Commissioner

April 26, 1999

Cara E. Lindsley
AKRF Inc. Environmental Consultants
117 E. 29th St.
New York City, NY 10016-8022

Dear Ms. Lindsley:

We have reviewed the New York Natural Heritage Program files with respect to your recent request for biological information concerning the proposed Long Island Rail Road East Side Access Project EIS, 6 study sites, areas as indicated on your enclosed maps, located in Manhattan, Bronx and Queens, New York City.

Enclosed is a computer printout covering the area you requested to be reviewed by our staff. The information contained in this report is considered sensitive and may not be released to the public without permission from the New York Natural Heritage Program.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our databases. We cannot provide a definitive statement on the presence or absence of all rare or state-listed species or significant natural communities. This information should not be substituted for on-site surveys that may be required for environmental impact assessment.

Our databases are continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

This response applies only to known occurrences of rare or state-listed animals and plants, of significant natural communities, and of other significant habitats. For information regarding regulated areas or permits that may be required under state law (e.g., regulated wetlands), please contact the appropriate NYS DEC Regional Office, Division of Environmental Permits, at the enclosed address.

Sincerely,

Teresa Mackey jp

Teresa Mackey, Information Services
NY Natural Heritage Program

Encs
cc: Reg. 2, Wildlife Mgr.
Peter Nye, Endangered Species Unit, Delmar

NATURAL HERITAGE REPORT on RARE SPECIES and ECOLOGICAL COMMUNITIES

Prepared 21 APR 1999 by NY Natural Heritage Program, NYS DEC, Latham, New York.

Records with a PRECISION value of "S" are known to be in a location which may be impacted by the proposed action.
Records with a PRECISION value of "M" may possibly occur within the project area in appropriate habitat.
This report contains SENSITIVE information which should be treated in a sensitive manner -- Please see cover letter.

REFER TO THE USERS GUIDE FOR EXPLANTIONS OF CODES, RANKS, AND FIELDS.

* LOCATION SCIENTIFIC NAME & Common Name	NY LEGAL STATUS & HERITAGE RANK	FEDERAL STATUS	PRECISION & ACRES	EORANK & LAST SEEN	GENERAL HABITAT AND QUALITY	TOWN(S) & DETAILED LOCATION	USGS TOPO QUAD LAT & LONG	OFFICE USE
* GLENDALE								
STROPHOSTYLES UMBELLATA Pink wild bean VASCULAR PLANT	UNPROTECTED G5 SH		M	H 1911		CITY OF NEW YORK. GLENDALE.	JAMAICA 40 42 15 N 73 52 18 W	4007367 20
* MET LIFE BUILDING								
FALCO PEREGRINUS Peregrine falcon BIRD	ENDANGERED G4 S2	E(S/A)	S	E 1998	SKYSCRAPER LEDGE.	CITY OF NEW YORK. MET LIFE BUILDING, 200 PARK AVENUE. NEST ON 57TH FLOOR OF MET LIFE BUILDING, SOUTH FACADE TO LEFT OF SIGN.	CENTRAL PARK 40 45 08 N 73 58 42 W	4007378 35 ESU

2 Records Processed

USERS GUIDE TO NY NATURAL HERITAGE DATA

New York Natural Heritage Program, 700 Troy-Schenectady Road, Latham NY 12110-2400 phone: (518) 783-3932

NATURAL HERITAGE PROGRAM: The Natural Heritage Program is an ongoing, systematic, scientific inventory whose goal is to compile and maintain d on the rare plants and animals native to New York State, and significant ecological communities. The data provided in the report facilitate sound planni conservation, and natural resource management and help to conserve the plants, animals and ecological communities that represent New York's natural herita

DATA SENSITIVITY: The data provided in the report are ecologically sensitive and should be treated in a sensitive manner. The report is for your in-hou use and should not be released, distributed or incorporated in a public document without prior permission from the Natural Heritage Program.

NATURAL HERITAGE REPORTS (may contain any of the following types of data):

COUNTY NAME: County where the occurrence of a rare species or significant ecological community is located.

TOWN NAME: Town where the occurrence of a rare species or significant ecological community is located.

USGS 7 ½' TOPOGRAPHIC MAP: Name of 7.5 minute US Geological Survey (USGS) quadrangle map (scale 1:24,000).

LAT: Centrum latitude coordinate of the location of the occurrence. Caution: latitude & longitude must be used with PRECISION (e.g. the location of a occurrence with M (minute) precision is not precisely known & is thought to occur within a 1.5 mile radius of the latitude/longitude coordinates).

LONG: Centrum longitude coordinate of the location of the occurrence. See also LAT above.

PRECISION: S - seconds: location known precisely. (within a 300' or 1-second radius of the latitude and longitude given.
M - minutes: location known only to within a 1.5 mile (1 minute) radius of the latitude and longitude given.
G - general: location known to within a 5 mile radius of the latitude and longitude given.

SIZE (acres): Approximate acres occupied by the rare species or significant ecological community at this location.

SCIENTIFIC NAME: Scientific name of the occurrence of a rare species or significant ecological community.

COMMON NAME: Common name of the occurrence of a rare species or significant ecological community.

ELEMENT TYPE: Type of element (i.e. plant, animal, significant ecological community, other, etc.)

LAST SEEN: Year rare species or significant ecological community last observed extant at this location.

EO RANK: Comparative evaluation summarizing the quality, condition, viability and defensibility of this occurrence. Use with LAST SEEN and PRECISION.
A-E = Extant: A=excellent, B=good, C=marginal, D=poor, E=extant but with insufficient data to assign a rank of A - D.
F = Failed to find. Did not locate species, but habitat is still there and further field work is justified.
H = Historical. Historical occurrence without any recent field information.
X = Extirpated. Field/other data indicates element/habitat is destroyed and the element no longer exists at this location.
? = Unknown.
Blank = Not assigned.

NEW YORK STATE STATUS (animals): Categories of Endangered and Threatened species are defined in New York State Environmental Conservation Law section 11-0535. Endangered, Threatened, and Special Concern species are listed in regulation 6NYCRR 182.5.

E = Endangered Species: any species which meet one of the following criteria:
1) Any native species in imminent danger of extirpation or extinction in New York.
2) Any species listed as endangered by the United States Department of the Interior, as enumerated in the Code of Federal Regulations 50 CFR 17.11.

T = Threatened Species: any species which meet one of the following criteria:
1) Any native species likely to become an endangered species within the foreseeable future in NY.
2) Any species listed as threatened by the U.S. Department of the Interior, as enumerated in the Code of the Federal Regulations 50 CFR 17.11.

SC = Special Concern Species: those species which are not yet recognized as endangered or threatened, but for which documented concern exists for their continued welfare in New York. Unlike the first two categories, species of special concern receive no additional legal protection under Environmental Conservation Law section 11-0535 (Endangered and Threatened Species).

P = Protected Wildlife (defined in Environmental Conservation Law section 11-0103): wild game, protected wild birds, and endangered species of wildlife.

U = Unprotected (defined in Environmental Conservation Law section 11-0103): the species may be taken at any time without limit; however a license to take may be required.

G = Game (defined in Environmental Conservation Law section 11-0103): any of a variety of big game or small game species as stated in the Environmental Conservation Law; many normally have an open season for at least part of the year, and are protected at other times.

NEW YORK STATE STATUS (plants): The following categories are defined in regulation 6NYCRR part 193.3 and apply to NYS Environmental Conservation Law section 9-1503.

(blank) = no state status

E = Endangered Species: listed species are those with:
1) 5 or fewer extant sites, or
2) fewer than 1,000 individuals, or
3) restricted to fewer than 4 U.S.G.S. 7 ½ minute topographical maps, or
4) species listed as endangered by U.S. Department of Interior, as enumerated in Code of Federal Regulations 50 CFR 17.11.

T = Threatened: listed species are those with:
1) 6 to fewer than 20 extant sites, or
2) 1,000 to fewer than 3,000 individuals, or
3) restricted to not less than 4 or more than 7 U.S.G.S. 7 and ½ minute topographical maps, or
4) listed as threatened by U.S. Department of Interior, as enumerated in Code of Federal Regulations 50 CFR 17.11.

R = Rare: listed species have:
1) 20 to 35 extant sites, or
2) 3,000 to 5,000 individuals statewide.

U = Unprotected

V = Exploitably vulnerable: listed species are likely to become threatened in the near future throughout all or a significant portion of their range within the state if causal factors continue unchecked.

NEW YORK STATE STATUS (communities): At this time there are no categories defined for communities.

continued on next page

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL PERMITS REGIONAL OFFICES

REGION	COUNTIES	NAME	ADDRESS AND PHONE NO.
Region 1	Nassau Suffolk	Robert Greene Permit Administrator	Loop Road, Bldg. 40 SUNY Stony Brook, NY 11790-2356 (516) 444-0365
Region 2	New York City	George Danskin Permit Administrator	Hunters Point Plaza 4740 21st Street Long Island City, NY 11101-5407 (718) 482-4997
Region 3	Dutchess Orange Putnam Rockland, Sullivan Ulster, Westchester	Margaret Duke Permit Administrator	21 South Putt Corners Road New Paltz, NY 12561-1696 (914) 256-3059
Region 4	Albany Columbia Delaware Greene, Montgomery, Otsego Rensselaer, Schenectady, Schoharie	William J. Clarke Permit Administrator	1150 N. Westcott Road Schenectady, NY 12306-2014 (518) 357-2234
Region 5	Clinton Essex Franklin Fulton, Hamilton Saratoga, Warren, Washington	Richard Wild Permit Administrator	Route 86 Ray Brook, NY 12977 (518) 897-1234
Region 6	Herkimer Jefferson Lewis Oneida, St. Lawrence	Randy Vaas Permit Administrator	State Office Building 317 Washington Street Watertown, NY 13601 (315) 785-2246
Region 7	Broome Cayuga Chenango Cortland, Madison, Onondaga Oswego, Tioga, Tompkins	Ralph Manna, Jr. Permit Administrator	615 Erie Blvd. West Syracuse, NY 13204-2400 (315) 426-7439
Region 8	Chemung Genesee Livingston Monroe, Ontario, Orleans Schuyler, Seneca, Steuben Wayne, Yates	Albert Butkas Permit Administrator	6274 East Avon-Lima Road Avon, NY 14414 (716) 226-2466
Region 9	Allegany Cattaraugus Chautauqua Erie, Niagara, Wyoming	Steven Doleski Permit Administrator	270 Michigan Avenue Buffalo, NY 14203-2999 (716) 851-7165

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

April 13, 1999

Mr. Mike Stoll
U.S. Department of the Interior
Fish & Wildlife Service
3817 Luker Road
Cortland, NY 13045

RE: Long Island Rail Road East Side Access Project EIS

Dear Mr. Stoll:

I am writing to request information from your files concerning threatened and endangered species and significant ecological communities for the above-referenced project. The East Side Access study includes six study areas located in New York, Bronx, and Queens Counties, New York that may be affected by the proposed project. The study areas are depicted on the enclosed applicable portions of the Central Park and Brooklyn, New York USGS topographical quadrangles and are labeled as follows:

1. Manhattan - Tunnel to Grand Central Terminal
2. Bronx - Highbridge Yard
3. Queens - Sunnyside Yard/Yard A
4. Queens - Maspeth Yard
5. Queens - Blissville Yard
6. Queens - Fresh Pond Yard

We would appreciate a review of all threatened and endangered species and significant ecological communities within the study areas that are identified on the enclosed maps. Locations that may contain rare species or significant ecological communities will be identified and mitigation measures will be suggested for any impacts the project may have on sensitive areas.

Sincerely,
AKRF, INC.

Cara E. Lindsley

Cara E. Lindsley
Environmental Analyst

Faxed 5/13/99

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 Luker Road
Cortland, NY 13045

May 13, 1999

Ms. Cara E. Lindsley
Environmental Analyst
AKRF, Inc., Environmental Consultants
117 East 29th Street
New York, NY 10016-8022

Dear Ms. Lindsley:

This responds to your letter of April 13, 1999, requesting information on the presence of endangered or threatened species in the vicinity of the following Long Island Railroad East Side Access Study locations:

1. The Tunnel to Grand Central Terminal in the Borough of Manhattan, New York County, New York.

2. The Highbridge Railroad Yard in the Borough of Bronx, Bronx County, New York.

3. The Sunnyside Railroad Yard/Yard A in the Borough of Queens, Queens County, New York.

4. The Maspeth Railroad Yard in the Borough of Queens, Queens County, New York.

5. The Blissville Railroad Yard in the Borough of Queens, Queens County, New York.

6. The Fresh Pond Railroad Yard in the Borough of Queens, Queens County, New York.

The peregrine falcon (*Falco peregrinus*) is a Federally listed endangered species known to occur in the vicinity of locations 1 through 3 above, and may be found in the surrounding area. This project's environmental documents should, therefore, include an evaluation of the potential direct, indirect, and cumulative effects of specific project-related activities on the peregrine falcon or its habitat, and include appropriate measures, if necessary, to protect this species and its habitat. When specific plans are identified, the plans and the results of the evaluation should be provided to this office to determine the need for further consultation pursuant to Section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

Except for the peregrine falcon, and occasional transient individuals, no other Federally listed or proposed endangered or threatened species under our jurisdiction are known to exist in the respective project impact areas. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered. A compilation of Federally listed and proposed endangered and threatened species in New York is enclosed for your information.

The above comments pertaining to endangered species under our jurisdiction are provided pursuant to the Endangered Species Act. This response does not preclude additional U.S. Fish and Wildlife Service (Service) comments under the Fish and Wildlife Coordination Act or other legislation.

Federally listed endangered and threatened marine species may be found near the project area. These species are under the jurisdiction of the National Marine Fisheries Service. You should contact Mr. Stanley Gorski, Habitat and Protected Resources Division, Area Coordinator, National Marine Fisheries Service, James J. Howard Marine Sciences Laboratory, 74 Magruder Road, Highlands, NJ 07732, for additional information (telephone: [908] 872-3037).

This species is also listed as endangered by the State of New York. The results of the evaluations discussed above should be coordinated with both this office and with the New York State Department of Environmental Conservation. The State contact for the peregrine falcon is Mr. Peter Nye, Endangered Species Unit, Wildlife Resources Center, Delmar, NY 12054-9767 (telephone: [518] 439-7635).

For additional information on fish and wildlife resources or State-listed species, we suggest you contact:

New York State Department
of Environmental Conservation
Region 2
47-40 21st Street
Long Island City, NY 11101
(718) 482-4900

New York State Department
of Environmental Conservation
Wildlife Resources Center - Information Services
New York Natural Heritage Program
700 Troy-Schenectady Road
Latham, NY 12110-2400
(518) 783-3932

National Wetlands Inventory (NWI) maps may or may not be available for the respective project areas. However, while the NWI maps are reasonably accurate, they should not be used in lieu of field surveys for determining the presence of wetlands or delineating wetland boundaries for Federal regulatory purposes. Copies of specific NWI maps can be obtained from:

Cornell Institute for Resource Information Systems
302 Rice Hall
Cornell University
Ithaca, NY 14853
(607) 255-4864

Work in certain waters and wetlands of the United States may require a permit from the U.S. Army Corps of Engineers (Corps). If a permit is required, in reviewing the application pursuant to the Fish and Wildlife Coordination Act, the Service may concur, with or without stipulations, or recommend denial of the permit depending upon the potential adverse impacts on fish and wildlife resources associated with project implementation. The need for a Corps permit may be determined by contacting Mr. Joseph Seebode, Chief, Regulatory Branch, U.S. Army Corps of Engineers, 26 Federal Plaza, New York, NY 10278 (telephone: [212] 264-3996).

If you require additional information please contact Michael Stoll at (607) 753-9334.

Sincerely,

Mark W. Clough

ACTING FOR

David A. Stilwell
Acting Field Supervisor

Enclosure

cc: NYSDEC, Long Island City, NY (Environmental Permits)
NYSDEC, Latham, NY
NYSDEC, Delmar, NY (Attn: P. Nye)
NMFS, Highlands, NJ (Attn: S. Gorski)
NMFS, Milford, CT (Attn: M. Ludwig)
EPA, Div. of Environmental Planning & Protection, New York, NY
COE, New York, NY

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES IN NEW YORK

Common Name	Scientific Name	Status	Distribution
FISHES			
Sturgeon, shortnose*	*Acipenser brevirostrum*	E	Hudson River & other Atlantic coastal rivers
REPTILES			
Turtle, bog	*Clemmys muhlenbergii*	T	Albany, Columbia, Dutchess, Genesee, Orange, Oswego, Putnam, Seneca, Ulster, Wayne, and Westchester Counties
Turtle, green*	*Chelonia mydas*	T	Oceanic summer visitor coastal waters
Turtle, hawksbill*	*Eretmochelys imbricata*	E	Oceanic summer visitor coastal waters
Turtle, leatherback*	*Dermochelys coriacea*	E	Oceanic summer resident coastal waters
Turtle, loggerhead*	*Caretta caretta*	T	Oceanic summer resident coastal waters
Turtle, Atlantic ridley*	*Lepidochelys kempii*	E	Oceanic summer resident coastal waters
BIRDS			
Eagle, bald	*Haliaeetus leucocephalus*	T	Entire state
Falcon, peregrine	*Falco peregrinus*	E	Entire state - re-establishment to former breeding range in progress
Plover, piping	*Charadrius melodus*	E	Great Lakes Watershed
		T	Remainder of coastal New York
Tern, roseate	*Sterna dougallii dougallii*	E	Southeastern coastal portions of state
MAMMALS			
Bat, Indiana	*Myotis sodalis*	E	Entire state
Cougar, eastern	*Felis concolor couguar*	E	Entire state - probably extinct
Whale, blue*	*Balaenoptera musculus*	E	Oceanic
Whale, finback*	*Balaenoptera physalus*	E	Oceanic
Whale, humpback*	*Megaptera novaeangliae*	E	Oceanic
Whale, right*	*Eubalaena glacialis*	E	Oceanic
Whale, sei*	*Balaenoptera borealis*	E	Oceanic
Whale, sperm*	*Physeter catodon*	E	Oceanic
MOLLUSKS			
Snail, Chittenango ovate amber	*Succinea chittenangoensis*	T	Madison County
Mussel, dwarf wedge	*Alasmidonta heterodon*	E	Orange County - lower Neversink River

* Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service.

Region 5 - 11/04/97 - 2 pp.

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES IN NEW YORK (Cont'd)

Common Name	Scientific Name	Status	Distribution
BUTTERFLIES			
Butterfly, Karner blue	*Lycaeides melissa samuelis*	E	Albany, Saratoga, Warren, and Schenectady Counties
PLANTS			
Monkshood, northern wild	*Aconitum noveboracense*	T	Ulster, Sullivan, and Delaware Counties
Pogonia, small whorled	*Isotria medeoloides*	T	Entire state
Swamp pink	*Helonias bullata*	T	Staten Island - presumed extirpated
Gerardia, sandplain	*Agalinis acuta*	E	Nassau and Suffolk Counties
Fern, American hart's-tongue	*Asplenium scolopendrium* var. *americana*	T	Onondaga and Madison Counties
Orchid, eastern prairie fringed	*Platanthera leucophea*	T	Not relocated in New York
Bulrush, northeastern	*Scirpus ancistrochaetus*	E	Not relocated in New York
Roseroot, Leedy's	*Sedum integrifolium* ssp. *Leedyi*	T	West shore of Seneca Lake
Amaranth, seabeach	*Amaranthus pumilus*	T	Atlantic coastal plain beaches
Goldenrod, Houghton's	*Solidago houghtonii*	T	Genesee County

E=endangered T=threatened P=proposed

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

April 13, 1999

Ms. Diane Rusanowsky
National Marine Fisheries Service
Habitat Conservation Division
212 Rogers Avenue
Milford, CT 06460

RE: Long Island Rail Road East Side Access Project EIS

Dear Ms. Rusanowsky:

I am writing to request information from your files concerning endangered and threatened marine species for the above-referenced project. The East Side Access study includes six study areas located in New York, Bronx, and Queens Counties, New York that may be affected by the proposed project. The study areas are depicted on the enclosed applicable portions of the Central Park and Brooklyn, New York USGS topographical quadrangles and are labeled as follows:

1. Manhattan - Tunnel to Grand Central Terminal
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3. Queens - Sunnyside Yard/Yard A
4. Queens - Maspeth Yard
5. Queens - Blissville Yard
6. Queens - Fresh Pond Yard

Several areas on Long Island will also potentially be impacted by the proposed project as a consequence of parking expansion and will be determined later in the study.

We would appreciate a review of all Federally listed threatened and endangered species within the study areas that are identified on the enclosed maps. Locations that may contain rare species or significant ecological communities will be identified and mitigation measures will be suggested for any impacts the project may have on sensitive areas.

Sincerely,
AKRF, INC.

Cara E Lindsley

Cara E. Lindsley
Environmental Analyst

c. Mr. Stanley Gorski, NMFS

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

April 13, 1999

Ms. Jean Petrusiak
Information Services
New York Natural Heritage Program
Wildlife Resources Center
700 Troy-Schenectady Road
Latham, NY 12110-2400

RE: Long Island Rail Road East Side Access Project EIS

Dear Ms. Petrusiak:

I am writing to request information from your files concerning rare plants, rare animals, and significant ecological communities for the above-referenced project. The East Side Access study includes six study areas located in New York, Bronx, and Queens Counties, New York that may be affected by the proposed project. The study areas are depicted on the enclosed applicable portions of the Central Park and Brooklyn, New York USGS topographical quadrangles and are labeled as follows:

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2. Bronx - Highbridge Yard
3. Queens - Sunnyside Yard/Yard A
4. Queens - Maspeth Yard
5. Queens - Blissville Yard
6. Queens - Fresh Pond Yard

We would appreciate a review of all rare plants, rare animals, and significant ecological communities within the study areas that are identified on the enclosed maps. Locations that may contain rare species or significant ecological communities will be identified and mitigation measures will be suggested for any impacts the project may have on sensitive areas.

Sincerely,
AKRF, INC.

Cara E Lindsley

Cara E. Lindsley
Environmental Analyst

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

April 13, 1999

Joseph Pane
Fish and Wildlife Division
New York State Department of Environmental Conservation
Region 2
Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101

RE: Long Island Rail Road East Side Access Project EIS

Dear Mr. Pane:

I am writing to request information from your files concerning rare plants, rare animals, and significant ecological communities for the above-referenced project. The East Side Access study includes six study areas located in New York, Bronx, and Queens Counties, New York that may be affected by the proposed project. The study areas are depicted on the enclosed applicable portions of the Central Park and Brooklyn, New York USGS topographical quadrangles and are labeled as follows:

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We would appreciate a review of all threatened and endangered species and significant ecological communities within the study areas that are identified on the enclosed maps. Locations that may contain rare species or significant ecological communities will be identified and mitigation measures will be suggested for any impacts the project may have on sensitive areas.

Sincerely,
AKRF, INC.

Cara E Lindsley

Cara E. Lindsley
Environmental Analyst

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

April 13, 1999

Mr. Joseph Seebode
Regulatory Branch
U.S. Army Corps of Engineers
26 Federal Plaza
New York, NY 10278

RE: Long Island Rail Road East Side Access Project EIS

Dear Mr. Seebode:

I am writing to request information concerning any permit applications or consultation that may be required with the Corps of Engineers for the above-referenced project. The East Side Access study includes six study areas located in New York, Bronx, and Queens Counties, New York that will be affected by the proposed project. The study areas are depicted on the enclosed applicable portions of the Central Park and Brooklyn, New York USGS topographical quadrangles and are labeled as follows:

1. Manhattan - Grand Central Terminal
2. Bronx - Highbridge Yard
3. Queens - Sunnyside Yard/Yard A
4. Queens - Maspeth Yard
5. Queens - Blissville Yard
6. Queens - Fresh Pond Yard

Proposed activities include excavation in the Grand Central Terminal and Sunnyside Yard/Yard A areas, and construction or expansion of existing railyards in the remaining four study areas.

We would appreciate a response from your department stating whether permitting is required for this scope of work. If permitting is required for this project, please include details of wetland areas within the five boroughs of New York City where this type of work would require such a permit.

If we receive no response from your department we shall assume that no permitting or consultation is required with the Corps of Engineers for this project.

Sincerely,
AKRF, INC.

Cara E Lindsley

Cara E. Lindsley
Environmental Analyst

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

March 6, 2000

Joseph Pane
Fish and Wildlife Division
New York State Department of Environmental Conservation
Region 2
Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101

RE: East Side Access Project EIS

Dear Mr. Pane:

I am writing to request information from your files concerning rare plants, rare animals, and significant ecological communities for the above-referenced project. The East Side Access study includes seven study areas located in Nassau and Suffolk Counties, New York that may be affected by the proposed project. The study areas are depicted on the enclosed applicable portions of the appropriate New York USGS topographical quadrangles and are labeled as follows:

1. Cerro Wire- Hicksville and Huntington Quadrangles
2. Hazelton- Greenlawn and Huntington Quadrangles
3. Deer Park- Greenlawn Quadrangle
4. Riverhead- Riverhead Quadrangle
5. Yaphank- Bellport Quadrangle
6. Babylon- Bay Shore West Quadrangle
7. Ronkonkoma- Patchogue Quadrangle

We would appreciate a review of all threatened and endangered species and significant ecological communities within the study areas that are identified on the enclosed maps. Locations that may contain rare species or significant ecological communities will be identified and mitigation measures will be suggested for any impacts the project may have on sensitive areas.

Sincerely,
AKRF, INC.

Elizabeth Nemeth
Environmental Analyst

cc. ESA File
Julie Cowing, AKRF

New York State Department of Environmental Conservation
Division of Fish, Wildlife & Marine Resources
Wildlife Resources Center – New York Natural Heritage Program
700 Troy-Schenectady Road, Latham, New York 12110-2400
Phone: (518) 783-3932 FAX: (518) 783-3916

John P. Cahill
Commissioner

March 21, 2000

Elizabeth A. Nemeth
AKRF, Inc
117 East 29th St
New York, NY 10016-8022

Dear Ms. Nemeth:

In response to your recent request, we have reviewed the New York Natural Heritage Program databases with respect to the proposed SEVEN study areas, involving some possible LIRR tunnels bringing the Railroad to the Grand Central Railroad Station, locations as indicated on the maps you provided, encompassing Suffolk and Nassau Counties.

Enclosed is a report of rare or state-listed animals and plants, significant natural communities, and other significant habitats, which our databases indicate occur, or may occur, on your site or in the immediate vicinity of your site. The information contained in this report is considered sensitive and may not be released to the public without permission from the New York Natural Heritage Program.

For most sites, comprehensive field surveys have not been conducted; the enclosed report only includes records from our databases. We cannot provide a definitive statement on the presence or absence of all rare or state-listed species or significant natural communities. This information should not be substituted for on-site surveys that may be required for environmental impact assessment.

Our databases are continually growing as records are added and updated. If this proposed project is still under development one year from now, we recommend that you contact us again so that we may update this response with the most current information.

This response applies only to known occurrences of rare or state-listed animals and plants, of significant natural communities, and of other significant habitats. For information regarding regulated areas or permits that may be required under state law (e.g., regulated wetlands), please contact the appropriate NYS DEC Regional Office, Division of Environmental Permits, at the enclosed address.

Sincerely,

Teresa Mackey

Teresa Mackey, Information Services
NY Natural Heritage Program

Encs.

cc: Reg. 1, Wildlife Mgr.
Reg. 1, Fisheries Mgr.
Peter Nye, Endangered Species Unit, Delmar

Prepared 16 March 2000 by NY Natural Heritage Program, NYS DEC, Latham, New York

Records with a Precision value of "S" or with a blank Precision are known to be in a location that may be impacted by the proposed action.
Records with a Precision value of "M" may possibly occur within the project area in appropriate habitat.
This report contains SENSITIVE information that should be treated in a sensitive manner -- Please see cover letter.
Refer to the Users' Guide for explanations of codes, ranks, and fields.

* County ** Town Scientifc Name, COMMON NAME, & Group Name	NY Legal Status & Heritage Ranks	Federal Status	Precision & Acreage	EO Rank & Last Seen	General Habitat and Quality	Detailed Location	USGS Topo Quad Lat & Long	Office Use
* SUFFOLK								
** RIVERHEAD								
Sporobolus clandestinus ROUGH RUSH-GRASS Vascular Plant	UNPROTECTED G5 S1		M	H 1873-09-30	SANDY SOIL. ASSOCIATED SPECIES: SPOROBOLUS LONGIFOLIUS.	AQUEBOGUE	RIVERHEAD 40 56 33 N 72 37 39 W	4007286 25
** RIVERHEAD, SOUTHAMPTON								
Fimbristylis castanea MARSH FIMBRY Vascular Plant	THREATENED G5 S2		M	H 1878-08-26		RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
Liatris scariosa var novae-angliae NEW ENGLAND BLAZING-STAR Vascular Plant	RARE G5?T3 S2		M	H 1919-09	DRY SHRUB OAK GROUNDS.	RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
Juncus brachycarpus SHORT-FRUIT RUSH Vascular Plant	UNPROTECTED G4G5 S1		M	H 1943-07-06		RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
Juncus debilis WEAK RUSH Vascular Plant	THREATENED G5 S1		M	H 1894-07-03		RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
Euphorbia ipecacuanhae WILD IPECAC Vascular Plant	UNPROTECTED G5? S1		M	H 1918-08-09		RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
Arethusa bulbosa SWAMP PINK Vascular Plant	RARE G4 S2		M	H 1925-06-02	BOG. SPHAGNOUS SWAMP.	RIVERHEAD BOG NEAR RIVERHEAD. SPHAGNOUS SWAMP, RIVERHEAD.	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8

Prepared 16 March 2000 by NY Natural Heritage Program, NYS DEC, Latham, New York

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Records with a Precision value of "M" may possibly occur within the project area in appropriate habitat.
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Refer to the Users' Guide for explanations of codes, ranks, and fields.

* County ** Town Scientific Name, COMMON NAME, & Group Name	NY Legal Status & Heritage Ranks	Federal Status	Precision & Acreage	EO Rank & Last Seen	General Habitat and Quality	Detailed Location	USGS Topo Quad Lat & Long	Office Use
* SUFFOLK								
** RIVERHEAD, SOUTHAMPTON								
Aletris farinosa STARGRASS Vascular Plant	UNPROTECTED G5 S2		M	H 1949-09-01	1920: WET SANDY SHORE. 1949: DRY SANDY OPEN GROUND.	RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
Utricularia striata FIBROUS BLADDERWORT Vascular Plant	RARE G4G5 S2		M	H 1972-08-15	WARM POND EDGE. WET MUD.	RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
Gaylussacia dumosa DWARF HUCKLEBERRY Vascular Plant	UNPROTECTED G5 S1S2		M	H 1877-08-20		RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
Potamogeton pulcher SPOTTED PONDWEED Vascular Plant	UNPROTECTED G5 S2		M	H 1952-09-05	1952: IN DENSE [?] STREAM.	RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
Rumex hastatulus HEART SORREL Vascular Plant	THREATENED G5 S1		M	H 1878-07-05		RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
Onosmodium virginianum VIRGINIA FALSE GROMWELL Vascular Plant	RARE G4 S1		M	H 1927-07-15		RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
Scleria pauciflora var caroliniana FEW-FLOWERED NUTRUSH Vascular Plant	THREATENED G5T4T5 S1		M	H 1950-09-12	DRY SANDY CLEARING.	RIVERHEAD	RIVERHEAD 40 55 08 N 72 40 13 W	4007286 8
* SOUTHAMPTON								

Prepared 16 March 2000 by NY Natural Heritage Program, NYS DEC, Latham, New York

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* County ** Town Scientific Name, COMMON NAME, & Group Name	NY Legal Status & Heritage Ranks	Federal Status	Precision & Acreage	EO Rank & Last Seen	General Habitat and Quality	Detailed Location	USGS Topo Quad Lat & Long	Office Use
* SUFFOLK								
** SOUTHAMPTON								
Cicindela patruela consentanea A TIGER BEETLE Beetle	UNPROTECTED G3T2 SH		M	H 1946-05-20		FLANDERS	RIVERHEAD 40 54 26 N 72 37 57 W	4007286 58
** SOUTHAMPTON, RIVERHEAD								
Utricularia juncea RUSH BLADDERWORT Vascular Plant	RARE G5 S2		M	H 1921-09-19	PINE BARREN SWAMP.	FLANDERS PINE BARREN SWAMP, FLANDERS.	RIVERHEAD 40 55 04 N 72 37 35 W	4007286 24
Sphenopholis pensylvanica SWAMP OATS Vascular Plant	UNPROTECTED G4 S1		M	H 1925-05-31		FLANDERS	RIVERHEAD 40 55 04 N 72 37 35 W	4007286 24

25 Records Processed

Natural Heritage Report on Rare Species and Ecological Communities

Yaphank Site

Prepared 16 March 2000 by NY Natural Heritage Program, NYS DEC, Latham, New York

Records with a Precision value of "S" or with a blank Precision are known to be in a location that may be impacted by the proposed action.
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Refer to the Users' Guide for explanations of codes, ranks, and fields.

* County ** Town Scientific Name, COMMON NAME, & Group Name	NY Legal Status & Heritage Ranks	Federal Status	Precision & Acreage	EO Rank & Last Seen	General Habitat and Quality	Detailed Location	USGS Topo Quad Lat & Long	Office Use
* SUFFOLK								
** BROOKHAVEN								
Erynnis persius persius PERSIUS DUSKYWING Butterfly/Skipper	ENDANGERED G5T2T3 SH		M	H XXXX-05-17		YAPHANK	BELLPORT 40 50 21 N 72 55 11 W	4007278 19 ESU
Lechea tenuifolia SLENDER PINWEED Vascular Plant	RARE G5 S2		M	H 1912-09-01		YAPANK YAPHANK.	BELLPORT 40 50 21 N 72 55 11 W	4007278 19
Crataegus uniflora DWARF HAWTHORN Vascular Plant	UNPROTECTED G5 SH		M	H 1907-07-14		YAPANK YAPHANK.	BELLPORT 40 50 21 N 72 55 11 W	4007278 19

3 Records Processed

Natural Heritage Report on Rare Species and Ecological Communities

Ronkonkoma Site

Prepared 16 March 2000 by NY Natural Heritage Program, NYS DEC, Latham, New York

Records with a Precision value of "S" or with a blank Precision are known to be in a location that may be impacted by the proposed action.
Records with a Precision value of "M" may possibly occur within the project area in appropriate habitat.
This report contains SENSITIVE information that should be treated in a sensitive manner -- Please see cover letter.
Refer to the Users' Guide for explanations of codes, ranks, and fields.

* County / ** Town / Scientifc Name, COMMON NAME, & Group Name	NY Legal Status & Heritage Ranks	Federal Status	Precision & Acreage	EO Rank & Last Seen	General Habitat and Quality	Detailed Location	USGS Topo Quad Lat & Long	Office Use
* SUFFOLK								
** BROOKHAVEN, ISLIP, SMITHTOWN								
Linum medium var texanum SOUTHERN YELLOW FLAX Vascular Plant	THREATENED G5T5 S2		M	H 1925-09-23	DRY, SANDY, OAK WOODS.	RONKONKOMA	PATCHOGUE 40 49 32 N 73 06 46 W	4007371 2
** BROOKHAVEN, SMITHTOWN, ISLIP								
Scleria pauciflora var caroliniana FEW-FLOWERED NUTRUSH Vascular Plant	THREATENED G5T4T5 S1		M	H 1922-09-25		RONKONKOMA	CENTRAL ISLIP 40 49 00 N 73 07 48 W	4007372 25
Aster concolor SILVERY ASTER Vascular Plant	ENDANGERED G4? S1		M	H 1928-09-20	DRY SANDY BARRENS.	RONKONKOMA	PATCHOGUE 40 48 54 N 73 06 58 W	4007371 5
** ISLIP								
Paspalum setaceum var setaceum SLENDER BEADGRASS Vascular Plant	UNPROTECTED G5T5 S2		M	E 1991-09-10	FIELDS AROUND LANDING STRIPS. NO COUNTS TAKEN.	MAC ARTHUR AIRPORT FIELDS AROUND LANDING STRIPS AT MAC ARTHUR AIRPORT, ISLIP, LONG ISLAND.	PATCHOGUE 40 48 00 N 73 06 11 W	4007371 15
Lespedeza stuevei VELVETY LESPEDEZA Vascular Plant	RARE G4? S2		M	H 1928-09-11	DRY PINE BARRENS.	RONKONKOMA	CENTRAL ISLIP 40 49 18 N 73 08 01 W	4007372 7
** ISLIP, BROOKHAVEN								
Gnaphalium helleri var micradenium CATFOOT Vascular Plant	UNPROTECTED G4G5T3? SH		M	F 1922	FAILED TO FIND. MORE HABITAT AVAILABLE.	RONKONKOMA	CENTRAL ISLIP 40 48 55 N 73 07 53 W	4007372 55

Natural Heritage Report on Rare Species and Ecological Communities

Cerro Wire, Hazelton, and Babylon Sites

Prepared 16 March 2000 by NY Natural Heritage Program, NYS DEC, Latham, New York

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Records with a Precision value of "M" may possibly occur within the project area in appropriate habitat.
This report contains SENSITIVE information that should be treated in a sensitive manner -- Please see cover letter.
Refer to the Users' Guide for explanations of codes, ranks, and fields.

* County ** Town Scientifc Name, COMMON NAME, & Group Name	NY Legal Status & Heritage Ranks	Federal Status	Precision & Acreage	EO Rank & Last Seen	General Habitat and Quality	Detailed Location	USGS Topo Quad Lat & Long	Office Use

No Records for the Cerro Wire, Hazelton, or Babylon Sites.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

DIVISION OF ENVIRONMENTAL PERMITS REGIONAL OFFICES

REGION	COUNTIES	NAME	ADDRESS AND PHONE NO.
Region 1	Nassau Suffolk	John Pavacic Permit Administrator	Loop Road, Bldg. 40 SUNY Stony Brook, NY 11790-2356 (516) 444-0365
Region 2	New York City	Charles deQuillfeldt Permit Administrator	Hunters Point Plaza 4740 21st Street Long Island City, NY 11101-5407 (718) 482-4997
Region 3	Dutchess Orange Putnam Rockland, Sullivan Ulster, Westchester	Margaret Duke Permit Administrator	21 South Putt Corners Road New Paltz, NY 12561-1696 (914) 256-3059
Region 4	Albany Columbia Delaware Greene, Montgomery, Otsego Rensselaer, Schenectady, Schoharie	William J. Clarke Permit Administrator	1150 N. Westcott Road Schenectady, NY 12306-2014 (518) 357-2234
Region 5	Clinton Essex Franklin Fulton, Hamilton Saratoga, Warren, Washington	Richard Wild Permit Administrator	Route 86 Ray Brook, NY 12977 (518) 897-1234
Region 6	Herkimer Jefferson Lewis Oneida, St. Lawrence	Randy Vaas Permit Administrator	State Office Building 317 Washington Street Watertown, NY 13601 (315) 785-2246
Region 7	Broome Cayuga Chenango Cortland, Madison, Onondaga Oswego, Tioga, Tompkins	Ralph Manna, Jr. Permit Administrator	615 Erie Blvd. West Syracuse, NY 13204-2400 (315) 426-7439
Region 8	Chemung Genesee Livingston Monroe, Ontario, Orleans Schuyler, Seneca, Steuben Wayne, Yates	Albert Butkas Permit Administrator	6274 East Avon-Lima Road Avon, NY 14414 (716) 226-2466
Region 9	Allegany Cattaraugus Chautauqua Erie, Niagara, Wyoming	Steven Doleski Permit Administrator	270 Michigan Avenue Buffalo, NY 14203-2999 (716) 851-7165

USERS GUIDE TO NY NATURAL HERITAGE DATA

New York Natural Heritage Program, 700 Troy-Schenectady Road, Latham NY 12110-2400 phone: (518) 783-3932

NATURAL HERITAGE PROGRAM: The Natural Heritage Program is an ongoing, systematic, scientific inventory whose goal is to compile and maintain data on the rare plants and animals native to New York State, and significant ecological communities. The data provided in the report facilitate sound planning, conservation, and natural resource management and help to conserve the plants, animals and ecological communities that represent New York's natural heritage.

DATA SENSITIVITY: The data provided in the report are ecologically sensitive and should be treated in a sensitive manner. The report is for your in-house use and should not be released, distributed or incorporated in a public document without prior permission from the Natural Heritage Program.

NATURAL HERITAGE REPORTS (may contain any of the following types of data):

COUNTY NAME: County where the occurrence of a rare species or significant ecological community is located.
TOWN NAME: Town where the occurrence of a rare species or significant ecological community is located.
USGS 7 ½' TOPOGRAPHIC MAP: Name of 7.5 minute US Geological Survey (USGS) quadrangle map (scale 1:24,000).
LAT: Centrum latitude coordinate of the location of the occurrence. Caution: latitude & longitude must be used with PRECISION (e.g. the location of an occurrence with M (minute) precision is not precisely known & is thought to occur within a 1.5 mile radius of the latitude/longitude coordinates).
LONG: Centrum longitude coordinate of the location of the occurrence. See also LAT above.
PRECISION: S - seconds: location known precisely. (within a 300' or 1-second radius of the latitude and longitude given.
M - minutes: location known only to within a 1.5 mile (1 minute) radius of the latitude and longitude given.
G - general: location known to within a 5 mile radius of the latitude and longitude given.
SIZE (acres): Approximate acres occupied by the rare species or significant ecological community at this location.
SCIENTIFIC NAME: Scientific name of the occurrence of a rare species or significant ecological community..
COMMON NAME: Common name of the occurrence of a rare species or significant ecological community.
ELEMENT TYPE: Type of element (i.e. plant, animal, significant ecological community, other, etc.)
LAST SEEN: Year rare species or significant ecological community last observed extant at this location.
EO RANK: Comparative evaluation summarizing the quality, condition, viability and defensibility of this occurrence. Use with LAST SEEN and PRECISION.
A-E = Extant: A=excellent, B=good, C=marginal, D=poor, E=extant but with insufficient data to assign a rank of A - D.
F = Failed to find. Did not locate species, but habitat is still there and further field work is justified.
H = Historical. Historical occurrence without any recent field information.
X = Extirpated. Field/other data indicates element/habitat is destroyed and the element no longer exists at this location.
? = Unknown.
Blank = Not assigned.

NEW YORK STATE STATUS (animals): Categories of Endangered and Threatened species are defined in New York State Environmental Conservation Law section 11-0535. Endangered, Threatened, and Special Concern species are listed in regulation 6NYCRR 182.5.

E = Endangered Species: any species which meet one of the following criteria:
1) Any native species in imminent danger of extirpation or extinction in New York.
2) Any species listed as endangered by the United States Department of the Interior, as enumerated in the Code of Federal Regulations 50 CFR 17.11.

T = Threatened Species: any species which meet one of the following criteria:
1) Any native species likely to become an endangered species within the foreseeable future in NY.
2) Any species listed as threatened by the U.S. Department of the Interior, as enumerated in the Code of the Federal Regulations 50 CFR 17.11.

SC = Special Concern Species: those species which are not yet recognized as endangered or threatened, but for which documented concern exists for their continued welfare in New York. Unlike the first two categories, species of special concern receive no additional legal protection under Environmental Conservation Law section 11-0535 (Endangered and Threatened Species).

P = Protected Wildlife (defined in Environmental Conservation Law section 11-0103): wild game, protected wild birds, and endangered species of wildlife.

U = Unprotected (defined in Environmental Conservation Law section 11-0103): the species may be taken at any time without limit; however a license to take may be required.

G = Game (defined in Environmental Conservation Law section 11-0103): any of a variety of big game or small game species as stated in the Environmental Conservation Law; many normally have an open season for at least part of the year, and are protected at other times.

NEW YORK STATE STATUS (plants): The following categories are defined in regulation 6NYCRR part 193.3 and apply to NYS Environmental Conservation Law section 9-1503.

(blank) = no state status

E = Endangered Species: listed species are those with:
1) 5 or fewer extant sites, or
2) fewer than 1,000 individuals, or
3) restricted to fewer than 4 U.S.G.S. 7 ½ minute topographical maps, or
4) species listed as endangered by U.S. Department of Interior, as enumerated in Code of Federal Regulations 50 CFR 17.11.

T = Threatened: listed species are those with:
1) 6 to fewer than 20 extant sites, or
2) 1,000 to fewer than 3,000 individuals, or
3) restricted to not less than 4 or more than 7 U.S.G.S. 7 and ½ minute topographical maps, or
4) listed as threatened by U.S. Department of Interior, as enumerated in Code of Federal Regulations 50 CFR 17.11.

R = Rare: listed species have:
1) 20 to 35 extant sites, or
2) 3,000 to 5,000 individuals statewide.

U = Unprotected

V = Exploitably vulnerable: listed species are likely to become threatened in the near future throughout all or a significant portion of their range within the state if causal factors continue unchecked.

NEW YORK STATE STATUS (communities): At this time there are no categories defined for communities.

continued on next page

FEDERAL STATUS (plants and animals): The categories of federal status are defined by the United States Department of the Interior as part of the 1974 Endangered Species Act (see Code of Federal Regulations 50 CFR 17). The species listed under this law are enumerated in the Federal Register vol. 50, no. 188, pp. 39526 - 39527.

(blank) = No Federal Endangered Species Act status.
LE = The taxon is formally listed as endangered.
LT = The taxon is formally listed as threatened.
LELT = The taxon is formally listed as endangered in part of its range and threatened in other parts.
PE = The taxon is proposed as endangered.
PT = The taxon is proposed as threatened.
C1 = Candidate, category 1 - There is sufficient information to list the taxon as endangered or threatened.
C2 = Candidate, category 2 - The taxon may be appropriate for listing but more data are needed.
3A = The taxon considered extinct by the U. S. Fish and Wildlife Service (USFWS).
3B = The taxon is no longer considered taxonomically distinct by the USFWS and thus is not appropriate for listing.
3C = The taxon has been shown to be more abundant, widespread, or better protected than previously thought and therefore not in need of official listing.
* = The taxon is possibly extinct.
** = The taxon is thought to be extinct in the wild but extant in cultivation.
Additional codes:
(C2NL) = Heritage code indicating that the taxon is a candidate in some areas, not listed in other areas.
(E/SA) = Heritage code indicating that the taxon is endangered because of similarity of appearance to other endangered species or subspecies.

FEDERAL STATUS (ecological communities): At this time there are no federal status categories defined for ecological communities.

GLOBAL AND STATE RANKS (animals, plants, ecological communities and others): Each element has a global and state rank as determined by the NY Natural Heritage Program. **These ranks carry no legal weight.** The global rank reflects the rarity of the element throughout the world and the state rank reflects the rarity within New York State. Infraspecific taxa are also assigned a taxon rank to reflect the infraspecific taxon's rank throughout the world.

GLOBAL RANK:
G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences), or very few remaining acres, or miles of stream) or especially vulnerable to extinction because of some factor of its biology.
G2 = Imperiled globally because of rarity (6 - 20 occurrences, or few remaining acres, or miles of stream) or very vulnerable to extinction throughout its range because of other factors.
G3 = Either rare and local throughout its range (21 to 100 occurrences), or found locally (even abundantly at some of its locations) in a restricted range (e.g. a physiographic region), or vulnerable to extinction throughout its range because of other factors.
G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.
G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.
GH = Historically known, with the expectation that it might be rediscovered.
GX = Species believed to be extinct.
GU = Status unknown.

STATE RANK:
S1 = Typically 5 or fewer occurrences, very few remaining individuals, acres, or miles of stream, or some factor of its biology making it especially vulnerable in New York State.
S2 = Typically 6 to 20 occurrences, few remaining individuals, acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State.
S3 = Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State.
S4 = Apparently secure in New York State.
S5 = Demonstrably secure in New York State.
SH = Historically known from New York State, but not seen in the past 15 years.
SX = Apparently extirpated from New York State.
SA = Accidental or casual in the state.
SE = Exotic, not native to New York State.
SP = Element potentially occurs in the state but there are no occurrences reported.
SR = Reported in the state but without persuasive documentation.
SU = Status unknown.
TAXON (T) RANK: The T-ranks (T1 - T5) are defined the same way the Global ranks (G1 - G5) are but the T-rank only refers to the rarity of the subspecific taxon of the species as a whole.
T1 through T5 = See Global Rank definitions above.
Q = Indicates a question exists whether or not the taxon is a good taxonomic entity.
? = Indicates a question exists about the rank.

OFFICE USE: Information for use by the Natural Heritage Program.

SIGNIFICANT HABITAT DATABASE REPORTS (Use of this database is slowly being discontinued as the data is integrated into Heritage databases)
REPORT ID: Significant habitat file code.
NAME OF AREA: Site name where the significant habitat is located.
TYPE OF AREA: Type of significant habitat.
COUNTY/TOWN OR CITY: County and town where the significant habitat is located.
QUADRANGLE: Name of the USGS 7.5 minute topographic map where the significant habitat is located.
LATITUDE: Latitude coordinate (degrees, minutes, seconds) for the location of the significant habitat.
LONGITUDE: Longitude coordinate for the location of the significant habitat.

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

March 6, 2000

Mr. Mike Stoll
U.S. Department of the Interior
Fish & Wildlife Service
3817 Luker Road
Cortland, NY 13045

RE: East Side Access Project EIS

Dear Mr. Stoll:

I am writing to request information from your files concerning threatened and endangered species and significant ecological communities for the above-referenced project. The East Side Access study includes seven study areas located in Suffolk and Nassau Counties, New York that may be affected by the proposed project. The study areas are depicted on the enclosed applicable portions of the appropriate New York USGS topographical quadrangles and are labeled as follows:

1. Cerro Wire- Hicksville and Huntington Quadrangles
2. Hazelton- Greenlawn and Huntington Quadrangles
3. Deer Park- Greenlawn Quadrangle
4. Riverhead- Riverhead Quadrangle
5. Yaphank- Bellport Quadrangle
6. Babylon- Bay Shore West Quadrangle
7. Ronkonkoma- Patchogue Quadrangle

We would appreciate a review of all threatened and endangered species and significant ecological communities within the study areas that are identified on the enclosed maps. Locations that may contain rare species or significant ecological communities will be identified and mitigation measures will be suggested for any impacts the project may have on sensitive areas.

Sincerely,
AKRF, INC.

Elizabeth A. Nemeth
Environmental Analyst

cc. ESA File
Julie Cowing, AKRF

United States Department of the Interior

FISH AND WILDLIFE SERVICE
3817 LUKER ROAD
CORTLAND, NY 13045

March 29, 2000

Ms. Elizabeth A. Nemeth
Environmental Analyst
AKRF, Incorporated
117 East 29th Street
New York, NY 10016-8022

Dear Ms. Nemeth:

This responds to your letter of March 6, 2000, requesting information on the presence of endangered or threatened species in the vicinity of the following locations:

1. The Cerro Wire Site in the Town of Oyster Bay, Nassau County, New York.
2. The Hazelton Site in the Town of Huntington, Suffolk County, New York.
3. The Deer Park Site in the Town of Huntington, Suffolk County, New York.
4. The Riverhead Site in the Town of Riverhead, Suffolk County, New York.
5. The Yaphank Site in the Town of Brookhaven, Suffolk County, New York.
6. The Babylon Site in the Town of Babylon, Suffolk County, New York.
7. The Ronkonkoma Site in the Town of Brookhaven, Suffolk County, New York.

The sandplain gerardia (*Agalinis acuta*) is a Federally listed endangered plant which is typically associated with grassland communities and is known to occur at several locations on Long Island, including in the vicinity of the Yaphank Site in the Town of Brookhaven. Although there are no records of this species occurring at this site, the project area should be evaluated by a qualified person to determine the presence or absence of the sandplain gerardia. The project environmental documents should identify any direct, indirect, and cumulative impacts on the sandplain gerardia and its habitat. This information should be provided to this office to determine the need for further consultation pursuant to Section 7 of the Endangered Species Act.

Except for the sandplain gerardia in the vicinity of the Yaphank Site, and occasional transient individuals, no Federally listed or proposed endangered or threatened species under our jurisdiction are known to exist in the respective project impact areas. Should project plans change, or if additional information on listed or proposed species becomes available, this

determination may be reconsidered. A compilation of Federally listed and proposed endangered and threatened species in New York is enclosed for your information.

The above comments pertaining to endangered species under our jurisdiction are provided pursuant to the Endangered Species Act. This response does not preclude additional Service comments under the Fish and Wildlife Coordination Act or other legislation.

The sandplain gerardia is listed as endangered by the State of New York. Any plans for surveys and their timing, should be coordinated with both this office and the New York State Department of Environmental Conservation. The State contact for sandplain gerardia is Kathryn J. Schneider, Ph.D., New York Natural Heritage Program, 700 Troy-Schenectady Road, Latham, New York 12110 (telephone: [518] 783-3932).

For additional information on fish and wildlife resources or State-listed species, we suggest you contact:

New York State Department
of Environmental Conservation
Region 1
Building 40, SUNY
Stony Brook, NY 11794
(516) 444-0200

New York State Department
of Environmental Conservation
Wildlife Resources Center-Information Services
New York Natural Heritage Program
700 Troy-Schenectady Road
Latham, NY 12110-2400
(518) 783-3932

National Wetlands Inventory (NWI) maps may or may not be available for the respective project areas. However, while the NWI maps are reasonably accurate, they should not be used in lieu of field surveys for determining the presence of wetlands or delineating wetland boundaries for Federal regulatory purposes. Copies of specific NWI maps can be obtained from:

Cornell Institute for Resource Information Systems
302 Rice Hall
Cornell University
Ithaca, NY 14853
(607) 255-4864

Work in certain waters and wetlands of the United States may require a permit from the U.S. Army Corps of Engineers (Corps). If a permit is required, in reviewing the application pursuant to the Fish and Wildlife Coordination Act, the Service may concur, with or without stipulations, or recommend denial of the permit depending upon the potential adverse impacts on fish and wildlife resources associated with project implementation. The need for a Corps permit may be determined by contacting Mr. Joseph Seebode, Chief, Regulatory Branch, U.S. Army Corps of Engineers, 26 Federal Plaza, New York, NY 10278 (telephone: [212] 264-3996).

If you require additional information please contact Michael Stoll at (607) 753-9334.

Sincerely,

Mark W. Clough

ACTING FOR

David A. Stilwell
Field Supervisor

Enclosure

cc: NYSDEC, Stony Brook, NY (Environmental Permits)
NYSDEC, Latham, NY
NYSDEC, Latham, NY (Attn: Dr. K. Schneider)
COE, New York, NY

FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES IN NEW YORK

Common Name	Scientific Name	Status	Distribution
FISHES			
Sturgeon, shortnose*	*Acipenser brevirostrum*	E	Hudson River & other Atlantic coastal rivers
REPTILES			
Turtle, bog	*Clemmys muhlenbergii*	T	Albany, Columbia, Dutchess, Genesee, Orange, Oswego, Putnam, Seneca, Ulster, Wayne, and Westchester Counties
Turtle, green*	*Chelonia mydas*	T	Oceanic summer visitor coastal waters
Turtle, hawksbill*	*Eretmochelys imbricata*	E	Oceanic summer visitor coastal waters
Turtle, leatherback*	*Dermochelys coriacea*	E	Oceanic summer resident coastal waters
Turtle, loggerhead*	*Caretta caretta*	T	Oceanic summer resident coastal waters
Turtle, Atlantic ridley*	*Lepidochelys kempii*	E	Oceanic summer resident coastal waters
BIRDS			
Eagle, bald	*Haliaeetus leucocephalus*	T	Entire state
Plover, piping	*Charadrius melodus*	E	Great Lakes Watershed
		T	Remainder of coastal New York
Tern, roseate	*Sterna dougallii dougallii*	E	Southeastern coastal portions of state
MAMMALS			
Bat, Indiana	*Myotis sodalis*	E	Entire state
Cougar, eastern	*Felis concolor couguar*	E	Entire state - probably extinct
Whale, blue*	*Balaenoptera musculus*	E	Oceanic
Whale, finback*	*Balaenoptera physalus*	E	Oceanic
Whale, humpback*	*Megaptera novaeangliae*	E	Oceanic
Whale, right*	*Eubalaena glacialis*	E	Oceanic
Whale, sei*	*Balaenoptera borealis*	E	Oceanic
Whale, sperm*	*Physeter catodon*	E	Oceanic
MOLLUSKS			
Snail, Chittenango ovate amber	*Succinea chittenangoensis*	T	Madison County
Mussel, dwarf wedge	*Alasmidonta heterodon*	E	Orange County - lower Neversink River
BUTTERFLIES			
Butterfly, Karner blue	*Lycaeides melissa samuelis*	E	Albany, Saratoga, Warren, and Schenectady Counties

* Except for sea turtle nesting habitat, principal responsibility for these species is vested with the National Marine Fisheries Service.

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FEDERALLY LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES IN NEW YORK (Cont'd)

Common Name	Scientific Name	Status	Distribution
PLANTS			
Monkshood, northern wild	*Aconitum noveboracense*	T	Ulster, Sullivan, and Delaware Counties
Pogonia, small whorled	*Isotria medeoloides*	T	Entire state
Swamp pink	*Helonias bullata*	T	Staten Island - presumed extirpated
Gerardia, sandplain	*Agalinis acuta*	E	Nassau and Suffolk Counties
Fern, American hart's-tongue	*Asplenium scolopendrium* var. *americana*	T	Onondaga and Madison Counties
Orchid, eastern prairie fringed	*Platanthera leucophea*	T	Not relocated in New York
Bulrush, northeastern	*Scirpus ancistrochaetus*	E	Not relocated in New York
Roseroot, Leedy's	*Sedum integrifolium* ssp. *Leedyi*	T	West shore of Seneca Lake
Amaranth, seabeach	*Amaranthus pumilus*	T	Atlantic coastal plain beaches
Goldenrod, Houghton's	*Solidago houghtonii*	T	Genesee County

E=endangered T=threatened P=proposed

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

March 6, 2000

Ms. Diane Rusanowsky
National Marine Fisheries Service
Habitat Conservation Division
212 Rogers Avenue
Milford, CT 06460

RE: East Side Access Project EIS

Dear Ms. Rusanowsky:

I am writing to request information from your files concerning endangered and threatened marine species for the above-referenced project. The East Side Access study includes seven study areas located in Nassau and Suffolk Counties, New York that may be affected by the proposed project. The study areas are depicted on the enclosed applicable portions of the appropriate New York USGS topographical quadrangles and are labeled as follows:

1. Cerro Wire- Hicksville and Huntington Quadrangles
2. Hazelton- Greenlawn and Huntington Quadrangles
3. Deer Park- Greenlawn Quadrangle
4. Riverhead- Riverhead Quadrangle
5. Yaphank- Bellport Quadrangle
6. Babylon- Bay Shore West Quadrangle
7. Ronkonkoma- Patchogue Quadrangle

We would appreciate a review of all Federally listed threatened and endangered species within the study areas that are identified on the enclosed maps. Locations that may contain rare species or significant ecological communities will be identified and mitigation measures will be suggested for any impacts the project may have on sensitive areas.

Sincerely,
AKRF, INC.

Elizabeth A. Nemeth
Environmental Analyst

cc. ESA File
Julie Cowing, AKRF

AKRF, Inc.

ENVIRONMENTAL CONSULTANTS
117 East 29th Street • New York, NY 10016-8022

TEL: 212/696-0670
FAX: 212/447-5546

March 6, 2000

Ms. Jean Petrusiak
Information Services
New York Natural Heritage Program
Wildlife Resources Center
700 Troy-Schenectady Road
Latham, NY 12110-2400

RE: East Side Access Project EIS

Dear Ms. Petrusiak:

I am writing to request information from your files concerning rare plants, rare animals, and significant ecological communities for the above-referenced project. The East Side Access study includes seven study areas located in Suffolk and Nassau Counties, New York that may be affected by the proposed project. The study areas are depicted on the enclosed applicable portions of the appropriate New York USGS topographical quadrangles and are labeled as follows:

1. Cerro Wire- Hicksville and Huntington Quadrangles
2. Hazelton- Greenlawn and Huntington Quadrangles
3. Deer Park- Greenlawn Quadrangle
4. Riverhead- Riverhead Quadrangle
5. Yaphank- Bellport Quadrangle
6. Babylon- Bay Shore West Quadrangle
7. Ronkonkoma- Patchogue Quadrangle

We would appreciate a review of all rare plants, rare animals, and significant ecological communities within the study areas that are identified on the enclosed maps. Locations that may contain rare species or significant ecological communities will be identified and mitigation measures will be suggested for any impacts the project may have on sensitive areas.

Sincerely,
AKRF, INC.

Elizabeth A. Nemeth
Environmental Analyst

cc. ESA File
Julie Cowing, AKRF

Your coast, your future

Coasts

DEPARTMENT OF STATE

George E. Pataki
Governor
Alexander F. Treadwell
Secretary of State

Division of
Coastal Resources
41 State Street
Albany, NY 12231-0001

December 7, 2000

Ms. Julie Cowing
AKRF, Inc.
117 East 29th Street
New York, New York 10016

Re: MTA LIRR Project Sites
Towns of Babylon, Brookhaven, Riverhead
Suffolk County

Dear Ms. Cowing:

I have reviewed the information provided to Ms. Nancy Rucks regarding the locations of three project sites relative to New York's coastal boundary, and have determined that two of the three sites identified lie within the coastal zone. The Babylon site and the Riverhead site are situated within the coastal boundary; the Brookhaven site is not.

If a project is located in New York State's coastal area and requires a federal license, permit or other authorization, or if the project involves federal financial assistance or the direct involvement of a federal agency, the project would be reviewed by the Department of State for its consistency with the New York State Coastal Management Program (CMP). In that case, a copy of the federal application (and in the case of a federal permit, a completed Federal Consistency Assessment Form) should be submitted to the Department together with any supporting information.

If you have any questions, please contact me at (518) 486-7670 or Steven C. Resler at (518) 473-2470.

Sincerely,

Christine Nelson
Coastal Resources Specialist
Consistency Review and Analysis

CN/vb

Appendix H: Process and Public Participation

APPENDIX H-1

COMPREHENSIVE COMMUNICATIONS AND COORDINATION PLAN (CCCP)

Comprehensive Communications and Coordination Plan (CCCP)
MTA/LIRR EAST SIDE ACCESS PROJECT
(Phase I)

Introduction

The Comprehensive Communications and Coordination Plan (CCCP) is a crucial element in the success of the MTA/LIRR East Side Access Project. Implementation of this plan will play a key role in achieving support for this project from the public as well as the many agencies involved.

As its name indicates, the CCCP stresses **comprehensive communications** with the public and all interested and affected parties. It will also be an essential component of an ongoing **coordination** effort with the agencies directly involved in the project. This includes providing a smooth transition from the recently conducted Major Investment Study (MIS) and establishing direct lines of communication among the Environmental Consultant (EC) Team, the Program Manager that has oversight responsibilities for the project throughout its duration, and the Tunnel and Systems Engineering Design Consultants that will provide engineering services. It also includes ensuring that all interested agencies throughout the metropolitan region understand the project and their roles in its development, and that they support its completion.

II. The CCCP

The primary goal of this plan is to create a dynamic public forum for the discussion of issues and exchange of information about the MTA/LIRR East Side Access Project. This outreach effort includes a variety of techniques and tools customized to reach, and respond to, a wide range of interested parties. Emphasis at this point is on Phase I - the completion of the Environmental Impact Statement (EIS) and receipt of the Record of Decision (ROD). However, the plan is intended to set the stage for continued and extensive public involvement as the MTA/LIRR East Side Access moves into design and construction.

The plan will also satisfy the statutory public participation requirements for the EIS process, including those of the National Environmental Policy Act (NEPA).

The public and agency scoping required by NEPA was performed during the MIS process in July 1995 and will not be held again. The public scoping meetings were held in Commack, Mineola, and Manhattan.

The plan provides a variety of additional opportunities for the public and the agencies to comment on the EIS scope early in the environmental process. Components of the plan include printed products intended to disseminate relevant project information to as broad an audience as possible, including the media, to large-scale meetings designed to share information and solicit input, to small-scale activities to encourage active participation by both technical and citizen advisory committees and customized presentations to groups representing particular interests, such as community boards and business and environmental groups.

The accompanying schedule is an integral part of this plan. It has been carefully developed to ensure ongoing public awareness of the MTA/LIRR East Side Access Project and the results of the EIS.

The CCCP is a blueprint for the public involvement program. It will be monitored to ensure that it remains focused and deals appropriately with project issues as they emerge. Monthly progress reports submitted to the MTA/LIRR by the EC will highlight activities performed during the previous month, activities planned for the following month, and issues that must be resolved to ensure the plan's success. The CCCP is designed to be dynamic; it will be reviewed on a regular basis and revised as needed.

III. Advisory Committees

A Technical Advisory Committee (TAC) and Citizen Advisory Committee (CAC) will be reconstituted from the memberships of these committees for the MIS and appropriate representatives will be added. Both committees will provide regularly scheduled review and input as the study proceeds. The membership lists are included in the appendix.

As the schedule indicates, both the TAC and the CAC will be activated in January 1999. Review of the technical data with the TAC will precede discussions with the CAC to ensure that the material presented is technically complete and accurate. Possible subjects for several of these meetings are indicated on the schedule. Their content is designed to be flexible to respond to the needs of the project as it develops as well as the desires of the TAC and CAC.

❑ Technical Advisory Committee

The TAC members will be charged with reviewing the technical data pertinent to the study and sharing their expertise and any relevant data available from their respective agencies. This committee will comprise representatives of transportation, environmental, and planning agencies at the federal, state, and local levels; municipal officials; and NYMTC. They will meet once a month, except during July and August, for a total of sixteen times during the project to ensure their ongoing involvement.

❑ Citizen Advisory Committee

The CAC members will serve as a sounding board for the review of project issues as they affect the community and will also serve as primary liaisons between their organizations and the project team. This committee will comprise representatives from affected community boards and environmental, civic, public interest, and transportation advocacy groups; public officials, members of business, labor, real estate, and economic development organizations; people from organizations representing under-served populations and persons with special transportation needs; and other interested individuals. The CAC may also form subcommittees to address specific issues, e.g., construction or commuter-related concerns. The CAC will meet eight times during the life of the project.

IV. General Information Meetings for the Public

The purpose of the general information meetings is to keep the public informed at regular intervals and solicit its input. Presentations will be made using a combination of slides, boards, and printed materials. Members of the public will be invited to ask questions and comment both at the meetings and via comment cards to be returned to the study team. The use of comment cards will facilitate communication, particularly for those individuals who hesitate to speak in public.

Three rounds of four meetings are scheduled to reach as large an audience as possible throughout the immediate project area. Convenient, accessible locations will be identified in Manhattan, Queens, Nassau, and Suffolk counties for these meetings. As the schedule indicates, Public Meeting #1 will occur during a two-week period in February 1999, and will consist of an update of the project since the MIS, a description of the EIS process, and an explanation of the project in the context of other related activities in the region (e.g., MESA, the Lower Manhattan Access Project, and the West Side Access Project). Representatives from these other efforts may be invited to participate. Public Meeting #2, scheduled for a two-week period in June 1999, will focus on the results of the EIS Study to date, and Public Meeting #3, scheduled for

November 2000, will update these results and cover any new activities.

In addition, Metro-North commuters will be reached through two rounds of two meetings each (one in Westchester and one in Connecticut). These meetings will be similar in content to Public Meetings #1 and #3, mentioned above, with special attention to the impacts of the MTA/LIRR East Side Access Project on Metro-North operations. In all cases, the public will be encouraged to attend these public meetings through advertisements in local and citywide newspapers and announcements to all persons and organizations on the project's comprehensive mailing list. This mailing list is expected to include over 1,000 addresses, and will include people and organizations concerned about Metro-North's operations. It will be based on the mailing list for the MIS, supplemented with names and addresses from Metro-North's mailing list, and will be regularly updated as appropriate. Seat drops will also be used on trains to announce meetings, as well as posters at stations.

V. Public Hearings

Public hearings are recommended by NEPA to provide a formal opportunity for public review of the Draft EIS (DEIS) results. Public hearings will be held in Manhattan, Queens, Nassau, and Suffolk counties at convenient and accessible locations during a two-week period, scheduled for February 2000.

To reach the widest possible audience, notices will be published in the Federal Register, New York State's Environmental Notice Bulletin and State Register and in local and citywide newspapers; announcements will be sent to all persons and organizations on the project mailing list; and seat drops on LIRR and Metro-North trains and posters will be used. Copies of the DEIS will be available for public review at designated locations, such as libraries, throughout the study area.

The public hearings will be documented by a court reporter, including all public testimony. Public comments will also be solicited during a comment period, which will extend 30 days after the last public hearing.

VI. Communication Between MTA/LIRR and the Federal Transit Administration

Frequent and comprehensive communication between the MTA/LIRR and the Federal Transit Administration (FTA) is essential to ensure all concerns are addressed in the EIS so that a timely Record of Decision (ROD) will be issued. The following protocol has been established for the project team:

- ✓ All team members, including the EC, subconsultants, etc., discuss issues with the PM

- ✓ The PM raises any concerns with the MTA/LIRR senior project staff
- ✓ The MTA/LIRR senior project staff, working through the MTA's Director of Grant Management, communicate with the FTA.

VII. Printed Materials

Printed materials that can be mailed to all the addresses on the project mailing list as well as handed out at meetings about the project will be essential to communicate to a broad audience about project issues. These materials will be designed to generate excitement over the project as well as to communicate information about it. This CCCP assumes that a dynamic, creative project logo for use by all team members (EC, PM, GEC) will be developed. This logo will be essential to creating a project image that appeals to the public.

❑ Fact Sheets

A series of two-sided, 8-1/2" X 11" fact sheets is planned, with each fact sheet focusing on a single subject. They will be concise, informative, and pitched to appeal to a broad audience, and will use graphics and photos to illustrate important points. As the schedule indicates, they will be distributed at key points throughout the EIS Study.

Although actual content will be decided as the project proceeds, the following topics are anticipated:

- ✓ Project update/EIS process
- ✓ Conduct of field work - environmental investigation
- ✓ Conduct of field work - vibrations study
- ✓ Project effects on Manhattan
- ✓ Project effects on Grand Central Terminal
- ✓ Project effects on Queens/Long Island
- ✓ Project effects on Metro-North operations and on LIRR operations.

❑ Information Package

An information package will be prepared for distribution on meetings. An attractive folder cover that identifies with the project will be designed. The folder will have pockets on both inside pages to hold printed materials. Color project information sheets will be prepared as inserts for the project folder. Each sheet will be topic specific and contain illustrative graphics.

VIII. Web Page

Use of the Internet is deemed essential for a project of this magnitude and duration. The EC Team has reviewed possible host sites to determine the best location for the MTA/LIRR East Side Access Project. These include web sites operated by NYMTC, the MTA, the LIRR, the New York City Department of Planning, the New York City Department of Transportation, and the New York State Department of Transportation. The MTA site has been chosen as the web page location because it is the most obvious location for this project and the information about the LIRR is readily accessible from the MTA home page. Of course, the MTA/LIRR East Side Access web page will be linked to the LIRR Home Page and other appropriate project and agency web sites to ensure maximum accessibility.

The web site will include all the printed materials previously described, as they become available, as well as the videos. In addition, a calendar will be kept up to date listing project activities and all scheduled meetings and presentations. Contacts will be identified to respond to requests for other information (via e-mail, telephone, or surface mail). Results of the EIS Study will be shown, as appropriate, and the Executive Summary of the EIS may be posted at the end of the study.

IX. Presentations

A wide range of organizations and public interest groups have expressed interest in this project. Approximately 40 presentations will be made to groups in the region, with time allocated for individuals to comment on the EIS process and the project in general. To be most effective, presentations have been scheduled to focus on certain time periods (listed below and shown on the schedule):

- ✓ January 1999
- ✓ April - June 1999
- ✓ September - October 1999
- ✓ February - May 2000

Presentations to, or informal meetings with, the following groups are expected to be held:

- ✓ Community boards and borough boards
- ✓ Business, transportation, civic, and environmental organizations (e.g., the NYC Partnership and Chamber of Commerce, New York Building Congress, General Contractors Association, Association for a Better New York, Long Island Association, PCAC/Long Island Rail Road Commuter Council, Westchester Association, Southwest Regional Planning Agency, Mid-Hudson Transportation Coordinating Council

- ✓ Other interest groups (e.g., the Regional Plan Association, Tri-State Transportation Campaign)

Requests for meetings beyond those identified by the study team will be referred to the LIRR's Public Affairs Officer (PAO). In addition, all requests from the media will be referred to the PAO.

X. Agency Coordination

The MTA/LIRR East Side Access Project will require a high degree of agency coordination for a variety of reasons including: applicable Federal, state and local regulations and requirements must be met; permits and approvals for specific construction and relocation needs must be secured; and an exchange of information is required among agencies and MTA/LIRR East Side Access project team members during each phase of the project.

The MTA/LIRR will take the lead in developing an ongoing dialogue with the Federal Transit Administration (FTA) to resolve issues that could hinder obtaining the Record of Decision (ROD) in a timely manner. During Phase I, project team members will meet with the FTA oversight officers and environmental specialists to gain consensus on the approach and scope for the Draft and Final EIS review.

Other agencies will also be continually and heavily involved in this project from now through final construction requiring a level of interface beyond the involvement identified to promote active involvement and establish meaningful working relationships between project team members and the regulatory, railroad, and transit agencies.

❑ Regulatory Agencies

A kick-off meeting comprised of representatives of Federal, state and local agencies that may potentially be involved in any phase of the MTA/LIRR East Side Access Project is proposed for January 1999. The purpose of the meeting is to introduce project team members, present an overview of the project and the timetable for EIS and project completion, and establish interface points with various agencies.

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Historic Preservation Officer (SHPO), for example, will be actively involved in the EIS process, and their involvement will continue through final construction as they monitor commitments for mitigation. An official liaison in both of these offices will be established and regular meetings will begin with them in the near future. The Landmarks Preservation Commission, the U.S. Environmental Protection

Agency (EPA), and NYMTC will also require ongoing dialogue. Additionally, technical specialists will require meetings with individual agencies on an as needed basis.

The kick-off meeting will be established through the Program Manager, as will meetings with individual regulatory agencies when the need for each meeting is identified.

Preliminary engineering will determine the specific permits and permitting agencies to be contacted. The agencies that must be involved to secure the Record of Decision are included. The Technical Advisory Committee will participate in the regulatory agency process.

❑ Railroad and Transit Working Committees

Working Committees will be formed at each of the following agencies:

- ✓ LIRR
- ✓ Metro-North Railroad
- ✓ New York City Transit
- ✓ Amtrak
- ✓ New Jersey TRANSIT
- ✓ New York & Atlantic Railway

Some of these organizations will require representation by more than one department. For example, the LIRR and Metro-North will have representatives from their Capital Program, Operations, Planning, and Safety departments, while Amtrak, NJ TRANSIT, and New York & Atlantic Railway may only need one coordinator each.

The objective of the meetings will be to understand the operating requirements of these agencies and the potential effects of the project on railroad and transit operations. One-on-one contacts with matching technical knowledge will be established between key project team members and agency personnel. Regular committee meetings will be established through the Program Manager with smaller working meetings and site visits scheduled on an as needed basis directly through the agreed to point person from the project team.

❑ Public Affairs Task Force

As part of the Program Management function, a Public Affairs Task Force will be created to include representatives from the rail and transit agencies that will be affected by the MTA/LIRR East Side Access Project. This Task Force will provide a consistent and informed voice from the start of the project, during the EIS phase, through design and construction, to the opening of the new LIRR service into Grand Central Terminal.

The creation of the Task Force provides the project with bi-directional communication to various groups within the rail/transit network. By soliciting cooperation during the earliest stage, and acknowledging that there are diverse and at times conflicting concerns among the agencies, the project will be able to proceed more smoothly. The Task Force will be kept up to date with the milestones and issues associated with the MTA/LIRR East Side Access Project, and it will be a source of input to the materials produced for release to the public such as the brochures, fact sheets, web page and videos.

Task Force meetings will take place approximately once a month. Task Force members are listed in the Appendix.

XI. Review/Approval Protocols

Timely reviews and approvals of the material being produced as part of this plan are crucial to its successful execution. The large number of activities proposed within a relatively tight time frame require that comments from those with review responsibility be received as stated in this plan.

All materials will be submitted to the Program Manager, who will in turn distribute them to the appropriate parties. Coordination with the MTA and among the involved MTA organizations, including the review of materials by legal representatives, will be the joint responsibility of the MTA/Program Manager.

To maintain the attached schedule, the following review periods/approvals are required:

Public Meetings: The contents of each public meeting and its timing must be approved six weeks prior to the meeting to permit time to arrange for facilities, notify the public, etc.

Fact Sheets: Comments on each fact sheet must be submitted to the Environmental Consultant within one week of receipt.

Information Package: Comments on each information package sheet must be submitted to the Environmental Consultant within two weeks of receipt.

Web Page: Comments about the design of the web page must be submitted to the Environmental Consultant within one week of receipt. Updates must be approved one week before they are made.

TAC/CAC Meetings: Approval of the content, date, and location of each of these meetings must be received by the Environmental Consultant three weeks prior to each meeting.

Presentations: A protocol for approval of the 40 presentations planned for specific groups will be established when more information is available about them.

Roles and Responsibilities

The following matrix has been developed to clarify the respective roles and responsibilities of the organizations and consultants involved in the MTA/LIRR East Side Access Project (Phase I). The matrix can be summarized as follows:

- The EC (AKRF) and its public involvement subconsultant (HSH) will have primary responsibility for scheduling, making arrangements for, and documenting the TAC and CAC meetings, all public meetings, the public hearings, and individual presentations.
- The LIRR/MTA will be responsible for approving these meetings and their proposed content.
- The Public Affairs Task Force will be responsible for reviewing all materials for the public, including fact sheets, brochures, videos, and the web page.
- The Program Manager will have overall responsibility for the Public Affairs Task Force, the Interagency Task Force, and other agency coordination.

Roles and Responsibilities Matrix
MTA/LIRR Grand Central Connection Project
Phase I

Role	Responsibility			
	LIRR/MTA	PM	EC	Public Affairs Task Force
CCCP				
Draft			X	
Review	X	X		X
Approve	X	X		
Implement	X	X	X	
CAC Meetings				
Schedule			X	
Arrange			X	
Document			X	
Attend	X	X	X	
Approve	X	X		
TAC Meetings				
Schedule			X	
Arrange			X	
Document			X	
Attend	X	X	X	
Approve	X	X		

Role	Responsibility			
	LIRR/MTA	PM	EC	Public Affairs Task Force
Public Information Meetings				
Schedule			X	
Arrange			X	
Document			X	
Attend	X	X	X	
Approve	X	X		X
Public Hearings				
Schedule			X	
Arrange			X	
Document			X	
Attend	X	X	X	
Approve	X	X		X
Fact Sheets				
Draft			X	
Comment	X	X		X
Revise			X	
Approve	X	X		X
Produce			X	
Distribute			X	

Role	Responsibility			
	LIRR/MTA	PM	EC	Public Affairs Task Force
Brochures				
Draft			X	
Comment	X	X		X
Revise			X	
Approve	X	X		X
Produce			X	
Distribute			X	
Videos				
Draft			X	
Comment	X	X		X
Revise			X	
Approve	X	X		X
Produce			X	
Distribute			X	
Web Page				
Design			X	
Approve	X	X		X
Update			X	
Approve				X
Maintain			X	

Role	Responsibility			
	LIRR/MTA	PM	EC	PATF
Presentations				
Create			X	
Schedule			X	
Arrange			X	
Document			X	
Attend	X	X	X	
Approve	X	X		X
Public Affairs Task Force Meetings				
Schedule		X		
Arrange		X		
Document		X		
Attend	X	X	X	X
Approve	X			
Regulatory Agency Meetings				
Schedule		X		
Arrange		X		
Document		X		
Attend	X	X	X	
Approve	X			
Railroad & Transit Working Committees				
Schedule		X		
Arrange		X		
Document		X		
Attend	X	X	X	
Approve	X			

APPENDIX H-2

CITIZENS ADVISORY COMMITTEE MEMBERS

MTA/LIRR EAST SIDE ACCESS CITIZENS ADVISORY COMMITTEE MEMBERS

Company	Contact		Title
42nd Street Development Corporation	Mr.	Fred Papert	President
American Planning Association	Mr.	Carl Perrera	
Auto Free New York	Mr.	George Haikalis	
Automobile Association of America (AAA)	Mr.	James McGowan	
Bechtel Corporation	Ms.	Audrey Heffernan	
Bronx Borough President's Office	Borough President	Hon. Fernando Ferrer	Borough President
Brooklyn Borough President's Office	Mr.	Michael Rossmy	
Brooklyn Borough President's Office	Mr.	George Synafakis	
Brooklyn Community Board # 12	Mr.	Alan J. Dubrow	Chairperson
Brooklyn Community Board #2	Mr.	Robert Evans	Chairperson
Brooklyn Community Board #3	Ms.	Marjorie Matthews	Chairperson
Brooklyn Community Board #5	Mr.	Earl Williams	Chairperson
Brooklyn Community Board #8	Ms.	Mable Boston	
Brooklyn Economic Development Corporation	Mr.	Abner Larrieux	Director
Brotherhood of Locomotive Engineers	Mr.	Robert M. Evers	General Chairman
Capital Review Board	Mr.	Robert M. Harding	Budget Director
Columbia University	Mr.	Mr. Daniel Cesano	
Commission for the Blind & Visually Handicapped	Mr.	Anthony DiAngelo	
Committee for Better Transit	Mr.	Stephen Dobrow	President
Community Board # 14	Mr.	Jonathan L. Gaska	District Manager
Connecticut Department of Transportation	Mr.	Harry P. Harris	Bureau Chief
Connecticut Department of Transportation	Mr.	James F. Sullivan	Commissioner
Councilman Eristoff's Office	Mr.	Ted LaBarbera	
Councilman Miller's Office	Mr.	Alex Villamar	
CT-Metro North Shoreline East Rail Commuter Council	Mr.	Rodney Chabot	Chairman
Dutchess County	Hon	Hon. William R. Steinhaus	County Executive
East Side Access Project	Tanya	Tanya Freeman	Environmental Engineer
East Side Association Inc.	Ms.	Leslie Slocum	Executive Vice President
East Side Coalition on Airport Access	Mr.	Richard Eyen	
Eastern Paralyzed Veterans Association	Ms.	Jessica Gonzalez	
Empire State Passengers Association	Mr.	Brendan B. Read	Long Island Coordinator
Environmental Action Coalition	Mr.	Paul Berizzi	Executive Director
ESPA	Mr.	Barry Adler	
General Contractors Association	Ms.	Rita Schwartz	Director
General Contractors Association of New York, Inc.	Mr.	Frank McArdle	Managing Director
Grand Central Partnership	Mr.	Donald Bussolini	
Grand Central Partnership	Mr.	Richard Loconte	
Grand Central Partnership	Mr.	Lowell J. Tooley	Interim President
International Union of Operating Engineers Local 14	Mr.	Joe Rizzuto	
-International Union of Operating Engineers, Local 15	Mr.	Tom McGuire	President & Business Manager
LIC Business Development Corporation	Mr.	Thomas Knierim	Executive Director
LIC Business Development Corporation	Mr.	John West	
LIRR Citizens Advisory Committee	Mr.	Robert Francis	
LIRR Commuters Council	Mr.	Lawrence Silverman	Chairman
Long Island Board of Realtors	Mr.	Joseph Mottola	CEO
Long Island Transportation Management	Mr.	Robert Wilson	
Manhattan Borough President's Office	Borough President	Hon. C. Virginia Fields	Borough President
Manhattan Borough President's Office	Mr.	Robert Kulikowski	
Manhattan Community Board # 4	Mr.	William Kelly	District Manager
Manhattan Community Board # 5	Ms.	Kathy Kinsella	District Manager
Manhattan Community Board # 6	Ms.	Carol Pieper	District Manager
Manhattan Community Board # 8	Ms.	Victoria Caramonte	District Manager
Manhattan Community Board # 9	Ms.	Maritta Dunn	Chairperson

MTA/LIRR EAST SIDE ACCESS CITIZENS ADVISORY COMMITTEE MEMBERS

Manhattan Community Board #5	Mr.	Joe Clift	
Manhattan Community Board #5	Mr.	Steven F. Wilder	
Manhattan Community Board #6	Mr.	Martin Barrett	
Manhattan Community Board #6	Mr.	Perry Luntz	
Manhattan Community Board #6	Mr.	Lou Sepersky	
Manhattan Community Board #8	Ms.	Barbara J. Chocky	
Metropolitan Transportation Authority	Mr.	Ed Helenius	
Morse Diesel International	Mr.	Vincent Arcuri	Senior Vice President
MTA- Metro-North Railroad	Mr.	Gavin McDonough	
MTA- Metro-North Railroad Commuter Council	Mr.	George Begany	
MTA- Metro-North Railroad Commuter Council	Mr.	Richard Cataggio	Chairman
Nassau County Council of Chambers of Commerce	Mr.	Gary A. Hudes	
New Jersey Association of Rail Road Pasengers	Mr.	Albert L. Papp, Jr.	
New Urban Transportation Systems (NUTS)	Mr.	Bob Olmsted	
New York City Building Congress	Mr.	Richard T. Anderson	President
New York City Fire Department	Mr.	Daniel Nigro	Assistant Chief
New York City Police Department	Officer	William Maynard	
New York City Police Department	Inspector	James McShane	Executive Officer
New York Coalition of 100 Black Woman	Mr.	Robin Bell-Stevens	
New York Society for the Deaf	Ms.	Pearl Johnson	Executive Director
New York State Department of Transportation	Mr.	Peter King	Supervisor of Planning and Development
NJTPA	Mr.	Joel Weiner	Executive Director
NYC District Council of Carpenters	Mr.	Dominic Lavacca	
NYC Partnership	Ms.	Lisa Bellucci	
NYC Partnership & Chamber of Commerce	Mr.	Robert Kiley	President & CEO
NYS Conservation Fund	Mr.	Charles Bevilacqua	
NYS Federation of Hispanic Chambers of Commerce	Mr.	Alfred Placeres	President
OILC	Mr.	Gil Yildiz	
PCAC to the MTA	Ms.	Beverly Dolinsky	Executive Director
PCAC to the MTA	Mr.	Michael Doyle	
PCAC to the MTA	Mr.	William K. Guild	
PCAC to the MTA	Mr.	Robert Schumacher	
Putnam County	Mr.	Hon. Robert J. Bondi	County Executive
Queens Chamber of Commerce	Mr.	Joseph Farber	President
Queens Chamber of Commerce	Ms.	Lucy Nunziato	Executive Vice President
Queens Community Board # 1	Mr.	Mr. George Delis	District Manager
Queens Community Board # 10	Ms.	Rose Pepe	District Manager
Queens Community Board # 11	Ms.	Anne Marie Ryan	District Manager
Queens Community Board # 12	Ms.	Yvonne Reddick	District Manager
Queens Community Board # 13	Ms.	Sally Martino-Fisher	District Manager
Queens Community Board # 2	Ms.	Dolores Rizzotto	District Manager
Queens Community Board # 4	Ms.	Rose Rena-Rothschild	District Manager
Queens Community Board # 5	Mr.	Gary Giordano	District Manager
Queens Community Board # 6	Ms.	Kathleen H. Reilly	District Manager
Queens Community Board # 7	Ms.	Marilyn Bitterman	District Manager
Queens Community Board # 8	Ms.	Diane Cohen	District Manager
Queens Community Board # 9	Ms.	Mary Ann Carey	District Manager
Queens Community Board #1	Mr.	Vinicio Donato	Chairperson
Queens Community Board #11	Mr.	Bernard Haber	Chairperson
Queens Community Board #13	Ms.	Susan M. Noreika	Chairperson
Queens Community Board #14	Ms.	Rosemary Murray	Chairperson
Queens Community Board #2	Mr.	Joseph Conley	Chairperson
Queens Community Board #3	Mr.	George Dickson	
Queens Community Board #3	Ms.	Yale Marienhoff	Chairperson
Queens Community Board #4	Mr.	Subutay Musluoglu	
Queens Community Board #5	Mr.	Vincent Arcuri	Chairman

MTA/LIRR EAST SIDE ACCESS CITIZENS ADVISORY COMMITTEE MEMBERS

Queens Community Board #5	Mr.	Paul Kerzner	
Queens Community Board #6	Mr.	Steven Goldberg	
Queens Community Board #6	Mr.	Joseph Hennessy	Chairperson
Queens Community Board #9	Ms.	Sylvia Hack	Chairperson
Queens Community Board #9	Ms.	Marie Turley	
Queens Independent Living Center	Ms.	Robin Shaikun	Executive Director
Real Estate Board of New York	Ms.	Deborah Beck	Executive Vice President
Real Estate Board of New York	Ms.	Carol Trezza	
REBNY	Ms.	Elizabeth Gibbs	
Regional Plan Association	Mr.	Jeffrey M. Zupan	
Sierra Club - Atlantic Chapter	Ms.	Marion Rose	
Straphanger's Campaign	Mr.	Gene Russianoff	
Suffolk County Council of Chambers of Commerce	Mr.	Louis Van Den Essen	President
TIAA/CREF	Mr.	William J. Forgione	
Trans. Committee Hauppauge Industrial Assoc.	Mr.	Steve Nelson	Chairman
Transport Workers Union - Local 100	Mr.	Dennis Gallen	Legislative Director
Tri State Transportation Campaign	Ms.	Janine Bauer	
Tunnel Workers Union, Local 147	Mr.	Richard E. Fitzsimmons	
United Transportation Union	Mr.	Michael Canino	General Chairman
Urban Transit Club	Mr.	Alexander S. Bockstein	Chairman
Village of Massapequa Park	Mr.	George Nussbaum	Mayor
West Maspeth Local Development Corporation	Mr.	Frank Principe	Executive Director
	Ms.	Hon. Carmen E. Arroyo	New York State Assemblywoman
	Mr.	Steven Ausnit	
	Mr.	Andrew J. Bergmann	
	Mr.	Richard Birch	Asst. Commissioner of Planning & Development
	Mr.	Hon. Richard L. Brodsky	New York State Assemblyman
	Mary	Mary Joe Bury	
	Mr.	David Cannon	
	Mr.	Hon. Adolfo Carrion	Councilmember
	Mr.	Marcus Cederquist	Rep. to Councilmember A. Eristoff
		Dr. Cho	
	Mr.	Demetrius G. Christophides	
	Senator	Hon. Martin Connor	State Senator
	Ms.	Hon. Lucy Cruz	Councilmember
	Ms.	Hon. Gloria Davis	New York State Assemblywoman
	Ms.	Hon. Rosa DeLauro	Congresswoman
	Mr.	Hon. Nelson A. Denis	New York State Assemblyman
	Mr.	Hon. Ruben Diaz	New York State Assemblyman
	Mr.	Hon. Jeffrey Dinowitz	New York State Assemblyman
	Senator	Hon. Christopher J. Dodd	Senator
	Ms.	Rosalyn Dorn	
	Senator	Hon. Thomas K. Duane	State Senator
	Rich	Rich Einhorn	
	Ms.	Hon. June M. Eisland	Councilmember
	Mr.	Hon. Ronnie M. Eldridge	Councilmember
	Mr.	Hon. Eliot L. Engel	Congressman
	Mr.	Hon. Andrew S. Eristoff	Councilmember
	Mr.	Hon. Pedro Espada	Councilmember
	Mr.	Hon. Adriano Espaillat	New York State Assemblyman
	Mr.	Hon. Herbert D. Farell, Jr.	New York State Assemblyman
	Mr.	Victor Fetter	
	Mr.	Hon. Wendell Foster	Councilmember
	Ms.	Hon. Kathryn E. Freed	Councilmember
	Mr.	John Fronhofer	
	Ms.	Hon. Sandra R. Galef	New York State Assemblywoman

MTA/LIRR EAST SIDE ACCESS CITIZENS ADVISORY COMMITTEE MEMBERS

	Mr.	Hon. David F. Gantt	New York State Assemblyman, Chairperson
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	Ms.	Hon. Deborah J. Glick	New York State Assemblywoman
	Senator	Hon. Efrain Gonzalez, Jr.	State Senator
	Senator	Hon. Roy M. Goodman	State Senator
	Mr.	Hon. Richard N. Gottfried	New York State Assemblyman
	Mr.	Hon. Alexander B. Grannis	New York State Assemblyman
	Ms.	Hon. Aurelia Greene	New York State Assemblywoman
	Mr.	Hon. Alexander J. Gromack	New York State Assemblyman
	Mr.	Hon. Jacob E. Gunther III	New York State Assemblyman
	Mr.	Brian Hatch	
	Mr.	Lewis Hitch	
	Ms.	Hon. Audrey G. Hochberg	New York State Assemblywoman
	Mr.	Hon. Stephen B. Kaufman	New York State Assemblyman
	Ms.	Hon. Sue W. Kelly	Congresswoman
	Mr.	Hon. Thomas Kirwan	New York State Assemblyman
	Mr.	Hon. Jeffrey Klein	New York State Assemblyman
	Mr.	Ted LaBarbera	Rep. to Councilmember A. Eristoff
	Mr.	Hugh Lacy	
	Senator	Hon. Vincent L. Leibell III	State Senator
	Senator	Hon. Joseph J. Lieberman	Senator
	Mr.	Hon. Guillermo Linares	Councilmember
	Mr.	Paul Lobo	
	Ms.	Hon. Margarita Lopez	Councilmember
	Ms.	Hon. Nita M. Lowey	Congresswoman
	Mr.	Patrick Mallon	
	Mr.	Hon. James H. Maloney	Congressman
	Ms.	Hon. Carolyn B. Maloney	Congresswoman
	Mr.	Hon. Patrick R. Manning	New York State Assemblyman
	Mr. & Mrs.	Simi & James Matera	
	Ms.	Hon. Naomi C. Matusow	New York State Assemblywoman
	Ms.	Hon. Carolyn McCarthy	Congresswoman
	Mr.	Keith McDermott	
	Senator	Hon. Olga A. Mendez	State Senator
	Mr.	Hon. Stanley E. Michels	Councilmember
	Mr.	Hon. Alan Gifford Miller	Councilmember
	Mr.	Hon. Joel M. Miller	New York State Assemblyman
	Ms.	Lynn Minutaglio	
	Senator	Hon. Daniel P. Moynihan	Senator
	Mr.	Hon. Jerrold Nadler	Congressman
	Ms.	Hon. Catherine T. Nolan	New York State Assemblywoman
	Senator	Hon. Suzanne Oppenheimer	State Senator
	Senator	Hon. David A. Paterson	State Senator
	Mr.	Hon. William Perkins	Councilmember
	Mr.	Hon. James Gary Pretlow	New York State Assemblyman
	Ms.	Hon. Madeline Provenzano	Councilmember
	Ms.	Hon. Cristin Quinn	Councilmember
	Mr.	Hon. Roberto Ramirez	New York State Assemblyman
	Mr.	Hon. Charles B. Rangel	Congressman
	Mr.	Hon. John A. Ravitz	New York State Assemblyman
	Mr.	Hon. Philip Reed	Councilmember
	Ms.	Meg Reed	Rep. to State Senator Connor
	Mr.	Hon. Jose Rivera	Councilmember
	Mr.	Hon. Peter M. Rivera	New York State Assemblyman
	Senator	Hon. David Rosado	State Senator
	Mr.	Hon. Steven Sanders	New York State Assemblyman

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	Mr.	Lewis Schatz	
	Senator	Hon. Eric T. Schneiderman	State Senator
	Senator	Hon. Charles Schumer	Senator
	Senator	Hon. Larry B. Seabrook	State Senator
	Mr.	Danny Seaman	
	Mr.	Hon. Jose E. Serrano	Congressman
	Mr.	Hon. Sheldon Silver	New York State Assemblyman
	Senator	Hon. Nicholas A. Spano	State Senator
	Mr.	Hon. Michael J. Spano	New York State Assemblyman
	Mr.	Hon. Willis H. Stephens, Jr	New York State Assemblyman
	Mr.	Hon. Scott M. Stringer	New York State Assemblyman
	Mr.	Hon. Edward C. Sullivan	New York State Assemblyman
	Mr.	Matthew Telera	
	Mr.	Hon. Ronald Tocci	New York State Assemblyman
	Mr.	Ron D. Troy	
	Senator	Hon. Guy J. Velella	State Senator
	Mr.	Jess Velona	
	Mr.	Hon. Lawrence A. Warden	Councilmember
	Mr.	Hon. Anthony Weiner	Congressman
	Mr.	Ed Wilkonski	
	Mr.	Hon. Keith Wright	New York State Assemblyman

APPENDIX H-3

TECHNICAL ADVISORY COMMITTEE MEMBERS

MTA/LIRR EAST SIDE ACCESS PROJECT: TECHNICAL ADVISORY COMMITTEE MEMBERS

Company		Contact	Title
	Mr.	Roger P. Akeley	Commissioner of Planning
	Ms.	Joyce Lannert	Commissioner of Planning
	Mr.	Andrew Spano	County Executive
Amtrak	Mr.	Walter R. Ernst	General Manager Metropolitan Division
Con Edison of New York	Mr.	John Bennett	
Con Edison of New York	Ms.	Tina Chan	Major Account Representative
Con Edison of New York	Mr.	Richard O'Neill	Major Account Representative
Department of City Planning	Mr.	Richard Barth	Director, Manhattan Office
Long Island Association	Dr.	Dr. Pearl Kamer	Chief Economist
Long Island Association	Mr.	Mitchell Pally	V.P. Legislative Affairs
Long Island Rail Road	Ms.	Pamela Burford	Director of Planning and External Relations
Long Island Rail Road	Mr.	Brian P. Dolan	V.P. Public and Government Affairs
Long Island Rail Road	Ms.	Janet Lewis	Director, Government and Community Affairs
Long Island Regional Planning Board	Dr.	Dr. Lee Koppelman	Executive Director
Mayor's Office of Envi. Coordination	Ms.	Annette M. Barbaccia	Director
Mayor's Office of Transportation	Mr.	Robert Grotell	Director
Mayor's Office of Transportation	Ms.	Rachel Stern	
Metropolitan Transportation Authority	Mr.	Joseph Petrocelli	Chief Financial & Administrative Officer
Metropolitan Transportation Authority	Mr.	William Wheeler	Director of Planning
Metropolitan Transportation Authority	Ms.	Stephanie Williams	Deputy Director
MTA- Capital Programs	Mr.	Francis Landers	
MTA- Long Island Bus	Mr.	Neil Yellin	President
MTA- Metro-North Railroad	Ms.	Robyn Hollander	Manager, Transp. and Environmental Planning
MTA- Metro-North Railroad	Mr.	Richard J. Marcus	
MTA- New York City Transit	Mr.	Peter Cafiero	Manager, Rail Planning
MTA- New York City Transit	Mr.	Thomas R. Jablonski	Director
Nassau County Planning Department	Mr.	Michael Licitra	
Nassau County Planning Department	Mr.	Paul F. Ponessa	Director
New York City Department of City Planning	Mr.	Floyd Lapp	Director Transportation Division
New York City Department of Transportation	Mr.	Naim Rasheed	
New York Power Authority	Mr.	Bart Chezar	Manager
New York State Department of Transportation	Mr.	Chung-Kuo Chiang	
New York State Department of Transportation	Mr.	Peter King	Supervisor of Planning and Development
New York State Department of Transportation	Mr.	Dave Putz	Director of Transit Services Bureau
New York State Department of Transportation	Mr.	Wayne R. Ugolik	Director of Travel Demand Management
NY Metropolitan Transportation Council	Ms.	Michele Bager	
NY Metropolitan Transportation Council	Mr.	Jan Khan	Senior Transportation Analyst
NYS Dept. of Environmental Conservation	Ms.	Mary Ellen Kris	Regional Director
Office of Management & Budget	Mr.	Robert M. Harding	Budget Director
Office of Manhattan Borough President	Mr.	Tim Forker	Policy Analyst
Office of Queens Borough President	Mr.	Michael Sinansky	Consulting Engineer
Queens Office Department of City Planning	Mr.	Dennis Ferris	Director
Queens Office Department of City Planning	Ms.	Penny Lee	
Suffolk County Planning Department	Mr.	Stephen M. Jones	Director of Planning
The Port Authority of NY & NJ	Mr.	P. Clark	
The Port Authority of NY & NJ	Mr.	Anthony Cracchiolo	Director, Airport Access Program
The Port Authority of NY & NJ	Mr.	Dave Widawsky	Director, ARC
United States Department of Transportation	Mr.	Ralph Branche	Area Engineer District A
United States Department of Transportation	Mr.	Anthony G. Carr	Deputy Regional Administrator
United States Department of Transportation	Mr.	Steven Faust	Office of Planning & Program Development
United States Department of Transportation	Mr.	Jon McDade	Director of Planning and Programming
United States Department of Transportation	Ms.	Kate Quinn	Intermodal Transportation Coordinator for NYC

APPENDIX H-4

LIST OF MEETINGS WITH OPERATING AGENCIES

Rail and Transit Working Committees

Working committees are comprised of a network of liaisons between project team members and technically knowledgeable agency personnel. They meet to evaluate the project's conceptual design, resolve issues and review progress made in the project. The following rail and transit working committee meetings have been held:

New York City Transit (NYCT)

April 19, 1999

- Overview of the project
- Access for Impact Testing and surveying in the 63rd Street Tunnel
- Current plans for the T1A &T2A Extensions
- As-Built Drawings for the 63rd Street Tunnel
- Access to the NYCT plans room
- Status of current work in the lower level of the Tunnel
- Combined ventilation vs. separate ventilation in the Tunnel
- Evacuation of the Tunnel

May 18, 1999

- Project update
- Status of the Impact Testing and surveying in the 63rd Street Tunnel
- Access for surveying NYCT areas at Grand Central Station
- NYCT feedback on plans for the T1A &T2A Extensions at the
- 63rd Street Tunnel
- NYCT feedback on combined ventilation vs. separate ventilation in the 63rd Street Tunnel
- As-Built drawings for the Superior Reed Building – Northern Blvd.
- Access to the NYCT plans room

June 21, 1999

- Status of the Impact Testing, surveying in the 63rd Street Tunnel and
- Surveying in Grand Central Station
- Planned geotechnical program for Transit tunnels in Manhattan
- Access to mechanical rooms in the 63rd Street Tunnel
- Proposed options for the T1A & T2A Extensions
- Status of MESA Study
- Lexington Ave. interface between NYCT and the LIRR
- Technical Working Group (TWG)
- Partnering

July 8, 1999

- East Side Access potential impacts to NYCT
- Passenger Movement Options
- Mitigation

July 19, 1999	• Status of the surveying in the 63rd Street Tunnel and • surveying in Grand Central Station • Access to mechanical rooms in the 63rd Street Tunnel • Proposed options for the T1A & T2A Extensions • Lexington Ave. interface between NYCT and the LIRR • Partnering
August 23, 1999	• Status of surveying in the 63rd Street Tunnel • and other NYCT properties • Proposed alignment of T1A & T2A • Lexington Ave. interface between NYCT and the LIRR
September 21, 1999	• Status of surveying in the 63rd Street Tunnel • and other NYCT properties • Status of Proposed alignment of T1A & T2A • Status of Lexington Ave. interface between NYCT and the LIRR
October 19, 1999	• Status of surveying in the 63rd Street Tunnel • and other NYCT properties • Status of Proposed alignment of T1A & T2A • Status of Lexington Ave. interface between NYCT and the LIRR
November 22, 1999	• Status of surveying in the 63rd Street Tunnel and other NYCT properties • Access to locked rooms in the lower level of the 63rd Street tunnel • Surveying and geotechnical borings for other NYCT properties • NYCT's T1A and T2A route protection • Lexington Ave. Station mitigation
December 22, 1999	• Status of surveying in the 63rd Street Tunnel and other NYCT properties • GCT Deep Station Presentation • NYCT subway crossings • NYCT's T1A and T2A route protection • NYCT plans for 29-76 Northern Blvd. • Conceptual Design Review
February 24, 2000	• NYCT T1A and T2A Route Protection cost estimates.
March 17, 2000	• Alternative solutions to the proposed extension of NYCT's T1A and T2A tracks.
March 22, 2000	• monthly update and coordination meeting

March 24, 2000	• alternative solutions to the proposed extension of NYCT's T1A and T2A tracks.
March 24, 2000	• Coordinating site access to NYCT property to perform geotechnical borings.
March 27, 2000	• Coordinating site access to NYCT property to perform site surveys.
April 6, 2000	• Coordinating site access to NYCT property to perform environmental surveys and borings.
April 12, 2000	• Coordinating site access to NYCT property to perform geotechnical borings.
April 24, 2000	• Coordinating site access to NYCT property to perform environmental surveys and borings.
May 2, 2000	• Alternative solutions to the proposed extension of NYCT's T1A and T2A tracks.
May 8, 2000	• Coordinating site access to NYCT property to perform site surveys.
May 10, 2000	• Coordinating site access to the 63Rd Street Tunnel to perform engineering and site surveys.
May 10, 2000	• Coordinating site access to NYCT property to perform geotechnical borings.
May 31, 2000	• Coordinating site access to NYCT property to perform geotechnical borings.
June 1, 2000	• Coordinating site access to NYCT property to perform environmental surveys and borings.
June 21, 2000	• Alternative solutions to the proposed extension of NYCT's T1A and T2A tracks.
June 30, 2000	• Coordinating site access to NYCT property to perform geotechnical borings.
July 27, 2000	• Alternative solutions to the proposed extension of NYCT's T1A and T2A tracks.

August 8, 2000	• Tunnel lighting alternatives.
August 14, 2000	• Monthly update and coordination meeting
October 11, 2000	• Coordination of track alignments in the vicinity of Sunnyside Yard.
October 13, 2000	• Coordinating site access to the 63Rd Street Tunnel to perform engineering and site surveys.
October 24, 2000	• Monthly update and coordination meeting

Metro-North Railroad

May 5, 1999	Project Briefing
June 21, 1999	ESA/MNR Monthly Progress Meeting Agenda included environmental sampling progress report.
July 19, 1999	MNR Working Committee Meeting Agenda included environmental update - Highbridge Yard sampling results reviewed.
August 23, 1999	Working Committee Meeting
September 22 1999	GCT Ventilation
September 27, 1999	Working Committee Meeting
September 27, 1999	GCT Lower Level Track Restoration
October 7, 1999	GCT Ventilation
October 25, 1999	ESA/MNR Monthly Meeting
November 18, 1999	GCT Ventilation
November 19, 1999	GCT Lower Level Track Restoration Scope
November 29, 1999	ESA/MNR Monthly Meeting Agenda included discussion on environmental issues at Highbridge and GCT.
December 1, 1999	ESA/MNR Communications & Signals Interface

December 20, 1999	ESA/MNR Monthly Meeting Agenda included PDEIS discussion and Highbridge Yard and GCT environmental sampling progress.
January 13, 2000	Highbridge Yard Security
January 24, 2000	ESA/MNR Monthly Meeting Agenda included ventilation plant permitting issues.
January 24, 2000	GCT Lower Level Environmental Investigations
February 8, 2000	GCT Lower Level Track Restoration
February 16, 2000	CAD Standards
February 28, 2000	ESA/MNR Monthly Meeting Agenda included discussion on environmental sampling results at Highbridge.
February 28, 2000	Highbridge Yard Development
March 3, 2000	GCT Ventilation Kick-Off
March 6, 2000	GCT Lower Level Track Restoration
March 8, 2000	System Safety and Reliability
March 22, 2000	MNR 2020 Operating Plan Simulation
March 27, 2000	ESA/MNR Monthly Meeting
May 1, 2000	ESA/MNR Monthly Meeting
May 1, 2000	MNR 2020 Operating Plan Simulation
May 11, 2000	MNR Informational Session
May 15, 2000	Highbridge/GCT Progress Meeting
May 22, 2000	ESA/MNR Monthly Meeting
May 24, 2000	MNR Mini-Informational Session
June 26, 2000	ESA/MNR Monthly Meeting
July 24, 2000	ESA/MNR Monthly Meeting

July 28, 2000	Highbridge DC Distribution
August 3, 2000	MNR Conceptual Design Presentation
August 21, 2000	ESA/MNR Monthly Meeting
September 25, 2000	ESA/MNR Monthly Meeting
October 10, 2000	Code Compliance/Enforcement

Amtrak

May 18, 1999	Queens alignment - Presentation on proposed five tunnel scheme and Harold Interlocking alignment.
September 10, 1999	Five tunnel scheme, Sunnyside building demolition. Further discussion on five tunnel scheme, Harold alignment, resultant proposed demolition of Amtrak structures within Sunnyside Yard.
November 15, 1999	Harold Staging - Presentation of Five Stage Harold Construction Plan.
January 6, 2000	Construction staging - Review of Amtrak comments on Harold staging.
January 26, 2000	Meeting with Amtrak Environmental representatives, Richard Mohlenhoff and Amtrak's Environmental Consultants, Roux Associates, to discuss environmental issues at Sunnyside Yard.
February 10, 2000	Meeting on environmental issues at Sunnyside Yard, to discuss NYSDEC requirements.
February 17, 2000	Meeting with NYSDEC (Amtrak environmental representatives in attendance), to discuss environmental issues at Sunnyside Yard.
February 7, 2000	Design Engineering, Infrastructure - Update of Project status. Discussion of various project aspects including design, construction and operations. Held in Philadelphia, PA with Amtrak Engineering Department.
March 2, 2000	Preliminary discussions on MOU.
March 16, 2000	Tour of Sunnyside Yard.
May 15, 2000	Harold Interlocking – Re-route track

July 5, 2000	Harold Alignment – MOU
July 27, 2000	Sunnyside Yard – Force Account Procedures
August 9, 2000	Arch Street Yard / Yard A access
September 12, 2000	Amtrak / NYAR Mail Agreement / Access to Arch Street
September 15, 2000	Amtrak Engineering – Access to Arch Street for Mail service.
October 3, 2000	NYAR Mail Service.
October 6, 2000	Amtrak / NYAR Mail service.

Long Island Rail Road (LIRR)

April 9, 1999	GCT Operating Plan, Sunnyside Station - Presentation of proposed GCT Operating Plan 1.80 and proposed Sunnyside Station configuration.
June 14, 1999	Overview, Technical Working group. Presentation of the role of East Side Access Technical Working Group; purpose, goals etc.
June 22, 1999	Harold, Five tunnel configuration. Presentation of Five Tunnel scheme that was shown to Amtrak on 5/18/99. Discussion of Harold alignment.
July 19, 1999	Queens alignment - Five tunnel scenario. Further discussion of Queens alignment, initial feedback on Harold Interlocking.
August 31, 1999	Maximum Grade, GCT Ops, Queens alignment, ventilation. Overview of proposed track grades in Queens and Manhattan. Discussion of GCT proposed track layout and ventilation plans.
September 20, 1999	Maximum Grade Issue. Presentation of ESA Grade Issues to LIRR Chief Transportation Officer, Chief Mechanical Officer and Chief Engineers Engineering and Strategic Investments.
November 4, 1999	Yard A maintenance requirements and layout with Maintenance of Equipment (M of E).
December 7, 1999	Follow up Yard A maintenance requirements and layout with M of E.
December 21, 1999	Maximum Grade Issue. Discussion of proposal set forth in 9/20/99

	meeting.
December 22, 1999	East End Yards. Discussion with Strategic Investments on ESA impacts in concert with LIRR plans for East End Yard expansion.
January 12, 2000	Engineering Option 2. Presentation on ESA Engineering Option 2 (Deep Mined Station) to LIRR Operating Chiefs.
January 13, 2000	Maximum Grade, Yard A requirements. Discussion on Maximum Grade Issue path forward, LIRR requirements in East Side Yard (Yard A).
February 8, 2000	Meeting on Operations Control Center location with Strategic Investments and Capital Program Management.
March 7, 2000	Operational Issues
March 30, 2000	Presentation of Engineering Option 2 to LIRR President.
April 4, 2000	Yard A / Arch Street – MofE Facility.
April 11, 2000	Grade Issue
April 12, 2000	Presentation of Engineering Option 2 to Senior Vice-President, Operations Staff.
April 17, 2000	Harold Reroute track
April 18, 2000	Presentation of Engineering Option 2 – Alternative 11D
May 19, 2000	Alternative 11D – Tail Tracks
July 20, 2000	NYAR Freight Amendment
July 27, 2000	Conceptual Design – Package Presentation
August 10, 2000	Harold Construction - Stage Zero
August 22, 2000	ESA – Open Issues
August 31, 2000	GCT – Tail Tracks.
September 1, 2000	Mis-routing of trains – System solution.
September 21, 2000	Arch Street – M-7 acceptance facility
October 26, 2000	ESA Update – Open Issues.

New York & Atlantic Railroad (NY&AR)

February 15, 1999	Meeting to collect information from NY&AR for the development of design criteria for the relocation of NY&AR form Yard A.
May 25, 1999	Meeting to obtain additional information regarding freight operations at Yard A and Maspeth Yard.
September 21, 1999	Relocation Plan - Yard A replacement facilities, Fresh Pond shop area, Blissville Yard. Discussion of proposed relocation plan of New York and Atlantic Railway facilities out of existing Yard A.
January 20, 2000	Presentation of STV proposed layout of Fresh Pond, Bliss Yard. Presentation of drawings prepared by STV showing proposed layout of shop area at Fresh Pond and lay up tracks at Blissville.
March 13, 2000	Comments from NYAR on STV proposal. Continued discussion of facilities for NYAR to be provided at Fresh Pond and Blissville.
May 9, 2000	NYAR comments on Fresh Pond proposal
May 16, 2000	Fresh Pond / Bliss discussions.
May 22, 2000	Fresh Pond / Bliss discussions.
July 6, 2000	Arch Street Freight Yard
July 20, 2000	Freight Amendment
August 7, 2000	Proposed Third Amendment agreement
September 12, 2000	Amtrak / NYAR Mail Agreement / Access to Arch Street
September 14, 2000	Third Amendment Negotiations
September 15, 2000	Amtrak Engineering – Access to Arch Street for Mail service.
October 6, 2000	Amtrak / NYAR Mail service.

New Jersey Transit (NJ Transit)

A meeting was held in June 1999 with NJ Transit to provide a general project description.

Public Affairs Task Force (PATF)

The PATF was created to include representatives from affected rail and transit agencies. The PATF has served as a resource for review of public outreach materials, coordination of meeting dates and distribution of meeting notices (posters and seat drops). Members of the PATF include representatives from the NJ Transit, Amtrak and the MTA including MNR, LIRR and NYCT. Meetings have been held throughout the course of the environmental review phase.

February 10, 1999	• Schedule of meetings and materials • Process for approvals • Mailing lists • Coordination of agencies' schedules and events
April 26, 1999	• Draft of web site page • Drafts of brochure and first fact sheet • Discussion of posters and seat drops • Railroads/Transit calendars of meetings
September 23, 1999	• Discussion of agencies' public meetings
May 23, 2000	• Status of project • Discussion and Comments on DEIS • Discussion of effectiveness of seat drops • Discussion of informational and public meetings

Technical Working Group (TWG)

The TWG is comprised of high level technical staff from the East Side Access project, senior executive level MTA project staff, and high level technical staff and managers from LIRR and MNR. Positions of TWG members inlcude MNR Director of Capital Program, LIRR New Fleet Engineer, LIRR Transportation Superintendent, Penn Station Superintendent, LIRR Strategic Investment Project Manager and LIRR Engineering Project Manager.

The TWG's purpose is to resolve technical issues and formally adopt plan elements.

May 21,1999	• Technical Work Group Kick-off Meeting
June 01,1999	• ESA Project Horizontal & Vertical Datum • Design Criteria; ESA Project Maximum Profile Gradient • ESA Project CADD Standards

June 15,1999	• Design Criteria; ESA Project Maximum Profile Gradient • ESA Project CADD Standards • Railroad Operating Requirements: Train Rescue
June 29,1999	• Design Criteria; ESA Project Maximum Profile Gradient • ESA Project CADD Standards • Railroad Operating Requirements: Train Rescue • ESA Project Horizontal & Vertical Datum • Minimum Platform Width & Controlling Clearances @ GCT • GCT Cross Passageway Locations
July 13,1999	• Design Criteria; ESA Project Maximum Profile Gradient • ESA Project Horizontal & Vertical Datum • ESA Project CADD Standards
August 3,1999	• Design Criteria; ESA Project Maximum Profile Gradient • ESA Project Horizontal & Vertical Datum • Minimum Platform Width & Controlling Clearances @ GCT • Queens Alignment Alternatives / Sunnyside Yard Loop Track • NYCT Tracks T1A/T2A: Route Protection Strategy • Railroad Operating Requirements: Train Evacuation Strategy • Deep Mined Alternatives • Manhattan Tunnel Alignments
August 17,1999	• Design Criteria; ESA Project Maximum Profile Gradient • Minimum Platform Width & Controlling Clearances @ GCT • Queens Alignment Alternatives / Sunnyside Yard Loop Track • Deep Mined Alternatives • Manhattan Tunnel Alignments • NYCT Tracks T1A/T2A: Route Protection Strategy
September 7,1999	• Design Criteria; ESA Project Maximum Profile Gradient • Minimum Platform Width & Controlling Clearances @ GCT • Queens Alignment Alternatives / Sunnyside Yard Loop Track • Traction Power Systems Models & Analysis
September 21,1999	• Design Criteria; ESA Project Maximum Profile Gradient • Minimum Platform Width & Controlling Clearances @ GCT • Queens Alignment Alternatives / Sunnyside Yard Loop Track • Manhattan Tunnel Alignments • Traction Power Systems Models & Analysis

October 19,1999	• Railroad Operating Requirements: Train Evacuation Strategy • Power Distribution & Vent Plant Operating Voltages • Railroad Operating Requirements: Operations Control Center Location(s)
December 21,1999	• Minimum Platform Width & Controlling Clearances @ GCT • Railroad Operating Requirements: Train Evacuation Strategy • Manhattan Tunnel Alignments • Power Distribution & Vent Plant Operating Voltages • Railroad Operating Requirements: Operations Control Center Location(s)
March 21, 2000	• Design Criteria: Minimum Platform Width and Controlling Clearances at GCT • Railroad Operating Requirements: Train Evacuation Strategy in Tunnels • Power Distribution & Vent Plant Operating Voltages • Harold Misrouting of Trains
April 25, 2000	• Railroad Operating Requirements: Train Evacuation Strategy in Tunnels • Train Live Loads in Tunnels • Harold Misrouting of Trains • Traction Power Systems Models & Analysis • Project Horizontal & Vertical Datum
May 30, 2000	• Railroad Operating Requirements: Train Evacuation Strategy in Tunnels • Traction Power Systems Models & Analysis • Harold Misrouting of Trains • GCT Platform Clearances • Train Live Loads in Tunnels • Bi-Level Trains to GCT
June 27, 2000	• GCT Platform Clearances • Traction Power Systems Models & Analysis • Train Live Loads in Tunnels
July 25, 2000	• GCT Platform Clearances • Train Live Loads in Tunnels • Tunnel Dimensions

September 28, 2000	• Basis for Traction Power Systems Models and Analysis • Tunnel clearances (Dimensions)
November 20, 2000	• Basis for Traction Power Systems Models and Analysis • ESA Project CADD Standards • Design Criteria: Minimum Platform Width and Controlling Clearance • Harold Misrouting of Trains

Appendix I: Comments Received on the DEIS

LIST OF GROUPS AND INDIVIDUALS WHO COMMENTED ON THE DEIS

Comments were received at the public hearing on June 15, 2000. In addition, written comments were submitted throughout the 45-day comment period and continuing through December 1, 2000. Commenters are listed below and copies of the hearing transcript and all written comments are attached in the same order.

1. Larry Silverman, Long Island Rail Road Commuters Council, comments made at public hearing.
2. John Steinberg, for Carlisle Towery, President, Greater Jamaica Development Corporation, comments made and written testimony submitted at public hearing.
3. Lisa Schreibman, Tri-State Transportation Campaign, comments made and written testimony submitted at public hearing.
4. Dean Angelakos, New York Building Congress, comments made and written testimony submitted at public hearing.
5. Lucy Mayo, for the Office of New York State Senator Thomas Duane, comments made and written testimony submitted at public hearing.
6. Jeffrey Zupan, Regional Plan Association, comments made and written testimony submitted at public hearing.
7. Richard Gualtieri, comments made at public hearing.
8. Gene Russianoff, NYPIRG Straphangers Campaign, comments made and written testimony submitted at public hearing.
9. Irwin Fruchtman, comments made at public hearing.
10. Louis P. Venech, Senior Manager, Transportation Policy Development, Office of Policy & Planning, Port Authority of New York & New Jersey, comments made at public hearing and letter dated July 12, 2000.
11. Jeff Elmer, General Contractors Association, comments made and written testimony submitted at public hearing.
12. Barry Adler, comments made at public hearing.
13. Herbert Landow, comments made, written testimony submitted at public hearing.
14. Robert Schumacher, comments made and written testimony submitted at public hearing.
15. George Haikalis, Committee for Better Transit, comments made and written testimony submitted at public hearing, and letter dated July 12, 2000.
16. Lester Epstein, Owner, 47 East 44th Street, comments made and written testimony submitted at public hearing.
17. Danny Pearlstein, comments made at public hearing.
18. John Cornelius, Bowne Park Civic Association, comments made at public hearing.
19. Ron Troy, comments made at public hearing.
20. Kristin Harrison, for the Office of U.S. Congresswoman Carolyn Maloney, comments made at public hearing.
21. Joel Azumah, comments made at public hearing.

22. Louis Hitch, comments made at public hearing.

23. Robert Olmstead, comments made at public hearing.

24. John Landers, comments made at public hearing.

25. Chung-Kuo Chiang, Ph.D., PE, New York State Department of Transportation, memorandum dated May 24, 2000.

26. Thomas S. Gulotta, County Executive, Nassau County, letter dated May 31, 2000.

27. Steven Ausnit, letter dated June 6, 2000.

28. Ron M. Aryel, MD, MBA, letter received June 7, 2000.

29. Patricia Zedalis, Chief Executive for School Facilities, New York City Board of Education, letter dated June 12, 2000.

30. Claire Shulman, President, Borough of Queens, letter dated June 13, 2000.

31. Mitchell Pally, Long Island Association, letter dated June 13, 2000.

32. New York State Senator Dean G. Skelos, written testimony dated June 15, 2000.

33. David E. Buerle, Coastal Resources Specialist, New York State Department of State, Division of Coastal Resources, letter dated June 15, 2000.

34. Joshua L. Schank, Transportation Planner, Permanent Citizens Advisory Committee to the MTA, memorandum dated June 20, 2000.

35. New York State Assemblywoman Catherine Nolan, letter dated June 28, 2000.

36. Richard C. Visconti, R.A., Acting Commissioner, New York City Department of Buildings, letter dated June 29, 2000.

37. Julian W. Adams, Senior Historic Sites Restoration Coordinator, New York State Office of Parks, Recreation and Historic Preservation, letter dated July 7, 2000.

38. Joseph B. Rose, Chairman, City Planning Commission, City of New York, letter dated July 7, 2000.

39. Daniel A. Nigro, New York City Fire Department, letter dated July 7, 2000.

40. Walter R. Ernst, General Manager, Metropolitan Division, Amtrak, letter dated July 11, 2000.

41. Richard H. Salmon, Jr., letter dated July 11, 2000.

42. David E. Buerle, Division of Coastal Resources, New York State Department of State, letter dated July 12, 2000.

43. Stephen B. Dobrow, Committee for Better Transit, Inc., letter received July 13, 2000.

44. Robert W. Hargrove, Chief, Strategic Planning and Multi-Media Programs Branch, United States Environmental Protection Agency, Region 2, letter dated July 14, 2000.

45. Willie R. Taylor, Director, Office of Environmental Policy and Compliance, United States Department of the Interior, letter dated July 17, 2000.

46. Joshua Laird, New York City Department of Parks and Recreation, letter dated July 19, 2000.

47. Jeffrey A. Warsh, Executive Director, NJ Transit, letter dated July 19, 2000.

48. Members of the Greenlawn/Huntington, Babylon, and Riverhead communities, approximately 300 letters received July 21, 2000 and later.

49. Kevin M. Gary, resident of Greenlawn, letter dated July 21, 2000.

50. Mark Cuthbertson, Councilman, Town of Huntington, letters dated July 26 and August 1, 2000.

51. Charles de Quillfeldt, Regional Permit Administrator, New York State Department of Environmental Conservation, Division of Environmental Permits, Region 2, letter dated July 27, 2000.

52. Allan H. Goldberg, Assistant Commissioner for Bureau Management, Regulatory and Environmental Health Sciences, The City of New York Department of Health, letter dated August 2, 2000.

53. Gina Santucci, The City of New York Landmarks Preservation Commission, Environmental Review, comments dated August 3, 2000.

54. Keith A. Archer, Morton Weber and Associates, Attorneys at Law, letter dated August 7, 2000.

55. Robert W. Ramage Jr., resident of Huntington, letter dated August 8, 2000.

56. Owen H. Johnson, Vice President Pro Tempore, New York State Senate, letter dated August 30, 2000.

57. Henry L. Barton, Jr., Clerk of the Legislature, letter dated September 19, 2000 (enclosing a sense resolution adopted by the Suffolk County Legislature on September 12, 2000).

58. Gene Gaye, resident of Huntington, letter dated October 6, 2000.

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METROPOLITAN TRANSPORTATION AUTHORITY,

RE: PUBLIC HEARING EAST SIDE ACCESS PROJECT

----------X

347 Madison Avenue
New York, New York

June 15, 2000
6:00 p.m.

PRESENT FROM MTA:

E. VIRGIL CONWAY, Chairman

DOUGLAS SUSSMAN, Deputy Director Govt. & Community Relations

BEVERLY DOLINSKY, Board Member

KENNETH CARUSO, Board Member

ANTHONY JAPHA, Chief Program Executive East Side Access

MR. SUSSMAN: Good evening, my name is Douglas Sussman, Deputy Director of Government & Community Relations for the MTA. I will serve as the hearing officer for today's hearing.

Before we begin, I would like to take a few moments to explain the purpose and procedures for this public hearing. The purpose of this hearing is to receive comments from our customers and the general public on the draft environmental impact statement on the MTA Long Island Railroad East Side Access Project.

This East Side Access Project will bring the Long Island Railroad to Grand Central Terminal by the existing 63rd Street tunnel beneath the East River. East Side Access will eliminate the over crowding conditions many customers face in their commute to Penn Station and provide commuters from Queens, Nassau, and Suffolk Counties with a direct single seat ride to work.

East Side Access will also provide a

new Long Island Railroad station at Sunnyside Yard, Queens and take cars off the roads during peak commuting hours.

For detailed information on the DEIS, please speak to the MTA East Side Access staff who are located near the registration table.

To promote this hearing, an advertisement was published in general circulation, community, and minority newspapers throughout the area including Newsday, The Journal News, Connecticut Post, Yankee Trader, Anton Community Newspapers, The Queens Chronicle, The Amsterdam News, and El Diario-La Prensa.

Notice of the hearing was also published in the Federal Register on May 26, 2000. Information on the hearing and the DEIS was also placed on the MTA online Internet service. A notice of public hearing was mailed to all public officials and interested parties in the MTA service area, and a press release announcing the hearing was sent to all media outlets in

the area.

Seat notices announcing the hearing were distributed on all MTA Long Island Railroad and Metro-North trains and posters placed in all stations.

For the record, the date is Thursday, June 15, 2000. The time is 6:08 PM. The hearing site is the board room of MTA headquarters located at 347 Madison Avenue, New York.

Before we begin, I would like to explain the procedures for this public hearing. First I will call the names of people who registered to speak prior to today's hearing. Then I will call the names of people who registered today in the order in which they signed up. If you wish to speak and have not filled out a registration form, do so at this time. Registration closes at eight PM.

There is a stenographic reporter located in the room who will record all comments and statements for the record. If you have a copy of your statement, please

hand it to the reporter as you conclude to help assure we have an accurate transcript.

So we may hear from all interested people this evening, please confine your remarks to three minutes. If you run out of time, you can submit written comments to supplement your verbal testimony. You may also drop off the testimony at the registration table or mail it to me at the MTA Government Relations Office at 347 Madison Avenue, New York 10017. We have already received a number of written comments most of which are supportive of the project notably from Deputy Majority Leader Senator Dean Skelos and the Long Island Association.

I should point out the hearing site is accessible to the mobility impaired and a sign language interpreter available upon request.

Before we begin, I will introduce the people seated before you. To my right is E. Virgil Conway, Chairman of the MTA. To

his right is Beverly Dolinsky, Ken Caruso, and to my left is Anthony Japha, Chief Program Executive of East Side Access.

At this time we will go to the list of speakers the first of which is Larry Silverman from the Long Island Railroad Commuters Council.

MR. SILVERMAN: Good evening. I represent the Long Island Railroad Commuter Council which are probably 125 thousand daily riders of the Long Island Railroad and many occasional riders on Long Island. If I go a little beyond three minutes, I will ask your indulgence, Mr. Chairman, because I think I have spoken to many of them, and all of my council members and I would like to relate their feelings.

This is a great day for the MTA and you Chairman Conway. I remember sitting in this room five or so years ago as if it were yesterday, and some of my colleagues said this day would never come. Government would never commit the resources to finish

(1)

the Long Island Railroad tunnel to Grand Central that was started more than 20 years ago.

To our great fortune, there are always those, you Mr. Chairman and the Governor, within the MTA and those within the MTA who saw a system expansion as imperative and not an option. People who could think beyond the box and yes, beyond the budget. With them was not the question of whether but how. Many of them have dedicated most of their lives to the great challenges of urban mass transit. To them we owe a great debt. This project is truly their legacy to this great City that will stand for centuries to come.

There are so many reasons to complete East Side Access that if we only realized half of them, we would still build it. The East River tunnels to Penn Station have no additional capacity to bring the Long Island Railroads ever increasing ridership into the midtown business district. Without it, Long Island can't accommodate

its commuter population. If it can't do that, it cannot compete with the other suburban areas in New Jersey and Connecticut for residents and the support those residents give to the regional economy. If they go elsewhere, New York taxpayers lose.

Without the Long Island Railroad service, without the quality of Long Island Railroad service this project will permit, service deteriorates, and commuters opt for cars and increased pollution.

This project will relieve over crowding on the Shuttle, the 7 train, E trains, and others to a lesser degree. It will increase overall capacity of the bus and subway system that will reduce future costs for expansion on that system. It will create capacity in Penn Station for Metro-North service making the West Side of Manhattan more accessible to those from the northern suburbs. It will save many Long Islanders up to two and a half hours

(2)

a week and 120 hours a year, and it will save them the additional subway and bus fares. These savings of time and money will make employment on the East Side more attractive and feasible for Long Island commuters thus enhancing overall employment in the region.

Let's not forget the enormous pollution benefits from cars, taxis, and buses traveling into and across the central business district that will be reduced. This is what government is supposed to be about. It is supposed to be about vision, leadership, commitment, and service.

(2)

This project has bipartisan support. This project has the support of regional planning groups that are responsible and that understand that for this region to thrive and grow we need to continue to build and invest in it.

MR. SUSSMAN: Please conclude.

MR. SILVERMAN: This project is a reaffirmation of the strength of our

economy and of the importance of New York in the world. Nothing less. It's a statement to the world that we believe in ourselves and our future.

Finally to those who will come in and try to find the Achilles heel in the project because they have other priorities, let me say this. These dollars were hard fought for as you know. These dollars, many of which are from the federal government, depend on this project being able to go forward, and those who would seek to frustrate that have to ask if they will do so at the peril of losing that support forever.

In closing, I would say that we Long Island Railroad commuters look forward in the next decade to the ribbon cutting ceremony for East Side Access to Grand Central. Thank you.

MR. SUSSMAN: The next speaker is John Steinberg of the Greater Jamaica Development Corporation. If you have a copy of your statement, hand a copy to the

court reporter as you conclude.

MR. STEINBERG: Thank you very much. I am speaking for Carlisle Towery, President of the Greater Jamaica Development Corporation who couldn't be here but wanted to be here.

Ours is a private not for profit economic development organization. We have been around since 1967 an out growth of the Regional Plan Association.

We really dig what you are doing here which is about regional connectivity. We are also very interested in job creation, job opportunities, and in particular jobs for minorities.

There are, as you know, issues about the ability of people in minority communities to connect with the centers of job opportunity, and certainly good rail connections are the way to do that.

Our board has enthusiastically supported your initiative here on East Side Access. I have attached to our statement a copy of the resolution that

(1)

(2)

was adopted a few months ago. We really think it is time for New York to come up to the high standards for rail services in the best European metropolises. We have the ability with the density of population to equal that. This is a terrific step towards that end.

We think as the prior speaker said that there are tremendous opportunities for both Queens commuters and our Long Island counter parts to get to Manhattan's East Side with this protect. It will save 60 thousand commuters 30 to 45 minutes a day and remove 12 thousand cars from the roads of Queens and East River crossings with obvious environmental effects in the positive.

We note that connection from Long Island Railroad to Grand Central will for Metro-North riders significantly enhance accessibility in our locale in Jamaica via the transfer at Grand Central and of course to JFK which inside of three years will be connected to Jamaica with an eight

minute train ride to the air terminal.

Residents of upper Manhattan, The Bronx, Yonkers, and close-in Westchester Hudson River towns will be within easy rail commute to Jamaica Station.

The attached map indicates the geographic areas of the region which ESA will bring within a 45 minute ride from Jamaica Center which is now significantly expanded to the north by the anticipated connection with Grand Central. We estimate that 345 thousand workers from the northern suburbs and upper Manhattan would be added to our Jamaica labor shed; 51 thousand from Manhattan, and 204 thousand from the Bronx, and 71,000 from Westchester.

(1)

This strengthens the local objectives of attracting jobs to Jamaica and RPA's long time recommendations of building sub-centers at transportation hubs outside of Manhattan, and as a result, two of the regional sub-centers, White Plains and Jamaica, would be connected by rail via

Grand Central. Thank you.

MR. SUSSMAN: Thank you. The next speaker is Lisa Schriebman.

MS. SCHRIEBMAN: My name is Lisa Schriebman. I am the New York City Coordinator for the Tri-State Transportation Campaign. It is a consortium of the region's 13 leading environmental, planning, and transit advocacy groups that work to achieve sustainable transportation by --

MR. SUSSMAN: Speak into the microphone.

MS. SCHREIBMAN: The East Side Access is an excellent project. According to the MTA, it will attract 16,300 new transit riders and save 45 thousand users of the present service the time it takes to back track from Penn Station to the East Side and get six thousand people out of their cars each day. All of this means cleaner air for everyone and less congestion on the highways and tunnels.

The East Side Access project will

include a new station at Sunnyside that could become a hub for the train services including the three major commuter rail systems serving New York City, Amtrak, and the New York City Transit subways. This type of commitment to making Long Island Railroad not only good for suburban travelers but also for people in the city is heartening to see. (3)

MTA has successfully passed the federal hurdle, and the project now has a recommended status which makes it eligible for New Starts money. The MTA is asking for approximately 2.1 billion dollars from federal sources or half the project's total. (4)

However, the FTA has not given the project a highly recommended status partially based on the low number of new riders who will use the service. Given the lack of adequate subway service on Manhattan's East Side, it seems likely that some of the people who will use the service will forego transit even after (1)

East Side Access is built rather than face the over crowded conditions on the 6 line.

We urge the MTA to coordinate the project with the building of the Second Avenue subway a coordination that will make both projects significantly stronger than separately. The combination of East Side Access and Second Avenue subway should be a preferred alternative identified in the FEIS. Thank you.

MR. SUSSMAN: Dean Angelakos.

MR. ANGELAKOS: Good evening, my name is Dean Angelakos, Vice President for Policy of New York Building Congress.

Mr. Chairman and members of the committee, we appreciate the ability to comment on the DEIS prepared for the East Side Access project. This project to bring the Long Island Railroad to Grand Central is one of the most critical transportation investments in the New York region.

Members of the Building Congress who are leaders of the design, construction and real estate industry of New York City

representing over 150 thousand constituents support the East Side Access project. From its inception in the late 1960's, the concept of providing direct Long Island Railroad access to the East Side has been an important objective for New Yorkers.

It is a vital component of the MTA's latest capital program which the Board of Directors of the Building Congress has endorsed enthusiastically. The MTA has made progress for the past 15 years by implementing four capital programs that have maintained and enhanced the transit system. The East Side Access Project, as part of an overall capital program that inspires confidence, and support, will continue the MTA's record of success.

Over the past year, the Building Congress and its committees have had a number of meetings on this project. In each case, project plans were reviewed in considerable detail. We are pleased to report that the project enjoys support in

our industry. There is no question for the need for East Side Access nor any disputes regarding a preferable alternative.

Our only concern is for adequate financial support of the project and the entire capital program. While transit infrastructure is much improved, sufficient resources are still not generated to meet the long term needs of the expanding economy. The Building Congress has implored our leadership on all government levels to dedicate greater long term financing for public transportation. Nowhere is this more apparent than with the East Side Access Project which has received a small portion of its funding.

We commend the MTA and its Long Island Railroad subsidiary for advancing LIRR access to the East Side of Manhattan. Few projects have enjoyed as widespread support in our industry as this one. From the outset it was planned with the fullest possible public involvement and with the

best expertise our industry has to offer. The project deserves our support and encouragement. We urge the MTA to continue fast track implementation and to devote its best efforts to securing the necessary financial support. Thank you very much. (2)

MR. SUSSMAN: The next speaker is Lucy Mayo.

MS. MAYO: Good evening, my name is Lucy Mayo. I am here representing State Senator Thomas Duane who represents the 27th Senatorial District in Manhattan. I am here to express his concerns about the plans for the Long Island Railroad East Side Access as outlined in the recently released DEIS for the project.

Senator Duane believes there are many positive aspects to linking the Long Island Railroad with Grand Central Terminal through the creation of an East Side Access but is greatly concerned about the proposed timing of the project. An East Side Access will make commuting for thousands who ride the Long Island (3)

Railroad to destinations on the East Side of Manhattan significantly easier.

However, the completion of the East Side Access Project before the completion of the full length Second Avenue subway will result in much hardship for the current riders on the Lexington Avenue line. The influx of Long Island Railroad riders on the Lexington line, facilitated by East Side Access, will greatly exacerbate the extreme over crowding on the Lexington line. The current over crowding on the Lexington line is unbearable at the current level. Pushing it up is unacceptable, and irresponsible, and Senator Duane will argue dangerous.

Not only will increased capacity make for an even more unbearable uncomfortable commute, but it threatens the health and safety of passengers as more people cram into cars not made to accommodate such numbers, and more overcrowding in stations, and on subway platforms make for fertile ground for a variety of dangerous

accidents or incidents.

To prevent such a situation from occurring, it is imperative that East Side Access not be completed until or unless we have completed a full length Second Avenue subway line. This additional line along the East Side of Manhattan will greatly reduce the over crowding on the Lexington line. With this in place, the influx of passengers for the Long Island Railroad on to the Lexington line will not have the overwhelming negative effect it would have under current conditions and not bring capacity levels to dangerous levels. Thank you.

MR. SUSSMAN: Jeffrey Zupan.

MR. ZUPAN: Thank you and good evening. My name is Jeffrey Zupan. I am senior fellow for transportation at the Regional Plan Association. RPA has been a consistent supporter of the project to connect the Long Island Railroad to Grand Central.

A little history of this project is

instructive. In the early 1970's when the project was proposed to be built to Third Avenue and 48th Street by the then MTA Chairman, Will Ronan, we objected on the grounds it should go directly to Grand Central to avoid creating a disconnected network. Unfortunately, the fiscal difficulties of the 1970's prevented the completion of the project in any form, and the commuter rail tunnel under the East River has been vacant for 25 years. The best thing of the delay is that the superiority of RPA's Grand Central option has been borne out by consultant studies.

(5)

The project known as East Side Access is an excellent project and one that will transform Long Island from a vast suburban area with an inferior commute to Manhattan to one that will be as good or better than any other suburban sector in the region. It will help lift up the economy of Long Island and overcome some of its dead end qualities. Long Islanders will have the option of reaching either the east or West

(6)

Side of Manhattan. An estimated 60 thousand commuters a day will save about 45 minutes by going directly to the East Side closer to their destinations, and another six thousand commuters a day will foresake their automobiles and the crowded roads of Nassau and Suffolk Counties and the Borough of Queens.

East Side Access will add about 24 peak hour trains from the east to the 42 peak hour trains that are now possible to reach Penn Station from the east. This will not only add capacity to bring more workers in Manhattan to the high paying jobs there, but offer flexibility in adding Amtrak service, better operation for New Jersey Transit from the west, and more service for Queens and Long Island residents. It will make it possible to travel by rail from Long Island and Metro-North service territory.

Given the benefits, RPA was delighted to unconditionally support East Side Access, but we cannot. The full Second

Avenue subway must be built and completed simultaneous with East Side Access. The MTA has not given any assurance this will be done. The capital program requests to the federal government subject to a hearing next week asks for 600 million for East Side Access and five million for Second Avenue.

The result is once East Side Access is in place the already intolerable congestion on the Lexington line will get worse. The East Side Access DEIS recognizes that the impacts in the subway will only be partially mitigated by improvements in the platforms and the turnstiles at the 42nd Street station.

The DEIS suggests that the number of additional commuters will be small. In part because some Long Island Railroad riders who would otherwise use the Lexington line after being dropped by East Side Access at Grand Central will choose not to use East Side Access because the Lexington line is too crowded. Thus the

DEIS and the MTA is admitting that if there is no Second Avenue subway to relieve the Lexington line, the full benefit of East Side Access will not be realized.

Should we be giving approval for the flawed approach that will help some members of the riding public and make it worse? RPA thinks not.

RPA supports East Side Access that is coordinated with and completed simultaneous with a full build Second Avenue subway.

MR. SUSSMAN: Please conclude.

MR. ZUPAN: We recommend that the final EIS fully assess this alternative and commit to it in a Record of Decision that will accompany East Side Access.

In the spirit of openness, we look forward to having the MTA engage us in discussions on these matters and not merely treat this hearing and others like a formality in a process. Thank you.

MR. SUSSMAN: Richard Gualtieri.

MR. GUALTIERI: Thank you for this opportunity to speak. I am very upset that the funding of this project would grossly disproportionately benefit certain suburban commuters while the growth needs of the city particularly in terms of the Bronx people, Brooklyn people, and Staten Island commuters are virtually completely overlooked.

I am also concerned very much about the connection from Second Avenue to Park Avenue which appears to pass beneath many residences and businesses, and the EIS that has been prepared does not in any way seem to talk about the needs of these or the impacts of construction possible that may occur in this corridor.

I believe that the underground easements that might be required are not in any way defined. The construction impacts are not defined. As I say, it seems to be that the overall capital

program over emphasizes Long Island commuters and does not adequately address the woefully inadequate subway system in the five boroughs themselves. It is grossly disproportional. Thank you. (1)

MR. SUSSMAN: Thank you. The next speaker is Gene Russianoff.

MR. RUSSIANOFF: Good evening Mr. Chairman, and members of the Board, and staff. I am Gene Russianoff, staff attorney for the NYPIRG Strap Hangers Campaign.

The Straphangers Campaign agrees there are major benefits to linking the Long Island Railroad to Grand Central, but, and (7) this is the theme of the evening so far, progress for Long Island Railroad riders should not come at the expense of subway riders on the already jam packed Lexington (1) express lines. East Side Access would mean pushing the Lexington line from 112 percent capacity to 117 percent capacity (2) according to your own DEIS. This is intolerable, and, indeed, the impact

statement suggests the number would be higher except that many of the Long Island Railroad riders will shun Grand Central because they can't bear to try and insert themselves on the Lexington line. The impact statement spells out potential mitigation for crowding to the Lexington line. These steps are unconvincing and largely amount to cajoling passengers on the line to moving faster or get out of the way.

(3)

What is the solution? East Side Access should be built in tandem with a full length Second Avenue subway. That way no traveler on the East Side, whether from the Long Island Railroad or somewhere else, would face inhuman traveling conditions.

(4)

Unfortunately, the two projects are not being given the equal financial and political treatment. MTA says it will complete East Side Access by 2009. The MTA has no estimated completion for when the Second Avenue subway will be completed.

(5)

This program provides nearly half of the three point 56 billion dollars in basic construction for East Side Access, and to quote Carl McCall, the MTA's five year capital program includes only one point one billion dollars for a full length Second Avenue less than seven percent of the total cost. During the 1970's fiscal crisis, MTA had to abandon the efforts to construct a Second Avenue subway for lack of resources a costly mistake that must not be repeated. For Second Avenue the glass is 1/14 full.

As the RPA suggested, we urge the final Record of Decision for the FEIS East Side Access tie the project to a concrete commitment to building a Second Avenue in tandem. Thank you. (C)

MR. SUSSMAN: Irwin Fruchtman.

MR. FRUCHTMAN: Good evening, my name is Irwin Fruchtman. I reside in Brooklyn. I am a professional engineer, and I have been involved in planning and constructing major transportation projects

for over 50 years.

The conclusions reached in the DEIS are not backed by the material. The need for the four point three billion dollar East Side terminal at Grand Central is not justified from either a cost benefit, land use, and future development perspective. The alternate studies are not sufficient to be considered a fair review of other practical hard and soft alternatives especially in light of the four point three billion dollar cost and the long period of construction that would bring us to the year of 2013 for the preferred alternative.

(1)

The study of the zoning patterns below Central Park reveals that the future development of the commercial, high tech, light industrial, and similar growth industries will occur west of Fifth Avenue and down to and along the Hudson River water front. Because the zoning east of Fifth Avenue is overwhelming residential and the land is already redeveloped for

(2)

these uses, no large commercial opportunities exist, err go, no generation of traffic.

With few exceptions, the West Side is zoned for manufacturing use as reflecting its historic relationship to the once bustling water front and port. This zoning will permit modern future business the city needs to supply the job growth it must sustain.

The Long Island Railroad station at Penn Station is ideally situated to meet and fulfill the future demands if the foresight to do this is there. What you could do is develop a connection to the rail system similar to what is being done on the Jersey water front that runs north and south of Penn Station.

The only hard alternative that has been studied, the 4.3 billion dollar alternative, has no capacity in the 63rd Street tunnel for the bilevel alternatives. There is no storage capacity at Grand Central so you have to bring the

(3)

(4)

trains back through those tunnels which will also reduce capacity.

The actual savings of time is overstated. If the East Side Access terminal is built at Grand Central, you have to go up about 123 feet from the platform level to the ground. That is a 12 story building vertically. That will take you time also. If you will make a connection with the subway, you have to walk six long blocks to get to the Lexington line or to the future connection so you are not going to save any time by this. Any savings in the double back is purely fictitious.

The future development of the West Side requires a West Side transit link. If passengers desire to continue from Penn Station to an east side destination, this can be accomplished at a fraction of the cost by extending the shuttle all the way to Penn Station, and your shuttle can go east to Grand Central and continue on to the Second Avenue subway.

Another alternative --

MR. SUSSMAN: Please conclude.

MR. FRUCHTMAN: One point. This is important. Another alternative was to build a completely new tunnel for bilevel trains where your present tunnel goes across. If you did a three track tunnel, and the short distance into Grand Central, look at the distance. It is about the same as tunnelling all the way down. (8)

MR. SUSSMAN: Let's move on to the next speaker. Thank you.

MR. FRUCHTMAN: Thank you.

MR. SUSSMAN: Lou Venech, Port Authority of New York and New Jersey.

If you can't conclude your comments in three minutes and you hand it to us, we will incorporate it into the official record.

MR. VENECH: I am Lou Venech from the Port Authority of New York and New Jersey here to summarize the written comment finding of the DEIS.

The timely advancement of this project (1)

is also as part of a broader regional campaign to expand the role of the commuter rail network in meeting regional transportation needs. Our planning work corroborates key findings in this DEIS notably through our partnership with MTA and New Jersey Transit in access to the regions core project which is the pull of the Manhattan job market on the regional labor force and concluded that commuter rail improvements would be most effective in meeting the next wave of growth expected from the markets to the east and west. (1)

As the East Side Access Project became an MTA priority, the art team shaped its work to compliment this project and to address in a similar way the problems on the trans-Hudson market where the capacity problem with and the growth pressures are just as compelling. Both efforts shed light on the crucial role of Penn Station on the regional transportation system. It's Amtrak's hub, but more than 93

percent of the passengers who use it on week days are Long Island Railroad and NJT riders. Penn Station is running out of capacity to meet the cumulative demand for expanded peak period service in the long term.

Activating the 63rd Street tunnel is not just a convenience for Long Island Railroad riders, but is a step in solving the broader problem of providing adequate commuter rail capacity to Midtown. Important questions need to be resolved about sharing Penn Station capacity. There is no long term answer evident for the Penn Station problem without opening a second facility for the Long Island Railroad in Manhattan as this project would do.

Our MIS study is in the third and final phase. It includes an option that would include connection to Grand Central. It's an option that our sponsors agrees needs further study before it is part of a recommended alternative.

Our current phase is looking at that and other variances that don't involve Grand Central. Consistent with MIS findings to date, East Side Access protects the possibility for a future connection between Grand Central and Penn Station. The Yark (phonetic) build alternative which may or may not depend on a GCT link must be protected.

I should mention that this project compliments another PA MTA partnership providing new options for access to Kennedy Airport. The Port Authority Air Train Project is under construction. When completed in three years it will allow JFK passengers to transfer at Jamaica between the Long Island Railroad system and our light rail service reaching JFK's passenger terminals.

When Long Island Railroad service becomes available at Grand Central, JFK passengers will have a choice of accessing the service from two midtown locations. The capacity expansion for the network

will facilitate the eventual provision after this project is complete of one seat ride service to JFK.

We look forward to working with the MTA and our other agency partners in both states to expand the capacity of the transit network to support growth, reduce congestion, and meet future transportation needs throughout the bi-state metropolitan area. Thank you.

3

MR. SUSSMAN: The next speaker and Thomas Crater. Vivian Mire?

MS. MIRE: I am not speaking.

MR. SUSSMAN: Jeff Elmer, General Contractors Association.

MR. ELMER: Good evening, and thank you for the opportunity to speak tonight.

The General Contractors Association was founded as a trade association for the New York City heavy construction industry in 1909. The founding members were the contractors who were building the first pieces of the subway network. Today we

remain the trade association that represents the heavy construction industry active in building and repairing New York City's sprawling transportation infrastructure.

The East Side Access Project must move forward as quickly as possible. It has been planned for almost one hundred years since the first Long Island Railroad trains carried passengers to Manhattan. We fought hard with the congressional delegation to put this project in the high priority category. Now that the MTA capital plan includes funding for a full length Second Avenue subway extending through Grand Central to lower Manhattan, both projects must proceed as quickly as possible.

We urge the MTA to make every effort to construct the Second Avenue subway at the same time at East Side Access. Ideally both projects will be developed on an expedited timeline. With growth on the ridership on the 4, 5, and 6 trains and

more congestion to come, it is critical that planning for both projects be coordinated.

East Side Access should move ahead now however because it will give us new ridership capacity quickly. It happens to be further ahead in the queue based on the work already done and where it is in the federal review process. It is in a good position to garner federal financial support.

The region needs both of the expansion projects to do what hasn't been done in many years; provide real new capacity. No one is suggesting that the East Side Access Project be sacrificed because of a demand for relief because of the over crowding on the Lexington lines. We need both of these projects as well as others.

We know there are concerns of the safety of this project and the potential impact of construction activities on buildings and businesses on the East Side Access route. However, the DEIS makes it

clear that these impacts would be relatively small. Most of the work would be underground with little activity on the surface. You can be sure that if GCA contractors are selected they will only use construction methods that have proven to be safe on jobs around the world. GCA union contractors invest millions of dollars into skills and safety training. It means that high quality projects are delivered safely and on time. (4)

Our industry has a deep commitment to safe work practices in order to ensure the preservation of property and the well being of employees and the general public.

Be aware that the East Side Access plan is supported by thousands of men and women whose livelihood depends on the construction industry. These are well paid positions with a living wage that can support a family. (2)

Direct employment from construction activities on East Side Access is an estimated 14 thousand 200 persons a year (5)

as according to the DEIS. That does not include thousands of additional jobs and indirect economic activity that will result from a project of this magnitude. Since three out of four of our construction workers resides in the five boroughs, you can be sure that the construction of ESA will also help build middle class neighborhoods throughout the City. (5)

Thank you for your time. The Association and the heavy construction industry stand ready to assist in any way we can. Clearly, the need for ESA is more acute now than ever before. Thank you. (2)

MR. SUSSMAN: Barry Adler.

MR. ADLER: Thank you very much. I would like to express my support for the Long Island Railroad East Side Access. I have been attending the MTA long range planning frame work hearings since they began in 1995.

I do feel it is a worthy project. However, I have some concerns on it. (1)

Namely, safety. The construction methods of a terminal in Grand Central, namely option number two which is a deep bore tunnel, is basically a fire trap and a disaster waiting to happen. You are going down the equivalent of 12 stories down. If there is an electrical fire on a train or electrical feeder fire, how do you evacuate people out of a closed environment in any amount of time? We saw recently the results of that when there was a fire in the Lexington line subway, and they had to close Grand Central because the smoke billowed in on a weekend, thank God, and nobody was seriously hurt. If you are coming in 12 stories down and try to get out on a stairway or escalators when the visibility is next to impossible, it is a dangerous situation and a disaster waiting to happen. Elevators will not help you because New York City fire regulations require elevators to be shut off in case of a fire.

Also, I would like to speak on the impacts on the Lexington line subway which I think have been basically glossed over. We have seen that the DEIS calls for we can add six people more per car and we can get away with it. Let me tell you something. I take the Lexington subway everyday from Grand Central at 7:25 in the morning, and sometimes you can't fit one person on a train, me, much less six more per car. (2)

Another thing is we will build more stairways in the Lexington line subway station which is fine except it doesn't take into account one thing that New York City Transit studies have shown. People don't line up on the platform on the subway station where they are getting on. They line up to the stairs where they are getting off. These things are not being taken into account. Thank you very much. (3)

MR. SUSSMAN: Thank you. Herbert Landow.

MR. LANDOW: Good evening, my

name is Herb Landow. I have been involved with this project since 1976. I worked with the PB team studying Grand Central and the Third Avenue options.

In the past several months I have submitted a series of three papers to the MTA, and I request that these be made part of the public record. One paper deals with the station design near the Biltmore Room. Another is entitled More Than You Ever Wanted To Know About The Grand Central Loop Tracks. It does just that by exploring both the history and the engineering that relates to speed around the loop. The speed issue relates to the capacity of the loop and the final design.

The New York Central Railroad had a limit of 12 mph on the outer loops. The current Metro-North limits are much lower and reflect cautious use of an aged infrastructure now scheduled for rebuilding.

In addition, in this report engineering equations for speed and

balancing super elevation are explored in detail for each section of track involved. The unbalanced lateral forces are measured and shown to be within normal railway design practice.

I conclude that the loop has the inherent capacity to handle the full operation at 12 mph. The effect of these first two reports is to provide a third alternative to the two alternatives now circulating.

(2)

It gets back to the fundamentals of the design. It moves the trains and the people while minimizing cost, risk, and construction time. Major items of the plan are dropped including the construction of 57 hundred feet of tunnel track under Park Avenue. The only tracks remaining under the Metro-North in the 50's under my suggestion is the two approach tracks, and these are 30 feet or more below Metro-North thereby avoiding the difficult construction of the fly over under the Metro-North.

Also, the former three track approach under the Tennis and Racket Club and other buildings need not occur. Instead, the approach tracks can focus on the J slot inbound and the A slot outbound. Thus the risks and difficulties of the former design can be avoided without resorting to deep tunnelling.

The final paper relates to the fact that a third of the market served by the ESA has destinations in the 50's. The stations serving Metro-North and Long Island Railroad is feasible in the area of 53rd to 57th. All trains would pause there en route to and from Grand Central.

(3)

While the 50's station is unfamiliar to the MTA, it is very relevant for the long term planning. It would reduce the pedestrian loading at Grand Central, and the surrounding streets, and subways, and shorten the trip time. This project could be built later, but the tunnel work now being planned from 63rd should rise to the elevations desired in the long term plan.

MR. SUSSMAN: Please conclude.

MR. LANDOW: It uses a two percent grade to come up and still protect that 30 foot envelope, and in effect the plan suggests that by getting rid of the extras you can have radical reductions in cost, risk, and build it quickly. Thank you.

MR. SUSSMAN: Thank you very much. Robert Schumacher. After that we will take a recess.

MR. SCHUMACHER: My name is Robert Schumacher. I have circulated this yellow paper. I would like to put on the record briefly two questions from the paper.

One; the Long Island Railroad trains will terminate 125 feet below the surface. Riding an escalator up to the surface is the equivalent of riding escalators up to the 12th floor of a building. I don't know of any place in the world where the public is expected to ride escalators up to the 12th floor. A previous speaker spoke of

(1)

(2)

the special risk of fire and smoke down below, and that adds to it.

My second question has to do with the funding of four and a half billion dollars which I believe is the most expensive transit proposal ever put forth. I have seen no solid indication of where this funding is going to come from other than mostly wishful thinking.

We have on Second Avenue an example of 50 years of disaster, and I think there is quite a possibility that Long Island Railroad access to the East Side is going to go through a period of 50 years of disaster exactly like the Second Avenue subway and for exactly the same reason. Thank you.

MR. SUSSMAN: Thank you. At this point we will take about a two to five minute break after which we will continue with the other speakers. If you wish to speak and haven't, please fill out a form at this time.

(At this time, a 10 minute

recess was taken.)

MR. SUSSMAN: Ladies and Gentlemen, if I can have your attention. I would like to reconvene the public hearing. If everyone will kindly be seated, I will continue to read the list of speakers.

I would like to remind the audience that we have a service of sign language interpreters for the hearing impaired. If you wish to avail yourself of that service, let us know.

Registration to speak will close at eight PM. If you wish to speak and have not filled out a form, do so at this time, please.

The next speaker is George Haikalis representing the Committee For Better Transit.

MR. HAIKALIS: The Committee for Better Transit strongly supports completion of the Long Island Railroad access to Grand Central, a project begun over 30 years ago. We see no need to spend

over three billion dollars to complete this project when one billion will get the job done. CBT proposed a streamlined alternative, the Apple Corridor, in June of 1996.

The CBT plan will make use of five existing Metro-North tracks at Grand Central that connect the upper level loop track. Two new tunnel tracks would link the existing lower deck of the 63rd Street tunnel near Second Avenue to the upper level tracks at 53rd and Park a distance of about four thousand feet. In Queens, CBT proposes that two new tunnel tracks be constructed to link with existing Long Island trackage.

In contrast, the Long Island plan is more ambitious. The original LIRR preferred plan would have reconfigured existing Metro-North tracks on the lower level creating a new 10 track terminal. Five of the tracks will connect to the lower level loop, and five would be stub tracks where trains would leave in the

same direction they entered.

To increase capacity, an underground fly over would be constructed north of the terminal just below Metro-North's trackage. The original LIRR plan required underpinning large buildings on Park Avenue including the land mark Lever House and Racquet Club, and removing, and re-framing 70 columns in Grand Central.

In Queens, the Long Island Railroad would include six new tunnels, four to LIRR trackage at Sunnyside and two leading to a new storage yard to be constructed from the largely disused freight yard adjacent to Amtrak's Sunnyside Yard. (1)

The DEIS has showed the Long Island Railroad has done streamlining of its own. In Queens, the LIRR proposes to construct only three tunnel connections to Long Island trackage at Sunnyside instead of four. Two tunnels will lead to the storage yard will remain the same.

In Manhattan, the DEIS describes a new variation; option two. In this new plan

the LIRR would construct a new 10 track stub terminal deep below the existing level of Grand Central. The Long Island Railroad would estimate that option two would cost 225 million less to construct or six point four of the 3.5 billion construction cost. Not much streamlining there.

CBT estimates a far simpler plan can be constructed for one third of the cost of the Long Island plan. In Manhattan, the CBT plan includes excavating 90,000 cubic yards of rock, and the Long Island plan half a million. The CBT plan uses existing Metro-North platforms, and the Long Island requires a new complex and new platforms.

The CBT plan has a higher capacity than the Long Island plan. The five track terminal leading to the loop is a high capacity facility. The plan can easily handle five trains per hour.

It's past four years. CBT has pleaded with the Long Island Railroad and its

consultants to give careful consideration. It has not happened. This review should perform instrumented tests around the loop to show what kind of speed is safe and use commuter simulation to compare the CBT with option two to do a benefit cost analysis of the midday car storage at Sunnyside and estimate the capital and implementation costs of the CBT. I would like to enter into our record our Apple Corridor as well as the statement I just made. (1)

MR. SUSSMAN: Thank you. The next speakers are two speakers together. Lester Epstein and Kevin McElroy. You will have three minutes between you.

MR. EPSTEIN: I will borrow your map. I will not address the public's interest in the project either pro or against at this time.

However, the reason I am here is that I own a building at 47 East 44th Street the only office building that is to be taken for this project. Frankly, we do not (1)

feel that this is necessary because the MTA already owns the three buildings, 341, 345, and 347 Madison so far.

To the rear of 347 Madison Avenue there is a large one story area and a smaller narrower three story area which we believe your ventilating housing system can be placed. This shows how it is to be built on my property, and it can be easily moved north to their property without the necessity of buying my property. I have owned this building for 32 years, and I hope to continue to own the same. Thank you very much.

MR. SUSSMAN: Thank you. The next speaker is Daniel Pearlstein.

MR. PEARLSTEIN: Hi. I am Danny Pearlstein. I go to high school on the Upper East Side. I ride the Lexington Avenue subway there, and I see lots and lots of people crowded on the subway. I hope if I was in high school in 10 years, I wouldn't have to see lots and lots of people on the subway.

I had trouble hearing about the meeting. I heard about if through the newsletter online, and I believe that indicates one of the problems with the hearing. Look at who is here. There are four people here, and I don't know if any of you are voting members of the MTA Board.

Notice of this meeting was not published to the New York City public. There was no ad in the New York Times and no ads in the subway station or subway cars frankly because the MTA Board didn't want the subway riders to come and complain. We made it anyway. Good for us.

The fact is we can't have this project moving forward the way it is. You have the gentleman from the Committee for Better Transit with his point that you are spending too much money on this. Of course you are. The money isn't there to begin with. The fact is the subway riders support a far greater share of their ride than any other riders in this country

including the riders on the New York City suburban line which are subsidized to the tune of over 50 percent.

The subway riders are already getting the shaft. It will lead to a greater part of the shaft. You are not building the Second Avenue subway in tandem. It needs to be done. The fact it costs a lot of money is a poor excuse.

As the gentleman from the CBT showed you, you can do it for a lower cost. The fact is that the people who want the Second Avenue are not the people who want the ESA. The people who want the ESA voted for the Governor and the people who wanted Second Avenue didn't. This is a clear example of political pandering, and perhaps graft, and it is not fair and democratic.

I learned that. I took a year and a half of American history. This is problematic to say the least. I hope that you address my concerns. Thanks a lot.

MR. SUSSMAN: Thank you. The

next speaker is John Cornelius.

MR. CORNELIUS: We have been trying to work on the East Side Access Project plan for a long time. I am concerned that it has to be worked in conjunction with the air train being built.

The first part of it, as you know, is to Jamaica Center. From there I hope I see in my lifetime it continues on to the Long Island Railroad along the Van Wyck. The reason why I point this out is you must get transportation in New York because by the year 2015, New York City will have over nine million people. With a world population to over six billion by the year 2050, we have to consider strongly about our transportation needs. (1)

I agree that the Second Avenue subway should work along with the East Side Access plan. We did a lot of talking. Let's start moving. Thank you very much. (2)

MR. SUSSMAN: Thank you. The next speaker is Vaughn Troy.

MR. TROY: I had the pleasure of spending a number of years that I lived in Manhattan commuting on the number 6. I know how awful it is. I have had the same type of pleasure commuting since then from Long Island much of it to the East Side.

It is a horrendous trip. Forget the railroad itself. Then trying to make your way back. It's the whole point of this huge project. It takes a huge amount of time and subway capacity like the Shuttle, and it is completely illogical.

We know it has to be built. We also know it can take 10 or 20 years before there is funding for a Second Avenue subway as desperately as we need that, and I know we do. I don't want for us to hold up this project until that one is finished. We should do our best to go ahead on both. This one we have got to get it started as quickly as possible.

I don't know whether the CBT's plans would work or not. I sincerely hope the MTA will take a close look at them because

if it is possible to do this project in a simpler and less expensive way, maybe that can free up some of the funding needed for the Second Avenue subway and get that going sooner.

One way or another, we desperately need the East Side Access. I also look forward to once that is done to Metro-North moving some of its passengers over to Penn Station. Maybe that will help the East Side Access a bit also. I don't know. I don't want to hold this up for another 10, 20 or 30 years or 50 years before a Second Avenue subway can finally be built. Thank you.

MR. SUSSMAN: Kristin Harrison representing Congresswoman Carolyn Maloney.

MS. HARRISON: Thank you for the opportunity to address you today. I am pleased to submit testimony on behalf of Congresswoman Maloney to the MTA on East Side Access Project that will have a positive effect on her district both in

Manhattan and Queens.

She states I also want to commend the Board on its decision to build a full length Second Avenue subway. Although we are here to comment on the DEIS for East Side Access, the message that many of us want to convey is that East Side Access needs to be done in conjunction with the Second Avenue subway if it is going to work. They are part of the same transportation solution and must be considered together. (1)

The DEIS is stunningly silent on the Second Avenue subway. (2) When the Long Island Railroad connection is completed in 2009, it will dump thousands of additional riders on to the East Side. The DEIS indicates that the preferred alternative study is expected to bring about 62 thousand Long Island Railroad riders into Grand Central during the four hour weekday AM peak period in the year 2010. The DEIS evaluates the impact that East Side Access will have on the bus and subway lines (3)

around Manhattan and Queens.

For instance, the DEIS notes that the additional Long Island Railroad passengers will result in significant impacts to the numbers 4 and 5 express lines southbound in the AM peak hour. I believe the discussion of the impact of adding more passengers to the already over capacity 4 and 5 trains is inadequate. There is no room on these lines for existing passengers, and to talk about adding more people without a Second Avenue subway to alleviate congestion is absurd.

The Lexington line is over crowded. The DEIS does not discuss how a full length Second Avenue subway would help to reverse the negative impacts on the Lexington line. Without a full length Second Avenue subway, over crowding will create dangerous conditions for riders. The already over crowded cars will not handle even the six passengers per car that the DEIS calculates will be added, and signal adjustments to the line will

not be enough to mitigate the negative impacts to the line. (5)

A supplemental DEIS should discuss the importance of the Second Avenue subway to provide an outlet for the new passengers when the Long Island Railroad project is completed. The DEIS is incomplete without a discussion of the way the Second Avenue subway will alleviate some of the environmental problems created by East Side Access. (2)

Since these projects should be built in tandem, the DEIS for East Side Access should include greater detail of the effects of the Second Avenue subway. Thank you.

MR. SUSSMAN: Thank you. Joel Azumah.

MR. AZUMAH: Good evening. I will make a few comments about this proposal.

One; the Second Avenue subway has to be built first. It's not an option. I (1) don't understand why it is not in your

DEIS. I don't understand why it is not part of your planning. It has to be done first. There is no question.

Two; in terms of getting trains off the main line into the Grand Central spur, you have to make sure it is a flying junction. If it's a slow junction, 20 or 30 mph, you have just wasted four and a half billion dollars.

Three; in terms of coordination with your regional entities such as New Jersey Transit, Amtrak, your sister agencies, you have to make sure that you network with them. For example, New Jersey Transit trains should be running through to Queens. That will help make sure that you guys don't duplicate the same equipment doing a similar type of service.

Right now we are having a lot of storage concerns about this project. Where are you going to put the extra trains? Well, if you strung up nine miles of catenary on the main line on two tracks, you can have New Jersey Transit trying to

alleviate some of that problem. When you through run a train, you don't have to separate two separate trains. Currently you do.

Three. What about right now? Right now we have a crowded Lexington line. The Long Island Railroad and its sister agencies have decided not to do anything about the situation right now. I think frankly that you run the Queens-Midtown Tunnel, you manage it, why don't you run a very simple express bus service from Jamaica to east midtown just to begin to mitigate it? You have an HOV lane there. You should be able to work with your sister agencies to do that.

(5)

If you are going to build a separate terminal for the Long Island Railroad, make sure you have a connection from the Metro-North main tracks that come from the upstate regions down to the new Long Island Railroad terminal. Make sure the two outer tracks can be pointed in a direction so that you cannot only go into

(6)

this terminal but from this terminal you can go to downtown Manhattan. You have a separate study doing that. I don't know why you are doing that. Frankly, it is all the same problem. If you go and build it all at once, it is much cheaper.

In conclusion, I think that the Long Island Railroad -- this should be not a Long Island Railroad study. The Long Island Railroad should be a leader and its sister agencies should be helping it. I think that will help you save money in the long run. Thank you.

MR. SUSSMAN: Thank you. The next speaker is Louis Hitch.

MR. HITCH: My name is Louis Hitch. I am on the technical research committee with Mr. Olmstead and others. I am speaking of course as a private citizen.

Quick history lesson. I got this out of my morgue file. It is dated February of 1968. It says report to Nelson A. Rockefeller, Governor of the State of New

York and explains the project. They said this.

The cost for the terminal at 48th Street and 44th and Third Avenue was 195 million dollars. It's what they said. Now I might point out that the fare at that time was only 20 cents. The fare is seven and a half times higher than that.

I say let's go forward with this. It was approved by the Mayor and Board of Estimate on September 20 of 1968. I urge you gentlemen to have ground breaking September 20 of 2000. Let's go for it.

Now versus option one and option two. I would prefer option one if, and only if, Long Island Railroad electric trains will have dual shoes that is top running and bottom running third rail shoes. It is not practical so I say go for option two. Let's do it.

For the record for anybody in the room listening to me, I favor a four track Second Avenue line from 180th Street down to Grand. Two tracks to Dyre Avenue and

two tracks to Pelham Bay Park from 125th Street to Grand Street four tracks with stations every half mile apart. Unfortunately, MTA did not listen to me. Here we are now. Thanks. Ciao.

MR. SUSSMAN: Thank you. Robert Olmstead.

MR. OLMSTEAD: I had not planned to speak tonight. I still plan to submit some written comments.

My first contact with this project was a third of a century ago. I was one of the authors of the MTA 68 Grand Design. It's the book that Lou Hitch just held up. That plan, as Lou said, included the Long Island Railroad East Side Access through the 63rd Street tunnel. We broke ground on that tunnel in 1969, and it was a two level tunnel, and the lower level reserved for the Long Island Railroad and upper level or new Queens subway, which I might add, also had connections to the Second Avenue subway.

The Long Island Railroad East Side

(2)

Access Project is unfinished business as is the partially built Second Avenue subway. Both projects should be built expeditiously. The Long Island Railroad East Side Access Project is ready now to enter the construction phase and should proceed as quickly as possible.

One speaker expressed concern about fire safety. This project must be designed according to the NFDA 130 fire code. This is a very rigorous code which I think will allay the fears of that gentleman. It was a code that did not exist when some of the other facilities were built.

The Long Island Railroad East Side Access Project has been touted as a suburban project. This is not entirely true. The project increases access to jobs in Manhattan's core thus strengthening the city's economic base. In addition, the project can provide additional service to underserved areas of Queens. Remember that Brooklyn and Queens are also on Long Island.

I do think that although the project doesn't suggest additional service to stations on line such as the Port Washington line and the Atlantic branch in Queens, we should look at the possibility of more service. We also need the Second Avenue subway. One project should not be held hostage to the other. That is a recipe for getting nothing done.

Let's get on with it and finish the 63rd Street tunnel project by expediting the Long Island Railroad East Side Access Project.

MR. SUSSMAN: Thank you. John Lender.

MR. LENDER: Good evening. I have just a few words with regards to the East Side Access connection of the Long Island Railroad. I think it is a wonderful idea. I think it is an idea that needs to get off the ground as soon as possible.

It is nice to see you again, Mr. Sussman. I haven't seen you since the Penny Bridge Disaster hearings out in

Queens. I would like to say that the Second Avenue subway which has been the topic tonight in addition to the East Side Access and Long Island Railroad -- I am the author of a book called 12 New York City Historical Street and Transit Maps.

One of the maps in my book is a Board of Transportation map of the City of New York Engineering Department proposed additional rapid transit lines and proposed vehicular tunnels. It is this map here. It shows the full length Second Avenue subway. The date of this maps was 1929. Please don't tie this East Side Access up that long. Have a good evening. (2)

MR. SUSSMAN: Thank you. That seems to complete the list of people who have signed up to speak this evening. Is there anyone else in the audience that wishes to make a statement for the record?

MR. TROY: Can I speak a second time?

MR. SUSSMAN: Briefly.

MR. TROY: There is something

else. Think carefully how you design the Sunnyside connection. Remember people like me. I live in East Northport in diesel country. I want be to sure we have a viable way of getting to the city because of the mistake made 30 years ago that we can't take double decker trains. Give us an easy transfer without steps like the drawings showing escalators. Make sure it is a practical connection for us. (2)

MR. SUSSMAN: For the record, your name is?

MR. TROY: Ron troy.

MR. SUSSMAN: That concludes the list of speakers for the moment. Registration will remain open until eight PM. If you wish to speak, fill out a form, and we will stand adjourned until there is another speaker. Thank you.

(At this time, a 30 minute recess was taken.)

MR. SUSSMAN: Ladies and Gentlemen, if I may have your attention, please. I would like to reconvene the

public hearing. Is there anyone else in the audience who would like to make a statement for the record? I am not hearing any response so we will adjourn this public hearing.

If anyone has comments they wish to submit for the record either to supplement their verbal testimony this evening or in lieu of verbal testimony, you can send that to me, Doug Sussman. I am Deputy Director of Government and Community Relations for the MTA. The address is MTA, 347 Madison Avenue, New York, New York 10017. We thank you for your attendance. Good evening.

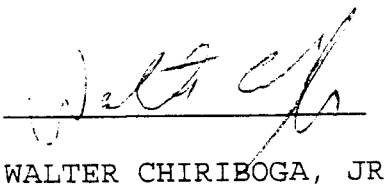
C E R T I F I C A T E

I, WALTER CHIRIBOGA, JR., a Shorthand Reporter and Notary Public of the State of New York, do hereby certify:

That the witness whose examination is hereinbefore set forth, was duly sworn, and that such examination is a true record of the testimony given by such witness.

I further certify that I am not related to any of the parties to this action by blood or marriage; and that I am no way interested in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 18th day of June, 2000.



WALTER CHIRIBOGA, JR.

ERRATA SHEET

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Subscribed and sworn to before me
this _____day of _____, 2000.

_____
Notary Public

_____
Witness

STATEMENT

F. Carlisle Towery
President, Greater Jamaica Development Corporation (GJDC)

To

Metropolitan Transportation Authority
Capital Projects Public Hearing
In Support of
EAST-SIDE ACCESS

(testimony presented by John Steinberg)

June 15, 2000

I am Carlisle Towery, President of GJDC, a private not-for-profit professional organization of civic and business leaders founded in 1967 and dedicated to the economic recovery and revitalization of Jamaica, Queens, and to the rebuilding of its downtown.

We enthusiastically support the East-Side Access project and submit with this Statement the Resolution of our Members, dated September 13, 1999. That Resolution outlines the several compelling public benefits of the project.

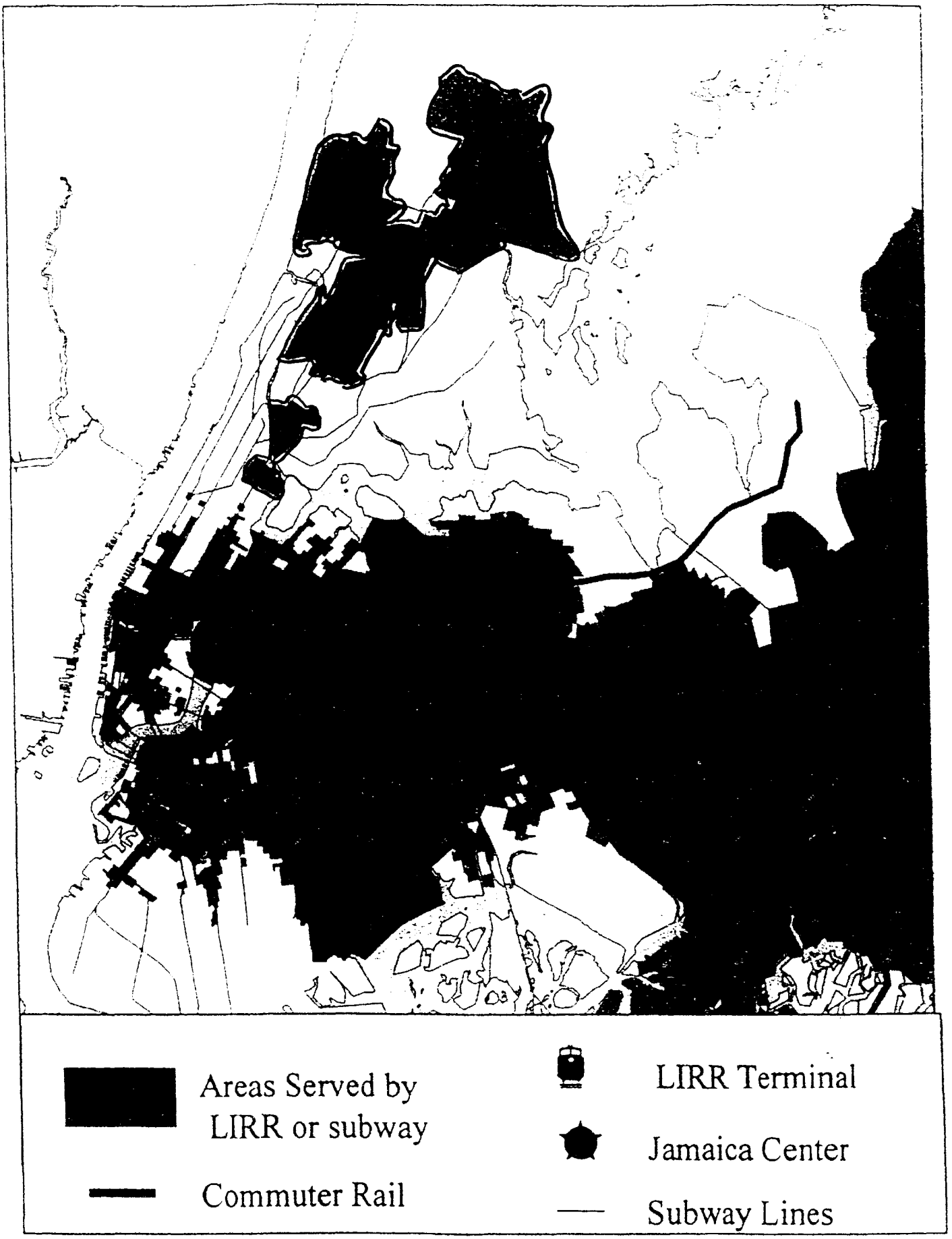
(2)

ESA will be enormously beneficial to LIRR commuters from Nassau and Suffolk counties destined for Manhattan's east side, and for LIRR commuters from Queens. It will save some 60,000 commuters 30 to 45 minutes a day. But its benefits to the region overall and to Jamaica may be more significant. It will, each work day, remove 12,000 cars from the roads of Queens and East River crossings. This favorable effect on the region's environment is favorable, given that automobile emissions are the largest contributor to its air pollution.

The connection of the LIRR to Grand Central Terminal will, for Metro North riders, significantly enhance accessibility to Jamaica via a transfer at Grand Central Terminal -- and to JFK International Airport via the new "AirTrain" light rail link at Jamaica. Residents of Upper Manhattan, the Bronx and Yonkers, from close-in Westchester Hudson River towns and for Mount Vernon, New Rochelle and Pelham will be within easy rail commute of Jamaica Station. The attached map indicates the geographic areas of the region which ESA will bring within a 45-minute commute by rail of Jamaica. We estimate that some 325,000 workers from those areas will be added to Jamaica's labor shed -- about 51,000 from Manhattan, 204,000 from the Bronx and 71,000 from Westchester. This strengthens our local objectives of attracting and accommodating jobs to Jamaica, and Regional Plan Association's long-time recommendations of building sub-centers at transportation hubs outside Manhattan. Two regional sub-centers, White Plains and Jamaica, will be connected by rail, via a transfer at Grand Central Terminal.

(1)

Map 7: Areas within One Hour of Jamaica via Long Island Rail Road or 45 Minutes via Subway (with ES Access)



RESOLUTION
of
The Membership of Greater Jamaica Development Corporation

SUPPORTING CONNECTION OF
THE LONG ISLAND RAIL ROAD TO GRAND CENTRAL STATION
("East Side Access")

- WHEREAS, projected jobs and economic growth in the New York Region over the next several decades are substantial and will likely cause enlargement of the Manhattan Central Business District, which is the Region's economic "heart;"

- WHEREAS, new commuter rail capacity is required to serve that projected growth and without such expanded capacity, the efficiency and competitiveness of the Region will suffer;

- WHEREAS, this project complements another Master Links component -- the JFK Airport light rail service ("AirTrain") – and adds to Jamaica's locational advantages and strengthens its potential for growth as a Regional sub-center by directly linking Jamaica Center to east Midtown, thus positioning Jamaica between Grand Central and JFK Airport by rail;

- WHEREAS, because the majority of current LIRR riders are destined for the east Mid-town area and must back-track -- using an additional mode -- to reach their destinations once they arrive at Penn Station, this project will save these commuters an estimated average of 30 minutes in daily travel time;

(2)

- WHEREAS, other benefits of the project include:

  - attracting new riders to public transportation;
  - reducing automobile-caused air pollution;
  - relieving congestion at Penn Station;
  - relieving over-crowding of Queens subway lines;
  - utilizing public investments already made in the 63rd Street tunnel;
  - stimulating economic growth in Queens and Long Island.

NOW THEREFORE, the Members of Greater Jamaica Development Corporation endorse the Long Island Rail Road's Grand Central Connection project, urge that it be given priority attention and scheduling by decision-makers, and respectfully request that the required State, Federal and local financing be provided.

Dated: September 13, 1999

Signed: _____
John H. Steinberg
Vice President/Assistant Secretary

TRI-STATE TRANSPORTATION CAMPAIGN

Mobilizing the Region

Testimony by the Tri-State Transportation Campaign on the MTA Long Island Railroad's DEIS for East Side Access presented by Lisa Schreibman, June 15, 2000

My name is Lisa Schreibman and I am the New York City coordinator for the Tri-State Transportation Campaign. The Tri-State Transportation Campaign is a consortium of thirteen of the region's leading environmental, planning and transit advocacy groups that work to achieve sustainable transportation by reforming and redirecting transportation investment patterns.

(3) East Side Access is an excellent project. According to the MTA, it will attract 16,300 new transit riders, save 45,000 users of the present service the time it takes to backtrack from Penn Station to the East Side and get 6,000 people out of their cars each day. All of which means cleaner air for everyone and less congestion on the highways and tunnels.

The East Side Access project will include a new station at Sunnyside that could become a hub for many train services including the three major commuter rail systems serving New York City, Amtrak and the New York City Transit subways. This type of commitment to making Long Island Railroad not only good for suburban travelers but also for people in the city is heartening to see.

(4) MTA has successfully passed the federal hurdle and the project now has a "recommended" status, which makes it eligible for "New Starts" money. The MTA will be asking for approximately 2.175 billion dollars from federal sources, half of the project's total.

(1) However, Federal Transit Administration did not give the project a "highly recommended" status at least partially based on the low number of new riders who will use the service. Given the lack of adequate subway service on Manhattan's east side, it seems likely that some people who might use the connection will forego transit even after East Side Access is built rather than face the overcrowded conditions of the Number 6 line.

(2) We therefore urge the MTA to coordinate this project with the building of the Second Avenue Subway. The combination of East Side Access and the Second Avenue Subway should be the preferred alternative identified in the final EIS.

Thank you.

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NEW YORK
BUILDING
CONGRESS

Testimony
of
B. Dean Angelakos, Vice President
New York Building Congress
to
Metropolitan Transportation Authority
on
Draft Environmental Impact Statement
for the
East Side Access Project
June 15, 2000

The New York Building Congress appreciates the opportunity to comment on the Draft Environmental Impact Statement prepared for the East Side Access Project. This project, which will bring the Long Island Rail Road directly into Grand Central Terminal, is one of the most critical transportation investments in the New York Metropolitan Region. (2)

Members of the Building Congress, who are leaders of the design, construction and real estate industry of New York City, enthusiastically support the East Side Access Project. From its inception in the late 1960's, the concept of providing direct Long Island Rail Road access to the East Side of Manhattan has been an enormously important objective for all New Yorkers.

The East Side Access Project is a vital component of the Metropolitan Transportation Authority's latest capital program, which the Board of Directors of the Building Congress has endorsed enthusiastically. The MTA has made progress over the past 15 years by implementing four successive capital programs that have maintained, and enhanced the transit system. The East Side Access Project, as part of an overall capital program that inspires confidence and support, will continue the MTA's record of success. (3)

44 WEST 28TH STREET, 12TH FLOOR, NEW YORK, NY 10001. TELEPHONE 212.481.9230. FAX 212.447.6439

Over the past year, the Building Congress and its Transportation and Infrastructure Committee have held a number of meetings on the East Side Access Project. In each case, project plans were reviewed in considerable detail. We are pleased to report that the project enjoys widespread support in our industry. There is no question of the need for East Side Access, nor have we uncovered any significant disputes regarding the preferable alternative.

Our only, ongoing concern is for adequate financial support of this project and the entire capital program. While transit infrastructure in New York City and its suburbs is much improved over the past two decades, sufficient resources still are not being generated to meet the long-term needs of the expanding economy. The Building Congress has implored our leadership, on all governmental levels, to dedicate greater long-term financing for public transportation. Nowhere is this financial need more apparent than with the East Side Access Project, which only has received a small portion of its required funding.

We commend the MTA and its Long Island Rail Road subsidiary for advancing LIRR access to the East Side of Manhattan. Few projects have enjoyed as widespread support in our industry as this one. From the outset, it has been planned with the fullest possible public involvement and with the best expertise our industry has to offer. The project deserves our full support and encouragement. We urge the MTA to continue "fast track" implementation and to devote its best efforts to securing the necessary financial support.

NEWS FROM . . .

SENATOR
THOMAS K. DUANE

27TH SENATORIAL DISTRICT - NEW YORK STATE SENATE

Testimony of State Senator Thomas K. Duane
Before the Metropolitan Transportation Authority Hearing
on the Draft Environmental Impact Statement
for the MTA Long Island Rail Road East Side Access Project
June 15, 2000

Good evening. I am State Senator Thomas K. Duane representing the 27th senatorial district in Manhattan. I am here tonight to again express my concerns about the plans for the Long Island Rail Road East Side Access as outlined in the recently released Draft Environmental Impact Statement for the project.

(3) I believe that there are many positive aspects to linking the Long Island Rail Road with Grand Central Terminal through the creation of an East Side Access, but I am greatly concerned about the proposed timing of this project. An East Side Access will certainly make commuting for thousands of people who ride the Long Island Rail Road (LIRR) to destinations on the East Side of Manhattan significantly easier. However, the completion of the East Side Access project before the completion of the full-length Second Avenue Subway will result in much hardship for the current riders of the Lexington Avenue Subway. The influx of LIRR riders on the Lexington Avenue Subway line facilitated by the creation of East Side Access will greatly exacerbate the current extreme overcrowding on the (1) Lexington Avenue line. The influx of LIRR riders onto the Lexington Avenue Subway line will push the current capacity rate of the Lexington Avenue line from 112% up to 117% (as stated in the Draft Environmental Impact Statement for East Side Access, and I believe this may even be an underestimate). The current overcrowding on the Lexington Avenue line is unbearable at the 112% level -- pushing that to a 117% rate is completely unacceptable, irresponsible, and I would argue even dangerous. Not only will increased capacity make for an even more unbearably uncomfortable commute, it threatens the health and safety of subway passengers as more people cram into cars not (2) made to accommodate such numbers, and more overcrowding in subway stations and on subway platforms make for fertile ground for a variety of dangerous accidents or incidents.

(3) To prevent such a situation from occurring, it is imperative that East Side Access not be completed until or unless we have completed a full-length Second Avenue Subway line. This additional line along the East Side of Manhattan will greatly reduce the overcrowding on the Lexington Avenue line. With this in place, the influx of passengers from the LIRR onto the Lexington Avenue line will not have the overwhelming negative effect it would have under current conditions, and would not bring capacity levels to dangerous levels.

Unfortunately, the MTA's 2000-2004 capital plan does not provide adequate funding for the completion of the Second Avenue Subway anywhere in the near future. The MTA's capital plan

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(4) includes $1.01 billion for the initial planning, design and the start of the construction of a full-length Second Avenue Subway, which amounts to only 7% of it's total cost, but does not indicate an estimated completion date or provide the vast majority of the funds that will be needed to carry through and complete the project. On the other hand, the East Side Access has an estimated completion date of 2009 and more than one-third of its costs, $1.5 billion out of a total of $4.3 billion, has been programmed for the next five years. Moreover, the MTA is planning to request $600 million in Federal and State funding to complete East Side Access in its submission to the Federal government, but is only requesting $5 million for the construction of the Second Avenue Subway.

(3) The separation of the these two projects must be halted. Spending public money on a project that will exacerbate an already existing problem is simply unconscionable. As stated, if built, the East Side Access project must move forward in parallel with progress on the full-length Second Avenue Subway line in order to avoid the intense overcrowding that would otherwise result.

RPA

Regional Plan Association

Testimony by Regional Plan Association
on the MTA Long Island Rail Road's
Draft Environmental Impact Statement for East Side Access
June 15, 2000

My name is Jeffrey Zupan and I am Senior Fellow for Transportation at Regional Plan Association. RPA has been a consistent supporter of the project to connect the Long Island Rail Road to Grand Central Terminal.

A little history about this project is instructive. In the early 1970s when the project was proposed to be built to Third Avenue and 48th Street by the then MTA Chairman, William Ronan, we objected on the grounds that it should go directly into Grand Central Terminal to avoid creating a disconnected network. Unfortunately, the fiscal difficulties of the 1970s prevented the completion of the project in any form and the commuter rail tunnel under the East River has been vacant for the last 25 years. The best thing about the delay is that the superiority of RPA's Grand Central option has now been borne out by numerous consultant studies. (5)

The project now known as East Side Access is an excellent project, one that will transform Long Island from a vast suburban area with an inferior commute to Manhattan to one that will be as good or better than the other (6)

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www.rpa.org • email: mail@rpa.org

suburban sectors in the Region. It can help lift up the economy of Long Island and overcome some of its dead end qualities. Long Islanders will have the option of reaching either the east or west side of Midtown. An estimated 60,000 commuters a day will save about 45 minutes by going directly to the east side, closer to their destinations. Another 6,000 commuters a day will forsake their automobiles and the crowded roads of Nassau and Suffolk counties and of the borough of Queens. East Side Access will add about 24 peak hour trains from the east to the 42 peak hour trains that already reach Penn Station from the east. This will not only add capacity to bring more workers into Manhattan to the high paying jobs in Manhattan, but it will offer flexibility in adding Amtrak service, better operations for NJ TRANSIT from the west, and more service for Queens and Long Island residents. It will also make it possible to travel by rail between Long Island and Metro North's service territory.

Given these vast benefits, RPA would be delighted to unconditionally support East Side Access, but we cannot. The full-build Second Avenue Subway must be built and completed simultaneously with East Side Access. The MTA has not given any assurances that this will be done. (Their capital program requests to the federal government, subject of a hearing next week, asks for $600 million for East Side Access and only $5 million of the Second Avenue Subway). The result is that once East Side Access is in place the already intolerable congestion on the Lexington Avenue subway will get worse. The East Side Access DEIS recognizes that the impacts on the subway will be "only partially mitigated" by improvements on the platforms and to turnstiles at the 42nd Street station. The DEIS suggests that the number of additional commuters will be small, in part because some

LIRR riders who would otherwise use the Lex after being dropped by East Side Access at Grand Central will choose not to use East Side Access because the Lex is too crowded. Thus, the DEIS (and the MTA) is admitting that if there is no Second Avenue Subway to relieve the Lex Line the full benefit of East Side Access will not be realized. Should we give approval for this flawed approach to East Side Access that will help some members of the riding public and making it worse for many others? RPA does not think so.

RPA supports an East Side Access project that is coordinated with and completed simultaneously with a full-build Second Avenue Subway. We recommend that the Final EIS fully assess this alternative and commit to it in a Record of Decision (ROD that will accompany East Side Access.

In a spirit of openness we look forward to having the MTA engage us in discussions on these matters, and not merely treat this hearing, and others like them as a formality in the process.

NYPIRG
Straphangers Campaign
a project of the New York Public Interest Research Group Fund
9 Murray Street, 3rd floor • New York, NY 10007-2272 • FAX 212-349-1366 • www.straphangers.org

Testimony
of
Gene Russianoff
Staff Attorney, NYPIRG Straphangers Campaign
before the
Metropolitan Transportation Authority
hearing on
the Draft Environmental Impact Statement
for MTA Long Island Rail Road East Side Access
June 15, 2000

Good evening. I'm Gene Russianoff, staff attorney for the NYPIRG Straphangers Campaign, which has been a voice for New York City subway and bus riders since 1979.

The Straphangers Campaign agrees that there are major benefits to linking the Long Island Rail Road to Grand Central Terminal. Certainly, this will make commuting easier for tens of thousands of LIRR riders whose jobs and destinations are on the East Side of Manhattan, not the current Penn Station on Manhattan's West Side. Around the world, cities have invested in providing multiple options for commuters; that makes sense here.

But progress for LIRR riders should not come at the expense of subway riders on the already jam-packed Lexington Avenue express lines. "East Side Access" for LIRR riders would mean pushing the Lexington from 112% capacity to 117%, according to the Draft Environmental Impact Statement. This is simply intolerable.[1] The Draft Environmental Impact Statement spells out "potential mitigation" for crowding on the Lexington. These steps are singularly unconvincing, largely amounting to cajoling passengers on the line to move faster or get out of the way!

What's the solution? The LIRR-East Side Access project should be built in tandem with a full-length Second Avenue Subway. That way all riders traveling by subway on Manhattan's East Side— whether coming from the LIRR or not—would not face inhuman traveling conditions.

The MTA's 2000-2004 capital plan includes $1.05 billion for the planning, design and start of construction of a full-length Second Avenue Subway.

But compare the two projects: The MTA says it will complete East Side Access by 2009; it is programming more than one-third of the costs over the next five years, some $1.5 billion out of $4.3 billion. The MTA has no estimated completion date for Second Avenue. And as Comptroller H. Carl McCall recently warned: "The MTA's five-year capital program includes only $1.1 billion for a full-length Second Avenue Subway, less than 7 percent of the total cost. During the 1970s fiscal crisis, the MTA had to abandon efforts to construct a Second Avenue Subway for lack of resources, a costly mistake that must not be repeated." The MTA is planning to request $600 million in federal and local costs for East Side Access in its upcoming submission to the federal government, but only $5 million for Second Avenue.

The Straphangers Campaign urges that the final Record of Decision for East Side Access tie the project to a concrete commitment to building a Second Avenue Subway.

[1] The DEIS says that 3,300 riders will be added to the Lexington express lines during the 8-9am rush-hours. The document suggests that the number would be higher except that some LIRR riders will shun Grand Central because they cannot bear to transfer to the overcrowded Lexington. It doesn't make sense to spend $4.3 billion on LIRR East Side Access on the assumption that it will be underused because of overcapacity on the Lexington line.

STATEMENT BY IRWIN FRUCHTMAN P.E. AT PUBLIC HEARING ON JUNE 15,2000

EAST SIDE ACCESS-DRAFT ENVIRONMENTAL IMPACT STATEMENT
PREPARED BY-U.S.DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION
AND
MTA/LONG ISLAND RAILROAD
MAY 2000

My name is Irwin Fruchtman,I reside at 2525 W.2nd Street,B'klyn, New York.A Professional Civil Engineer for close to 50 years,I have been involved in the planning and construction of many major transportation and building projects.

The conclusions reached in the DEIS are not backed up by the material presented.

I.The NEED for a new 4.3 Billion dollar EAST SIDE LIRR TERMINAL at GC not justified from a cost/benefit,land-use and future development perspective. (1)

II.The ALTERNATES:1)NO ACTION,2)TRANSPORTATION SYSTEMS MANAGEMENT(TSM) and 3)PREFERRED ALTERNATIVE(OPTION 2),are not sufficient to be a considered a fair review of other practical,hard and soft alternatives,especially in light of the 4.3 Billion $ cost,and the long period of construction and disruption before actual operation commences in 2013(roughly 13 years after completion of the DEIS)for the PREFERRED ALTERNATIVE. (9)

I.NEED

A study of the zoning patterns below Central Park will reveal that the future development of the commercial/high tech/light industrial and similar growth industries will occurr west of Fifth Avenue and down to,and all along,the Hudson River Waterfront.Because the zoning east of Fifth Avenue is overwhelmingly Residential,and the land is already predominately developed for residential uses,no large commercial opportunities exist.
With the exception of the Clinton,Penn Station South,Chelsea and the Greenwich Village communities,the west side is zoned for manufacturing uses,reflecting its historic relationship to the once bustling waterfront and port.This M zoning will permit the modern and future business the city needs to supply the job growth it must sustain. (2)

Thus,the LIRR Station at Penn Station is idealy situated to meet,and fulfill the future demands of the rapidly changing west side.What is lacking however,is the foresight to make sure this terminal will be the transit hub to distribute the newly generated demand along the west side.This would be similar to the rail system being developed along the developing New Jersey waterfront(Newport City,etc).

II.ALTERNATIVES

Only one "HARD" ALTERNATIVE has been studied,and it is the PREFERRED ALTERNATIVE(Option 2),at a cost of 4.3 Billion $,with operation of the completed project streching out to 2013(at the earliest).

(5) The pluses presented for this solution in the DEIS are misleading and greatly overstated.An examination of the actual savings of time for the LIRR passenger,if the East Side Terminal is built at Grand Central,compared to the present Penn Station Terminal is a perfect example of this point.The new terminal will be extremely deep-about 123 ft from the lowest platform to street level,requiring several long and time consuming escalator runs,even before they start their walk to their subway connection,or walk to their job location. To reach the Lexington Subway for example,a walk of about 6 blocks would be requited.

(6) There would be no differential time saving to the East Side Terminal due to the fact that the distance to either terminal is about equal. In fact,the 90% turn from the 63rd Street to Park Avenue,will mean a slow speed.

(5) Thus any savings in the "double back" is purely fictious.But there

(3) are also questions about the inability of the 63rd Street Tunnel to handle new bi-level cars which can greatly increase the number of passengers carried to the Penn Station.There has already been a tremendous investment in storage and connections for the West Side.

(4) How will the lack of storage tracks at Grand Central impact the carrying capacity of the 63rd St.Tunnel?

The future development of the West Side area requires a north-south transit link along the waterfront,or just inland.This is doable,as the existing hi-line can be used,as can the hook up to below qrade track under Eleventh Avenue.There is a present link to the Javits Center from Penn Station.

(7) But if passengers desire to continue on from Penn Station to an East Side destination this can be accomplished at a fraction of the 4.3 Billion $ cost.By continuing the SHUTTLE west and south to Penn Sta. a completely flexible transportation hub will result.And it can be extended west to the Javits Center,or east to Second Avenue went the subway link is ultimately built.

The DEIS is deficient because it has not presented reasonable "ALTERNATIVES" for the PUBLIC to evaluate.It is NOT REASONABLE for PUBLIC AGENCIES to simply say that they have thought about other alternates,but discarded them,because the agencies did not think they met the projects goals. (9)

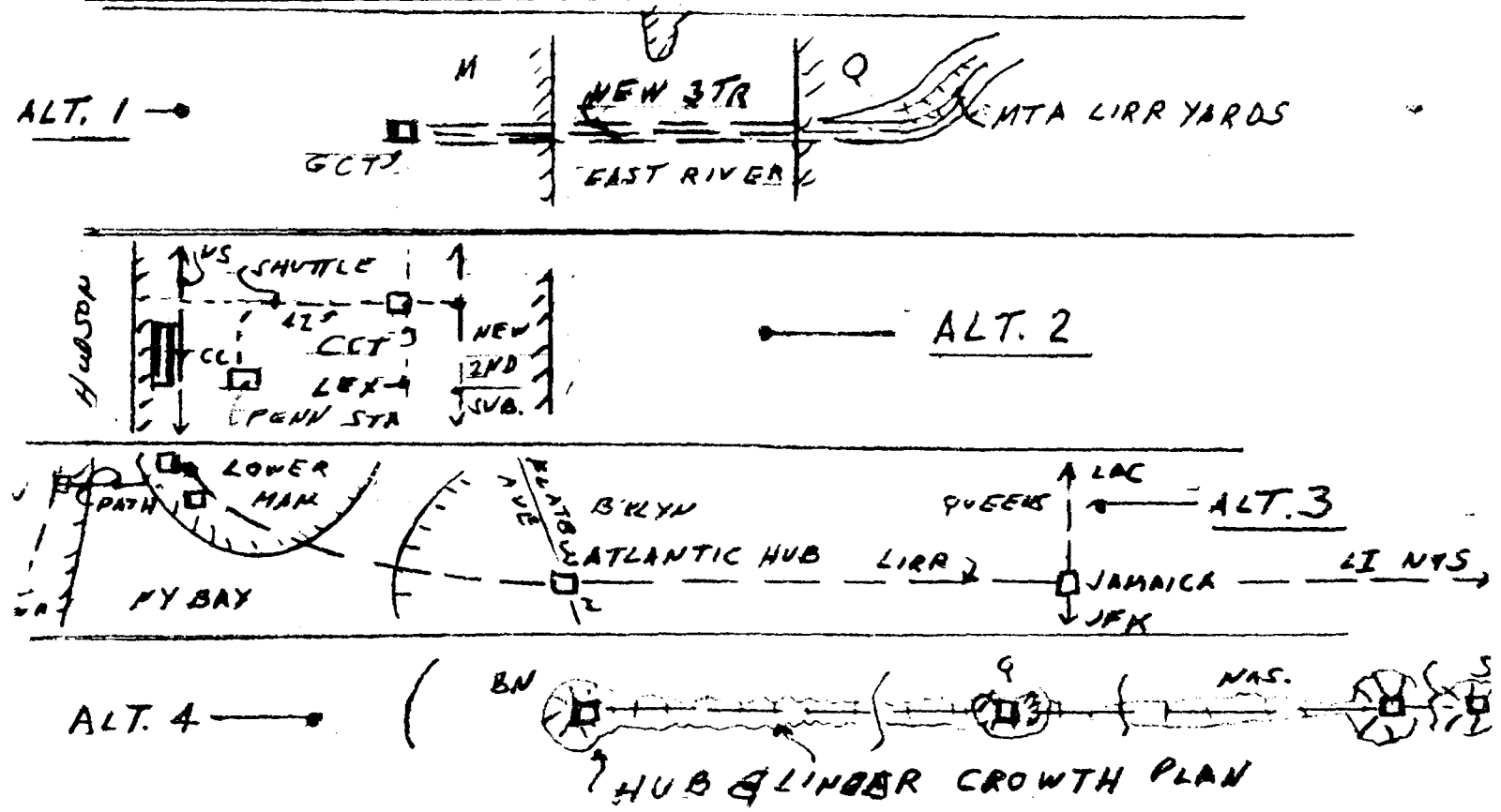
Here are three reasonable "ALTERNATIVES" that should be included in the DEIS:(No prefrence until DEIS completed) (8)

1-A NEW 3-TRACK TUNNEL from the most westerly end of the present LIRR tracks in QUEENS to a TUNNEL IN MANHATTAN directly into GC. THE NEW TUNNELS WOULD PERMIT uses of higher capacity Bi-Level trains,and peak hour reverse movement for storage in Queens.

2-THE 42nd ST.SHUTTLE EXTENSION WEST AND SOUTH TO PENN STATION,PLUS FUTURE ENTENSIONS FURTHER WEST TO JAVITS CENTER,AND EAST TO THE NEW SECOND AVENUE SUBWAY STATION.THIS ELIMINATES A NEED FOR A NEW LIRR TERMINAL AT GC.

3-BRING LIRR SERVICE TO LOWER MANHATTAN ALONGSIDE WORLD TRADE CENTER VIA PRESENT LIRR ATLANTIC/FLATBUSH HUB,BY USE OF A TA SUBWAY TERMINAL.THIS WOULD EFFECTIVELY TIE ALL 3 PA AIRPORTS VIA THE PATH TUBES-LIRR-JAMAICA CENTER-LAG/JFK.

4-IMPROVE HUBS AT ATLANTIC/FLATBUSH-JAMAICA CENTER-IN NASSAU & SUFFOLK COUNTY AS A DEVELOPMENT POLICY TO DIRECT NEW GROWTH AWAY FROM MANHATTAN CBD'S.THIS WOULD SPREAD JOB GROWTH IN HIGH-TECH AND SERVICING INDUSTRIES CLOSER TO AREAS OF POPULATION GROWTH.



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RECEIVED
JUL 12 2000

July 12, 2000

Mr. Anthony F. Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, NY 10018

Dear Mr. Japha:

The Port Authority of New York and New Jersey offers the following comments on the Draft Environmental Impact Statement (DEIS) for the Long Island Rail Road East Side Access (LIRR ESA) project. This letter expands on the reasons for our support offered at the public hearing on the DEIS on June 15, 2000.

Summary

- Implementation of the LIRR ESA project is a critical step in a broader regional strategy to expand the capacity and role of the commuter-rail network in the bi-state metropolitan area. Though important as a stand-alone project, it also sets the stage for future enhancement of regional rail services serving Penn Station New York (PSNY), JFK International Airport, and other key transportation facilities.

- Interagency analyses involving the Port Authority and others corroborate the long-term need to expand rail transit capacity serving the region's Central Business District (CBD). Absent the project, the LIRR network and Penn Station New York (PSNY) will lack the capability during peak travel hours to provide needed transit services and to achieve maximum diversion of trips from the region's overburdened highway network.

(1)

- Consistent with current interagency efforts, the final design of LIRR ESA should preserve and facilitate a future connection between Grand Central Terminal (GCT) and PSNY, as identified in the ongoing Access to the Region's Core Major Investment Study. It also should anticipate airport passenger requirements for future service between GCT and JFK, as a distinct enhancement project after completion of LIRR ESA.

(2)

Region's Commuter Rail Network Requires Additional Capacity

Timely advancement of the East Side Access plan is important for the commuter market and Central Business District served by the LIRR, as a freestanding project that creates new peak-period capacity to meet future growth in demand. It also is a critical element of a broader regionwide campaign to expand the rail transit share of the commuter market; to support new

(1)

development in the Manhattan CBD and the office districts emerging around it; and to capture more non-commuter travel, including airport trips, now using our congested roadways.

This strategy is embodied in another planning initiative, the Access to the Region's Core (ARC) partnership among the Port Authority, the Metropolitan Transportation Authority, and New Jersey Transit. ARC began as a Major Investment Study five years ago. Our goal was to assess jointly the need for additional transit capacity to serve the Midtown core, primarily from the west and the east, and to develop solutions for meeting forecast needs to the year 2020 and beyond.

ARC's early work affirmed the vitality of the Midtown job market and its continuing "pull" on the regional work force, with a disproportionate share of the region's highest-paying jobs concentrated in Manhattan and forecasts showing strong prospects for future employment growth in the CBD. ARC also ploughed through a long list of potential transit investments encompassing many modes, concluding that commuter-rail strategies appeared to be most effective in addressing the next wave of expected growth from the markets east and west of Midtown.

The LIRR East Side Access study moved forward in parallel with ARC. As it became a priority in the MTA capital program, the ARC team shaped its work to ensure a compatible and complementary approach for serving the trans-Hudson market, where growth pressures and capacity problems are just as compelling.

The LIRR and ARC efforts both shed light on the crucial role of Penn Station New York in the regional transportation picture. Penn Station and its connecting tunnels reaching to New Jersey and to Queens are owned by Amtrak. This complex is the hub of Amtrak's busy Northeast Corridor. However, LIRR and NJT passengers make up 93 per cent of the total weekday ridership at Penn Station, which is the Manhattan anchor for both commuter systems.

One of the critical challenges facing our region, as documented in ARC and other joint work by the railroads, is that Penn Station is running out of capacity to meet the cumulative demand for peak-period train slots. All three Penn Station railroads are pursuing market-driven opportunities to expand service, but there is not enough track and platform capacity at PSNY to take full advantage of the railroads cumulative potential for long-term ridership growth. In addition to the needs of the markets that already rely on Penn Station, the MTA is studying options for extending some Metro North Railroad service to the facility.

In this respect, East Side Access for the Long Island Rail Road is not just a convenience for some proportion of its riders working in east Midtown. Activating the 63rd St. tunnel and opening a second facility in Midtown is the solution for meeting growing demand from LIRR territory on Long Island and in Queens that cannot be satisfied at Penn Station. *Important questions need to be resolved about sharing Penn Station capacity. However, there is no evident long-term answer to the pressures on Penn Station without moving forward to create a second Midtown terminal for the Long Island Rail Road, which carries two-thirds of the Penn Station passengers today.*

The ARC MIS study now is in its third and final phase. ARC is taking LIRR East Side Access as a given in its analysis. The leading "build" alternative for ARC entering this phase included a new two-track Hudson River tunnel which could allow NJT to nearly double the number of peak-hour trains that could be scheduled into Penn Station during peak travel periods. This concept also included a new tunnel linking Penn Station and Grand Central Terminal, which would allow some NJT trains to carry passengers there and connect into the LIRR's 63rd St. tunnel for daytime storage in Sunnyside Yard.

The Penn-GCT link was integral to the proposed new trans-Hudson connection because the existing facilities and operations at Penn Station lack the capability during peak hours to process the additional NJT trains through the crossover tracks and tunnels to go back to New Jersey or eastward to Queens. Another feature of this concept was a tunnel connection allowing all three Metro North divisions to schedule some trains through GCT to Penn Station.

The prospect of connecting the region's two major railroad terminals and its three commuter-rail systems holds many benefits, but it is ambitious, complex, and expensive. All three ARC sponsors agreed that this concept required further analysis before it could be recommended as the preferred alternative.

ARC's current work program incorporates further assessment of this concept, as well as variant "build" alignments that do not rely on the LIRR East Side Access connection. ARC Phase 3 also includes development of near-term improvements, building on other current work by the Penn Station railroads, which could enhance rush-hour operations at the station by the later years of this decade.

Consistent with the ARC MIS findings to date, the Port Authority recommends that the final design of LIRR East Side Access protect the possibility for a future connection between GCT and Penn Station. LIRR ESA is a step toward overcoming a potential crisis at Penn Station. The ARC "build" alternative for our generation may or may not depend on a GCT link, but the potential to create that connection in the future should be protected.

LIRR ESA Accommodates Future Direct Service Linking Midtown with JFK

East Side Access for the LIRR system complements another PA-MTA partnership: providing new options for residents and visitors traveling to and from JFK International Airport. The Port Authority AirTrain project is under construction. When completed in 2003, it will allow passengers boarding Jamaica-bound LIRR trains to make a seamless transfer at that railroad hub to our automated light-rail service, which will carry them directly to JFK's Central Terminal Area. Service from Penn Station will be faster and more reliable than making the trip by motor vehicle. When LIRR service becomes available at Grand Central, JFK passengers will have the choice of accessing the service from two Midtown locations.

By creating additional capacity on the LIRR network linking Manhattan and Queens, the East Side Access project also will address one of the major obstacles to introduction of a one-seat-ride service between Manhattan and JFK via the commuter-rail network. The EIS process for AirTrain established that the current LIRR network does not have the capability to meet both

peak-period commuter demand and maintain a frequent one-seat-ride service. With East Side Access in place, it should be possible to introduce one-seat-ride service without compromising commuter requirements.

The final design of LIRR ESA should anticipate future introduction of frequent service to and from JFK via Grand Central Terminal, by considering service requirements and passenger-handling facilities for future airport service. Similar considerations are being addressed in the development of the Farley/Pennsylvania Station Redevelopment Project.

(2)

The FEIS makes the case for East Side Access mainly in the context of the Long Island Rail Road's market, and those benefits are substantial. It is just as important to understand how the project fits in the wider regional framework of efforts to reinforce the Midtown commercial core, to set the stage for expansion of other services at Penn Station, and to support a more expansive role for the commuter-rail network in serving airport-access and other non-commuting trips. Pressure on the entire regional transportation network – rail, highway, rapid transit – is growing. The time to move forward on East Side Access is now.

(1,2)

The Port Authority looks forward to working with the MTA and our partner agencies in both states to make the fullest possible use of this expanded capability and other projects moving through the planning process to support sustainable growth throughout the metropolitan area. The project should go forward as proposed, with an awareness of its wider potential to improve regional mobility by enabling consideration of additional connections and services in the years following completion of this project.

(3)

Sincerely,

Louis P. Venech, Senior Manager
Transportation Policy Development
Office of Policy & Planning

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EAST SIDE ACCESS D.E.I.S. PUBLIC HEARING

June 15, 2000

Presented by: **Jeffrey Elmer**, GCA Deputy Director of Government Relations

I appreciate the opportunity to provide testimony this evening regarding the MTA's East Side Access Project (ESA).

The organization that I represent, The General Contractors Association (GCA), was founded as a trade association for New York City's heavy construction industry in 1909. The founding members were the contractors who were building the first pieces of the subway network. Today, we remain the trade association that represents the heavy construction industry active in building and repairing New York City's sprawling transportation infrastructure – subways, railroads, highways, bridges, etc.

East Side Access is crucial to regional growth and development. It will improve mobility for Long Island Railroad users, increase capacity to Manhattan and strengthen the economic core of the Central Business District. Clearly, this program is important to the continued economic strength of the City and Long Island. It will also provide thousands of construction jobs to New Yorkers who are raising families in the region.

(3)

60 East 42nd Street, New York, New York 10165-0016 • (212) 687-3131 • (800) 999-4116 • FAX: (212) 808-5267

It is clear to everyone that uses the facilities of the MTA that just about every system segment is being used to its fullest capacity. There are very few unexploited rush hour train paths left on the transit properties or the commuter railroads. The midtown office buildings planned or under construction will add to these burdens, as will the completion of other transit system improvements. The continued growth of the New York City economy is possible only through a massive investment in new capacity.

The East Side Access Project must move forward as quickly as possible. The project adds capacity for more riders from Long Island and eastern Queens as well as putting commuters closer to their East Side destinations. It has been planned for almost 100 years, since the first LIRR trains carried passengers into Manhattan. We fought hard, along with our Congressional delegation to put this project in the TEA-21 high priority category. Now that the MTA capital plan includes funding for a full-length Second Avenue subway extending through Grand Central Terminal to lower Manhattan, both projects must proceed as quickly as possible.

3

We urge the MTA to make every effort to construct the full-length Second Avenue Subway at the same time as ESA. Ideally, both projects will be developed on an expedited timeline. With the growth in ridership on the 4, 5, and 6 trains and more congestion to come, it is critical that planning for both projects be coordinated. Adding more riders to the overcrowded Lexington Avenue subway could partly negate the benefit East Side Access provides unless there is relief provided by a Second Avenue line.

1

East Side Access should move ahead now however, because it will give us new ridership capacity relatively quickly. It happens to be further ahead in the queue, based on the amount of work already done and where it is in the federal review process; it is in a good position to garner federal financial support. The region needs both of the expansion projects to do what we haven't done in many, many years - provide real new capacity. No one should suggest that the East Side Access project be sacrificed because of a demand for relief from the overcrowding on the Lexington Avenue line. We need both of these projects as well as others.

3

We know that there are concerns about the safety of this project and the potential impact of construction activities on buildings and businesses along the ESA route. However, the DEIS makes it clear that these impacts would be relatively small. Most of the work would be underground with little activity at the surface if the preferred alternative is selected. You can be sure that if GCA contractors are selected, they will only use construction methods that have proven to be safe on jobs around the world. GCA union-contractors invest millions of dollars into skills and safety training. This means that high quality projects are delivered safely and on-time. Our industry has a deep commitment to safe work practices in order to ensure the preservation of property and the well being of employees and the general public. (4)

Please be aware that the East Side Access plan is supported by thousands of men and women whose livelihood depends on the construction industry. Union members need the jobs that will be created by this construction – these will be well-paid positions with a living wage that can support a family. (2) Direct employment from construction activities on ESA is an estimated 14,200 person-years. That, of course, does not count the thousands of additional jobs and indirect economic activity that will result from a project of this magnitude. Since close to 40 percent of the area's construction workforce is composed of minorities and nearly three out of four construction workers employed by the local industry resides in the five boroughs, you can be sure that the construction of ESA will also help build middle class neighborhoods throughout the City. (5)

Once again, thank you for your time. The Association and the heavy construction industry stand ready to assist in any way that we can. Clearly, the need for ESA is more acute now than ever before.

Good evening gentlemen,

My name is Herb Landow. I have been concerned with this project since 1976 when I worked with the PB team studying GCT and the Third Avenue options. We were directed to plan for 30 trains per hour and the storage of 12 full trainsets. Thus we had to set up a 30 in/18 out operating scenario. This required a two level approach interlocking. You may recognize this as tracks 1,2 and 3 of the current plan. Later studies were able to break away from the notion of storing the trains in GCT. The loop was used – but the extra stub tracks and the two level interlocking remained. The ghost of the 1976 MTA specifications still lives in your plans.

The MTA inherits at GCT a natural solution to the design problem. That is, full use of the loop tracks from the Madison Avenue yard area into track 200 and back north. Mr. Wilgus, the NYC chief engineer planned for this usage. It is up to you to use this gift. (2)

In the past months I have submitted a series of three papers to the MTA. I request that they be made a part of the public record of submittals in this matter. They deal with various aspects of the project.

The October 99 paper deals with the station design near the arrival room – or Biltmore room as it has been renamed. It integrates the MNRR and LIRR station functions there, widens the corridors and speeds the flow. It avoids an expensive lowering of the Madison track level to accommodate a 44th street cross passage. Instead, the profile is undisturbed and the passengers are moved directly to the upper level station. (1)

The November 99 report is entitled "More Than You Ever Wanted To Know About The Grand Central Loop Tracks". It does just that - by exploring both the history and engineering that relates to speed around the loop. The speed issue relates to the capacity of the loop. The NYC had a limit of 12 MPH on the outer loops. The current MNRR limits are much lower and reflect cautious use of an aged infrastructure now due for rebuilding. In addition, in the report, the engineering equations for speed and balancing superelevation are explored in detail for each section of track involved. The "unbalanced" lateral forces are measured and shown to be within normal railway design practice. I conclude that the loop has the inherent capacity to handle the full operation at 12 MPH. (2)

The effect of these two reports is to provide a third alternative to the two now circulating. You have the deep tunnel and Madison Yard schemes. The third alternative "C" is a cost effective one. It gets back to the fundamentals of the design. It moves the trains and people while minimizing cost, risk and construction time. Major items of the Madison plan are dropped, including:

The two level interlocking and tracks 3,4,5,6 under Park Avenue. (5700 track feet)

The revision of track 200 north of 45th to dive down (under the Waldorf and other buildings).

The stub station trackage in favor of a through design operation.

The avoidance of the massive column changes near Ladders N and U.

The lowered track profile in the Madison yard area.

The only tracks remaining under the MNRR in the 50s area are the 63rd St. approach tracks. These are 30 ft or more below the MNRR trackage, thereby avoiding the difficult construction of the flyover under the MNRR. Also, the former three track approach under the Tennis & Racquet Club and other buildings need not occur. Instead, the approach tracks can focus on the J slot inbound - and the A slot outbound. Tracks I and J can be reversed in their upper/lower level access functions. Thus, the risks and difficulties of the former design can be avoided – without resorting to deep tunneling.

The grade from 63rd St. can be reduced from 3% to 2% as the two level interlocking is not needed.

The final paper relates to the fact that a third of the market served by the ESA has destinations in the 50's. A station serving MNRR and LIRR is feasible in the area from 53rd to 57th. All trains would pause there en route to/from GCT. The market estimation is based on the 1976 MTA studies. The market has expanded since then. While the 50s station is unfamiliar to the MTA, it is very relevant for long term planning. It would reduce the pedestrian loading at GCT and the surrounding streets and subways, shorten the trip time and heighten customer satisfaction. This project could be built later – but the tunnel work now being planned from 63rd should rise to the elevations desired in the long term plan. This uses a 2.24% grade with a 1% grade in the platform area from 53rd to 57th. This still leaves the 30 feet envelop under the MNRR mentioned earlier.

(3)

In conclusion, a plan based on the fundamentals, which deletes the "extras" can radically reduce the cost of the project, eliminate risk and get the project built quickly. At this time I invite any questions you may have.

Herb Landow
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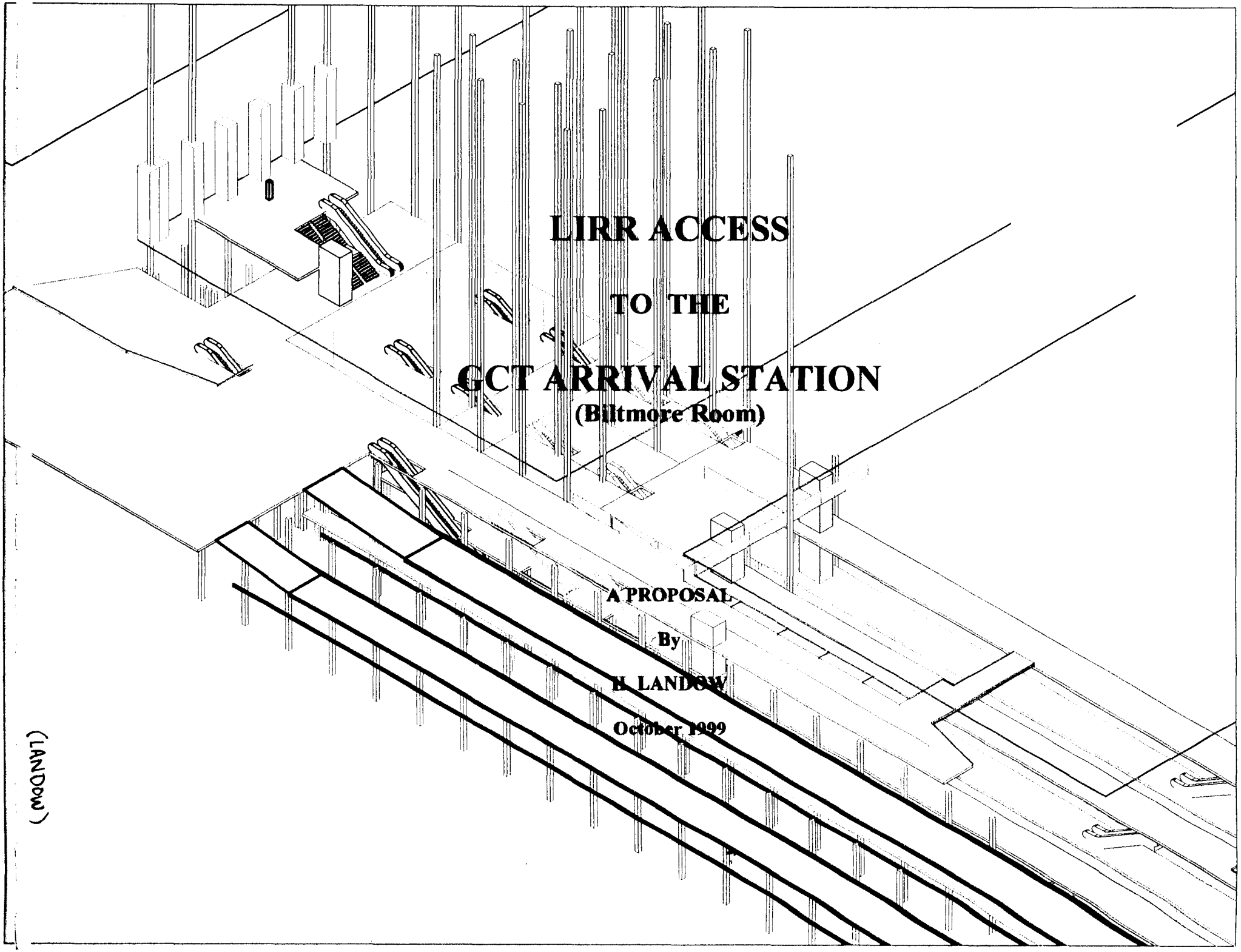


LIRR ACCESS

TO THE

GCT ARRIVAL STATION

(Biltmore Room)

A PROPOSAL

By

H. LANDOW

October 1999

(LANDOW)

OBJECTIVES

- Increase the presence of the LIRR on the main concourse
- Give direct access to the upper concourse from LIRR tracks 7-12
- Improve MNRR circulation to the arrival station from tracks 38-42
- Improve arrival station vertical circulation to 43rd street lobby
- Reduce project costs
- Reduce project complexity and duration of construction
- Improve ADA access

(LANDOM)

INTRODUCTION

This report offers an alternative design for the LIRR entry to GCT as it relates to the station elements from 44th to 42nd streets. It proposes to replace the 44th street cross passage with direct platform access to the arrival station of GCT (Biltmore Room). This design approach was not selected in 1976 due to the desire to separate the LIRR passengers from those of MNRR.

This study assumes that the design can consider the total passenger flow and need not separate the two MTA rail lines for policy reasons. The passenger flows and the waiting areas needed by both can best be approached by integrating them, and separating them only in cases of congestion.

The study takes care to understand the structural issues involved in the proposal. ***Detailed*** column alignment data was entered into the CAD environment in which the design was developed. Columns that seem to present issues are highlighted and discussed. Only a limited number of columns seem in question in this respect, and none are structurally related to the Bank of America building (former Biltmore Hotel).

(LANDOW)

The design involves a straightforward linkage of the LIRR tracks 7-12 to the arrival station (Biltmore Room). From here, there are vertical circulation improvements that connect directly to the 43rd Street Lobby entrance to that room.

Although the design is triggered by the desire to improve south end access to the LIRR, it has beneficial effects for MNRR. There is improved circulation for the tracks 38-42 to the arrival station as well. The ramps are replaced by a pair of escalators of higher capacity.

ADA access is improved by providing elevator access from 43rd street to the arrival station floor (main concourse), the MNRR level (38-42) and the LIRR (7-12). It eliminates the tough 12-foot climb up the 140' long ramp by a manually propelled wheelchair.

Each design element is discussed in detail in this report. Sub-alternatives exist and are described. However, the reader is invited to concentrate on the objectives list given above, and test whether or not the proposal meets those objectives. In particular, consider the cost savings and system improvements.

(LANDOW)

BASIC VERTICAL CIRCULATION PLAN

The proposal provides each LIRR platform (tracks 7-12) with two escalators and one elevator. This is more effective than the STV proposal, which provided one ADA elevator, one stair and one escalator.

For MNRR, the proposal offers an option. The ramps to 38-42 could be retained if modified, but we suggest a full-scale replacement with more powerful egress methods. The ramp is more effective than a single escalator, but not as effective as two. We suggest a dual escalator and ADA elevator. The rate of egress would be 180 persons/minute (90 PPM for each escalator).

The LIRR and MNRR ADA elevators share a common shaft. They operate between the arrival station level and *both* the upper and lower level platforms.

Vertical circulation is also provided from 43rd at street lobby level to the arrival station floor.

PLATFORM LENGTH

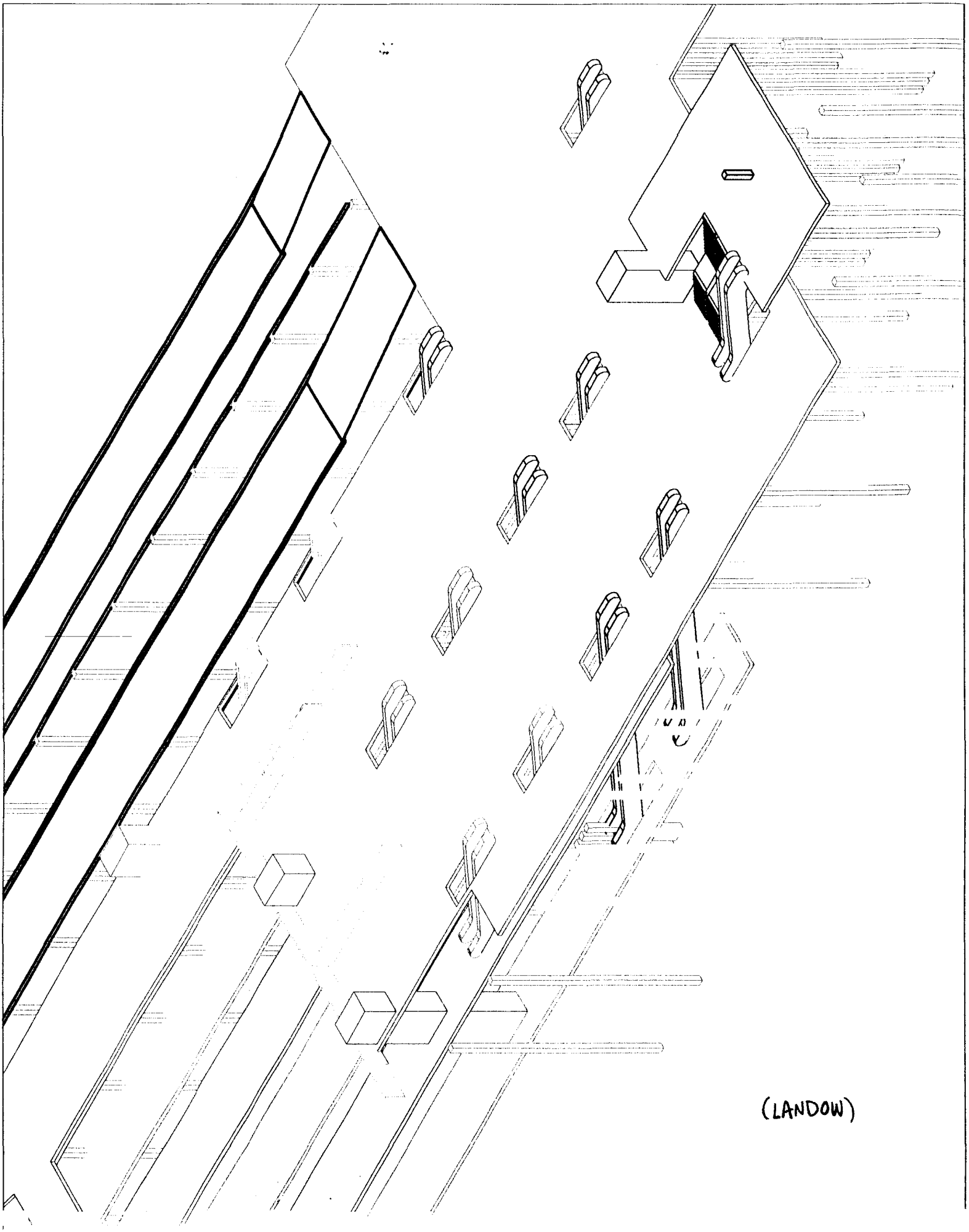
If both the MNRR and LIRR are connected as described, the south end of the platforms can be shifted from N 5+60 south to N 4+00. This 160 feet is just short of two car lengths. The exact platform length varies with the curve location. This lengthens length for MNRR and retains the proposed length for the LIRR.

PERSPECTIVE DRAWINGS

Two general drawings follow. The first shows the arrival station floor in place. The second shows it removed to allow a better view of the platforms and the vertical circulation elements.

(LANDOW)

(LANDOW)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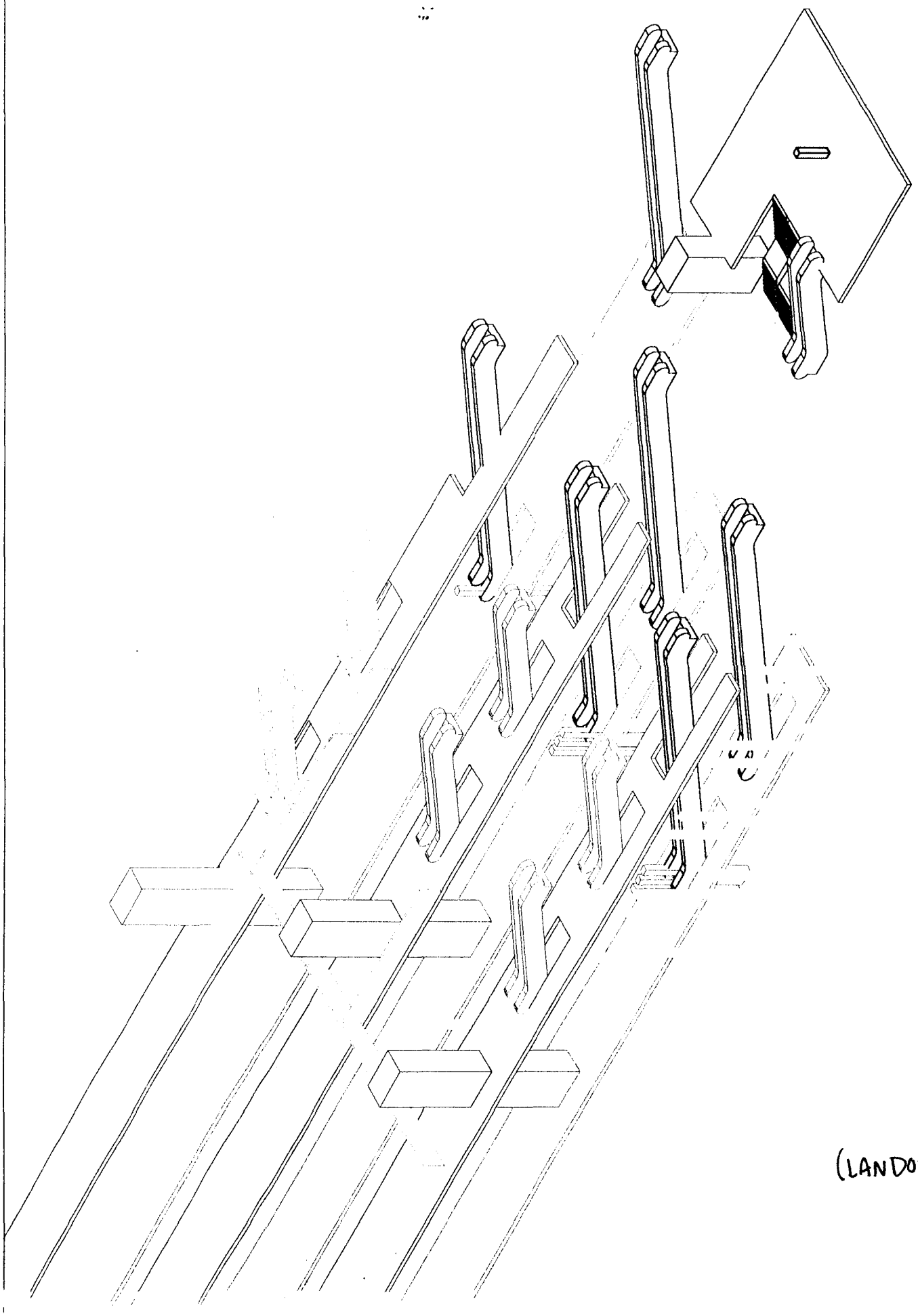


(LANDOW)

DATA SOURCES – TRACKS & COLUMNS

- NYC & HR RR **COMPOSITE** Plan Tracks and Columns **BOTH LEVELS**
  Grand Central Terminal Improvement New York City
  January 15, 1910 Revised 1-14-1914
  Scale 30 ft. Issue #11. Scope: 0+00 to E 8+00, N 28+50

  This drawing is 30" wide by 8 1/2 ft. long. **It gives dimensions to 0.001 ft.,** e.g., station 2+38.335. All columns are shown as of the date of revision. Prior revisions are noted as issues 6-10. This includes Yale Club columns between 44th and 45th.

  Columns are coded to show separately those:
  Suburban Level base *up to* Express Track Level
  Above Express Track Level
  Suburban Level *up through* Express Level
  Similar coding is used to separate independent building columns from those supporting trackwork.

  This drawing has been encoded in a CAD file and used in this study. References to this source will use the name **COMPOSITE.**

- Similar to NYC & HR RR above. Tracks and Columns **EXPRESS LEVEL**
  Grand Central Terminal Improvement New York City
  March 15, 1933
  Scale 50 ft. Issue # 19
  Covers issues 8-19. Issue 12 here is equivalent to issue 9 above.

  Dimensions stated are given to 0.001 ft.
  Track curvature is indicated by degree or radius specification.
  References to this source will use the name **EXPRESS.**

(LANDAU)

- Similar to NYC & HR RR above. Tracks and Columns **SUBURBAN LEVEL**
  Grand Central Terminal Improvement New York City
  Scale 50 ft

  Dimensions stated are given to 0.001 ft.
  Track curvature is indicated by degree or radius specification.
  References to this source will use the name **SUBURBAN.**

DATA SOURCES – PRIOR STUDIES

- Grand Central Alternative
  Long Island Rail Road East Midtown Terminal
  October 15, 1976
  By PBQ&D / G&H for the MTA

  This study was prompted by the prior studies of the Third Avenue Alternative. It was noted that GCT could be a less costly and better located site.
  References to this source will use the name **PB/GH.**

- Operational & Physical Feasibility Study of Long Island Rail Road Access to Manhattan's East Side

  Prepared for the Long Island Rail Road
  April 1993
  by STV/Seelye Stevenson Value & Knecht
  References to this source will use the name **STV.**

(LANDOM)

43RD STREET LOBBY

VERTICAL CIRCULATION to the ARRIVAL ROOM

There is an existing double stairway from 43rd street to the arrival station. This egress point will have increased traffic. Accordingly, we have added both an elevator for ADA requirements and an escalator. Both are positioned to be clear of columns in the region

The 43rd street lobby is quite spacious. The curved approaches to the staircase will probably need modification by the addition of the elements proposed.

The exterior sidewalk is only 10 feet wide on the north side of the street. It should be set at 15 feet to handle the increased pedestrian circulation to/from the west. The street has minor automotive traffic volume and can absorb this change. It is westbound only and gets its flow only from Vanderbilt Avenue.

In the plan view, the track centerlines are in black. The lateral track clearance is in green. It represents the lateral movement of the side of the car on a curve.

The light blue colored columns support the upper track deck. The dark green columns support the building structure. The blue and violet columns extend above the arrival station. They are absent in the middle of the arrival station where the high ceiling is located.

The elevator is shown with its base over the restricted clearance area. As the tracks have descended to the south on a 1% grade, it would appear that the necessary vertical clearance is available. Ample room exists for the motor room at the top of the elevator shaft.

(LANDOW)

ARRIVAL STATION – EXPANSION OF AREA

We propose to expand the surface area of this region by 90%. This will increase the waiting and commercial areas significantly. The existing area is 7544 sqft. The new area adds 6800 sqft.

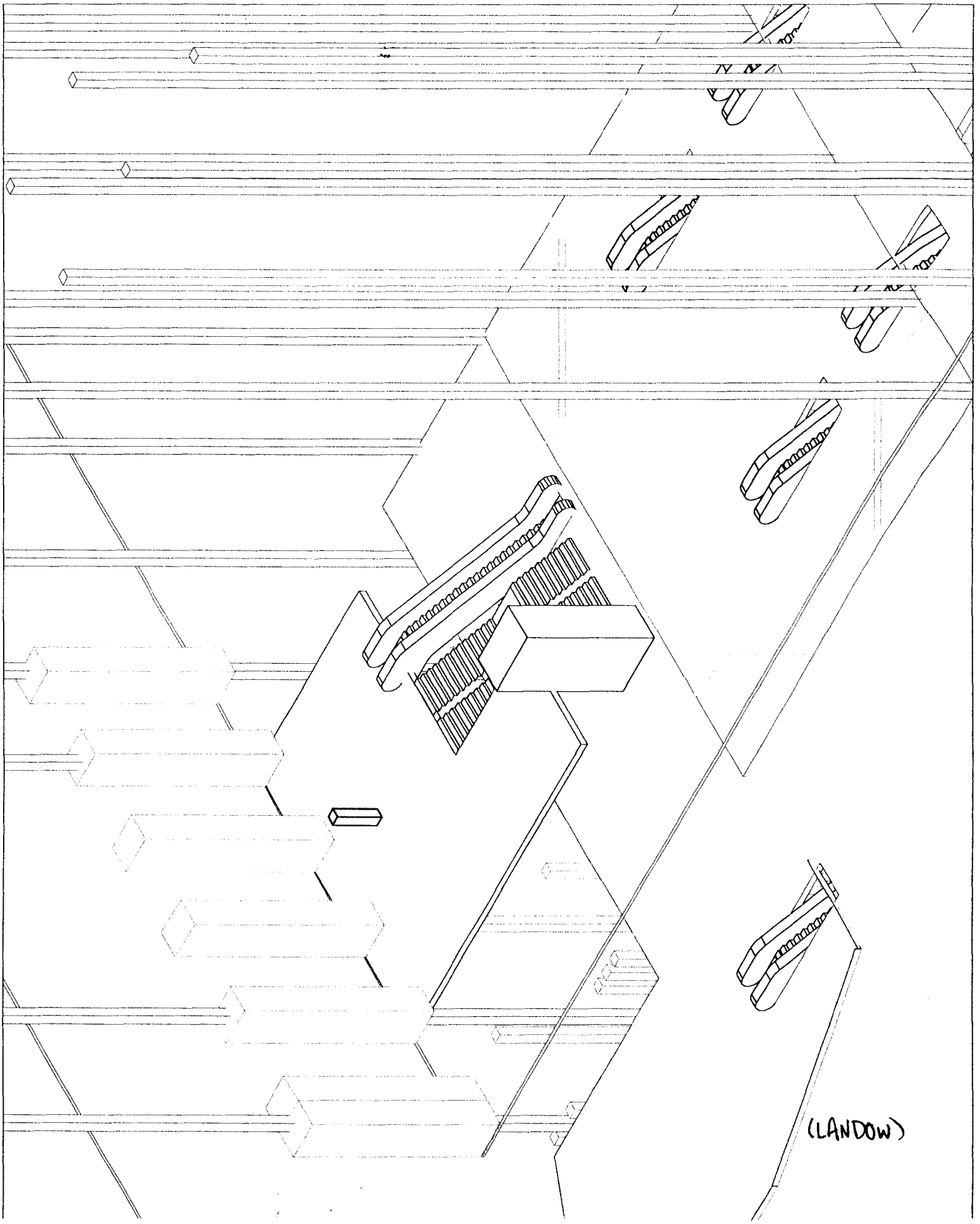
The expansion includes 3 of the 4 **offices** (green shading). The westernmost office is not used in the expansion. The office spaces are located between N 4+18 and N 4+70. On the East axis, they extend from E 2+22 to E 2+90. They are separated by the ramps for tracks 41-42 and 39-40. The gross office area taken is approximately 68 x 52, 3536 sqft.

The expansion also includes a **new floor** north of the existing offices (in gray shading). The office floor already extends 10 ft under 44th street north of the building line. The additional 50' (60-10) is bordered by a major girder for the Yale Building. Another major brace running north/south is used in the north 40 feet of the street. This limits but does not totally block pedestrian circulation. We propose to extend the floor north to N 5+18, near the north edge of 44th. This will expand the floor by 68 x 48 ft, 3264 square ft.

Low headroom exists under the street on the west side. The road moves up sharply to the east from a mid block low spot (near the GCT garage ramp). This can be addressed in several ways.

The new floor areas created can be used for commercial space and as a waiting room.

(LANDOW)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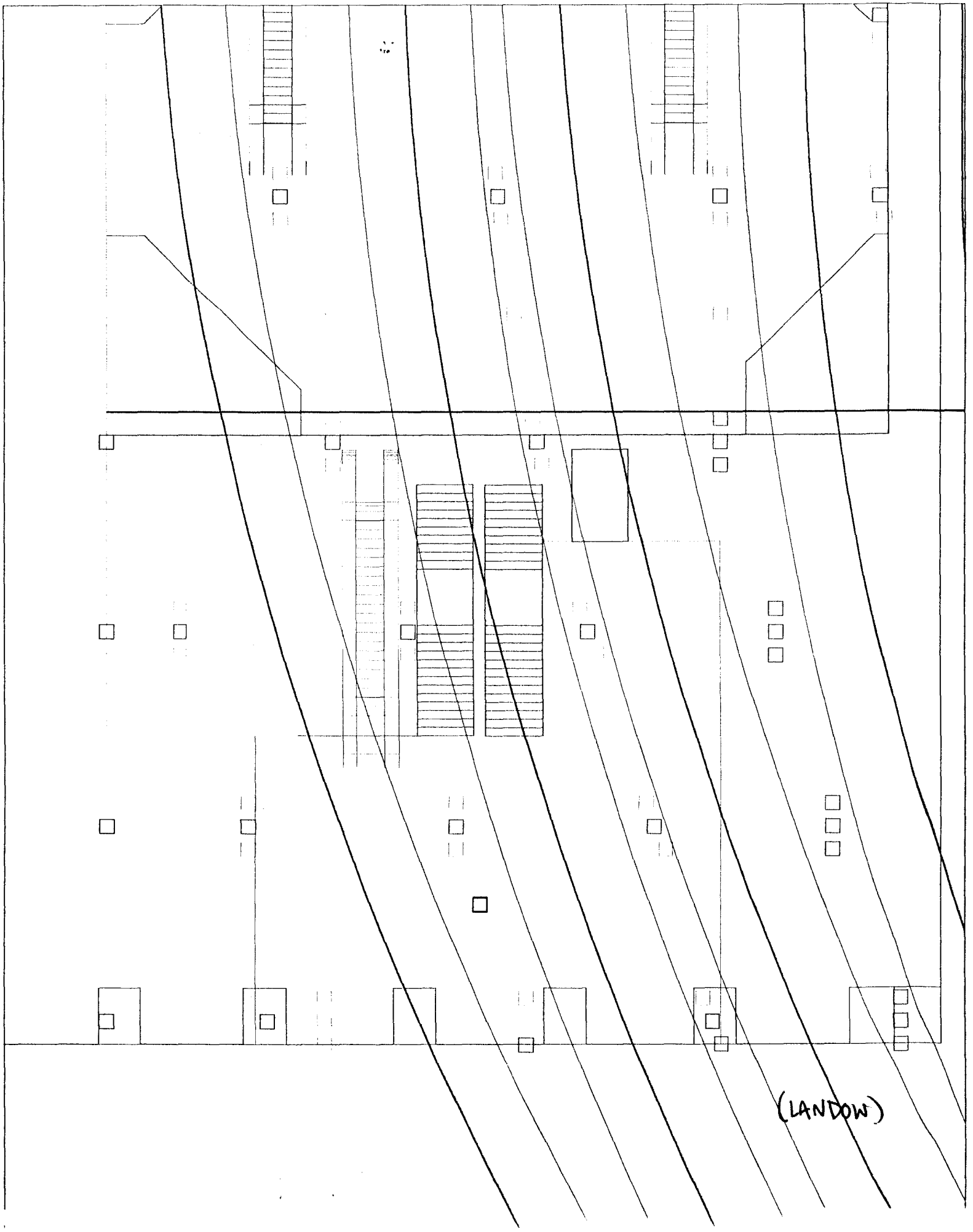
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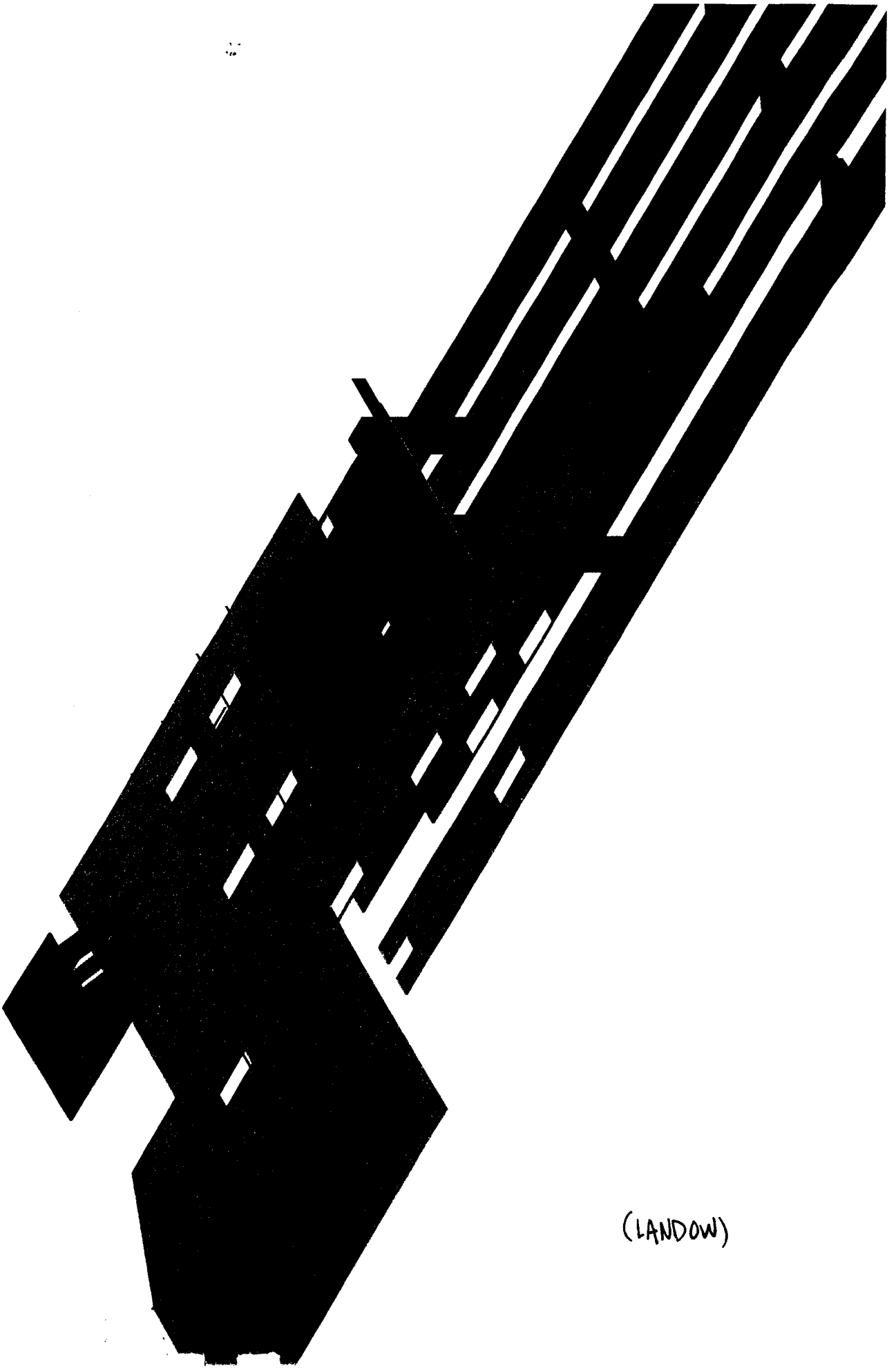

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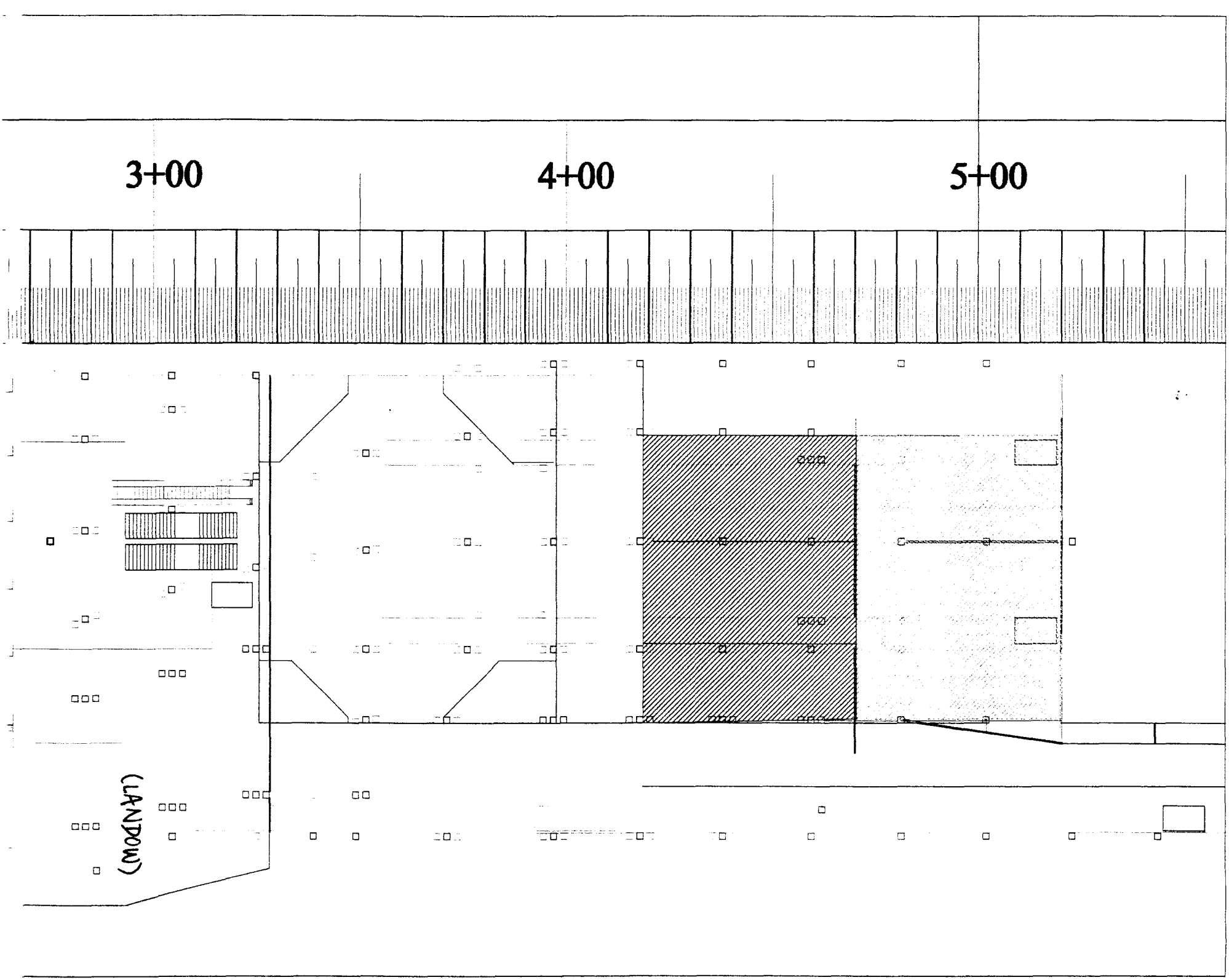

3+00
4+00
5+00
(LANDOW)

ROOSEVELT PASSAGEWAY

This passage is adjacent to the track 38 ramp. The proposal widens the passage by 8.5 feet. The east wall of the passage moves further east to the existing wall between tracks 37 and 38. This is along column line RA at E 3+17.917. The ramp is removed and is replaced by escalators and an elevator as described earlier. These are 6 feet wide and take up space in the new 8.5' expansion, leaving a net expansion of 2.5'.

The blue hatched area is the shop area. The green hatch shows the expanded area in the passage. The final corridor width will be 23'9" in lieu of 15'3". This will allow users of the arrival station area to go north to 45th street without undue congestion.

The stores remain in place. They are in the margin between column line SA at E 2+90.083 and the building line on Vanderbilt at E 2+95.8. The difference of 5.717 feet is the theoretical depth of the shops.

The north MNRR **escalator** is located on the expanded passage at the point where the passage **west** wall has widened out. This shift is caused by a major bracing beam shown in the drawing. The escalators are all in the widest portion of the passage.

The **elevator** centers on N 5+50. It is in the widened section of the passage. The doors open for movement along the north/south axis and do not impeded pedestrian flow when loading or unloading.

(LANDOW)

VERTICAL CIRCULATION
TRACKS LIRR 11-12 AND MNRR 38

LIRR ESCALATORS

The south and north LIRR escalators in the arrival station area are widely spaced from each other. On the upper concourse, level one is at N 3+08 and the other at N 3+92. This 84-foot separation allows unimpeded pedestrian flow along the upper concourse to the arrival station region. A 20-foot space is allowed for each escalator footprint, reducing the free circulation distance to 64 feet.

The south LIRR escalator takes space from the Park Avenue Sweets shop. The adjacent Junior's shop will also be effected. A column at N 3+07, E 3+17 restricts movement of that escalator further south.

The north LIRR escalator has its upper section near the "telephone wall" south of the ramp for track 38. The escalator exterids to the corner of the wall, fully visible to pedestrians walking north. A column at N 4+62, E 3+11.5 is effected at the base of the escalator on the lower level platform. This column (red color) supports only the upper level track deck, but it will need re-framing.

MNRR ESCALATORS

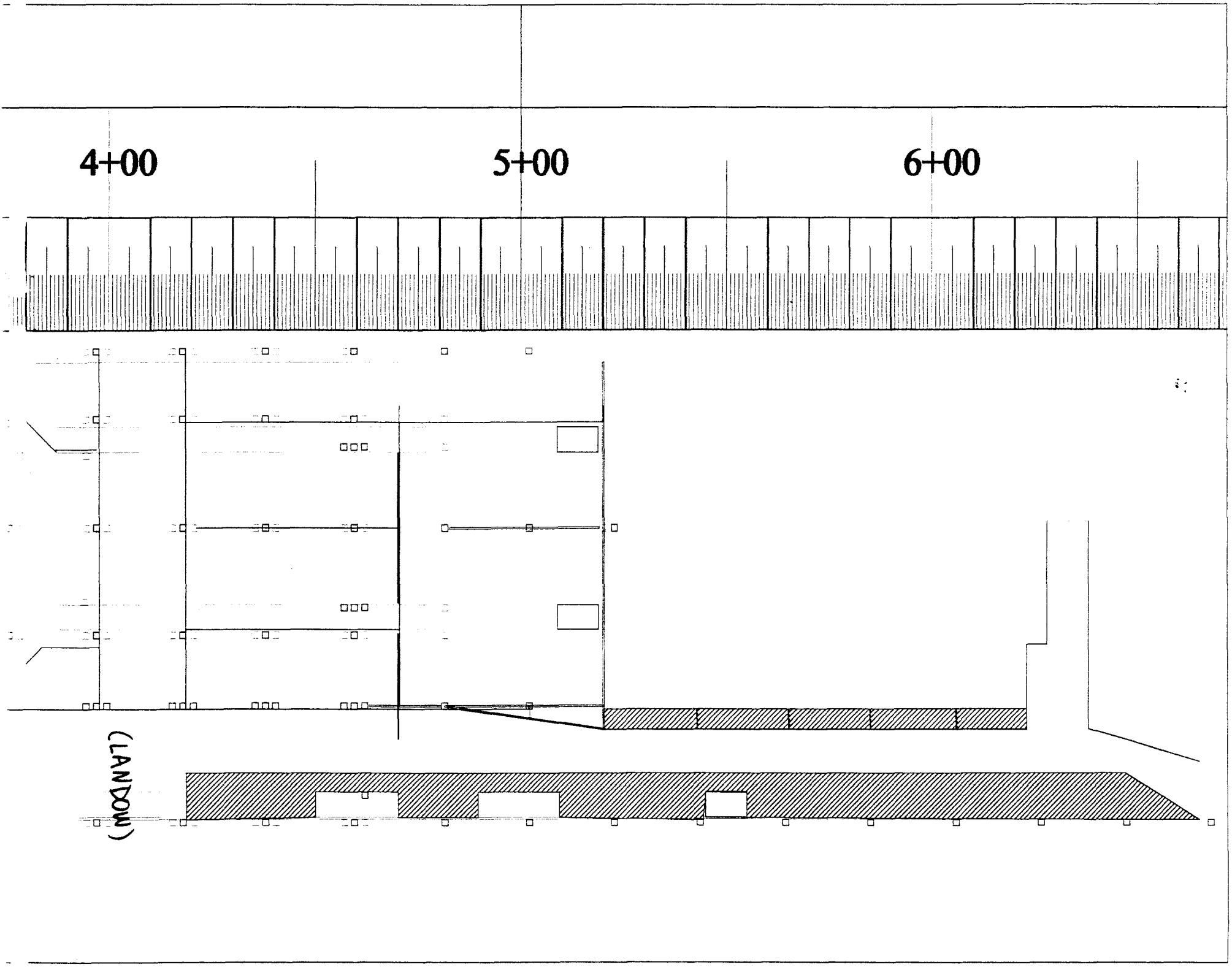
While the ramp to track 38 started descending at N 4+18, the new escalators are at N 4+50 and N 4+89. This allows a wide spacing between the converging passenger flows. There is no special column interference and the escalators could be positioned further south if desired.

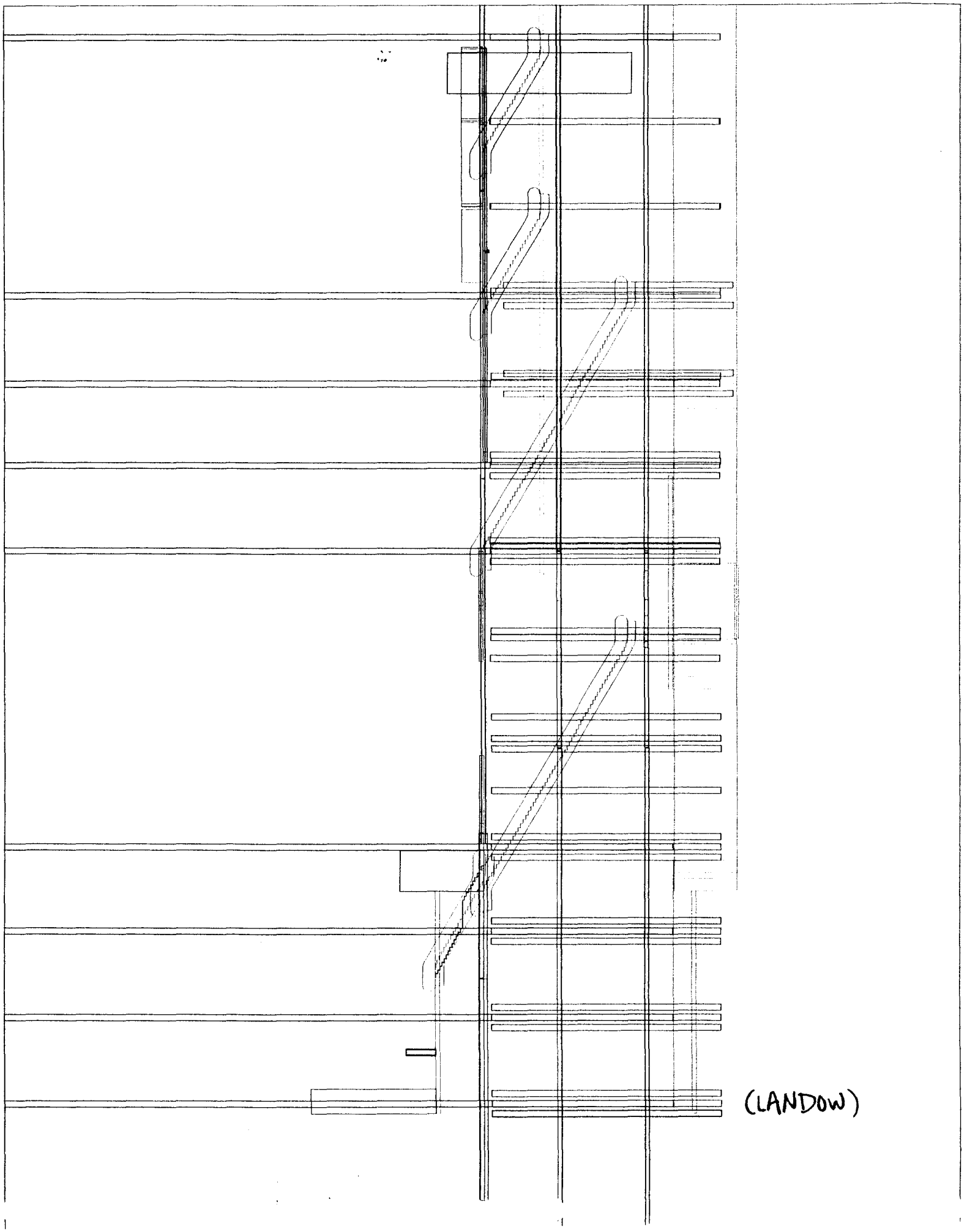
These escalators are in the widest part of the Roosevelt corridor. The corridor is widened by shifting the east wall east 8.5 feet. Therefore, no congestion of note is expected at this busy location.

ELEVATOR / SHARED BY MNRR & LIRR

This unit connects the arrival station area to **both** the upper level track 38 **and** the lower level Track 11-12. It is drawn here as a 6x10 foot unit centered at N 5+50. This is just south of the current bottom of ramp position (N 5+60).

(LANDOW)


4+00
5+00
6+00
(LANDOW)


(LANDOW)

VERTICAL CIRCULATION
TRACKS LIRR 7-8, 9-10 AND MNRR 42-41, 40-39

LIRR ESCALATORS

The south and north LIRR escalators in the arrival station area are closely spaced. One is located at N 3+55 and the other at N 3+87. However, there is 12' of separation between the 20' footprints to allow free circulation. There is ample lateral room to absorb the combined flows in the arrival station.

The south LIRR escalator is 30 feet from the arrival station south wall. Ample circulation space exists for pedestrian movement in the region. A column at N 3+51 blocks a shift to the south. However, if this were re-framed (it supports the arrival station floor), it would eliminate the interference mentioned below for the north escalator. In addition, this opens more room for the MNRR escalators.

The north LIRR escalator has its upper section at N 3+87. This is 10 feet south of the imposing south column at N 4+18. The columns in this region have small cross sections hidden within large facades. These facades would be replaced with a narrower decorative skin. At N 4+56 to N 4+63 are three lower level columns that support the upper track deck. These effect the base of the escalator on the lower level platform. These column supports will need re-framing on an E axis shift of about 2.5 feet. As an alternate, the escalators can both move south and avoid this problem.

MNRR ESCALATORS

Whereas the MNRR ramp started descending at N 4+18, the new MNRR escalators are at N 4+22 and N 4+57. This allows sufficient spacing between the converging passenger flows. There is no special column interference. The escalators could be positioned further south if the LIRR escalators are moved as well.

ELEVATOR / SHARED BY MNRR & LIRR

This unit connects the arrival station area to both the upper level and lower level tracks. It is drawn here as a 6x10 foot unit centered at N 5+14.

(LANDAU)

ELEVATORS

These units are drawn as a 6x10 unit. To facilitate pedestrian circulation, the 6 foot width would be across the platform. The west two platforms ("U" & "T") of the station have a 15'8" wide platform. This would leave 9'8" feet remaining, 4'10" feet to a side.

Loading / unloading is on a north south axis so that the user will be moving parallel to the long axis of the platform. The elevator and its door would be centered for maximum isolation from the platform edge.

A three foot wide door satisfies current ADA standards. A four-leaf door will allow the 3 feet to be folded into 9" areas to each side of the door. Having two doors on opposite ends of the elevator would allow usage from/to either direction without requiring the user to move around the elevator to reach the door.

Three elevators are used in situations where little or no headroom exists above the arrival station level. This requires that the motor room be placed below the unit, under the lower level platform.

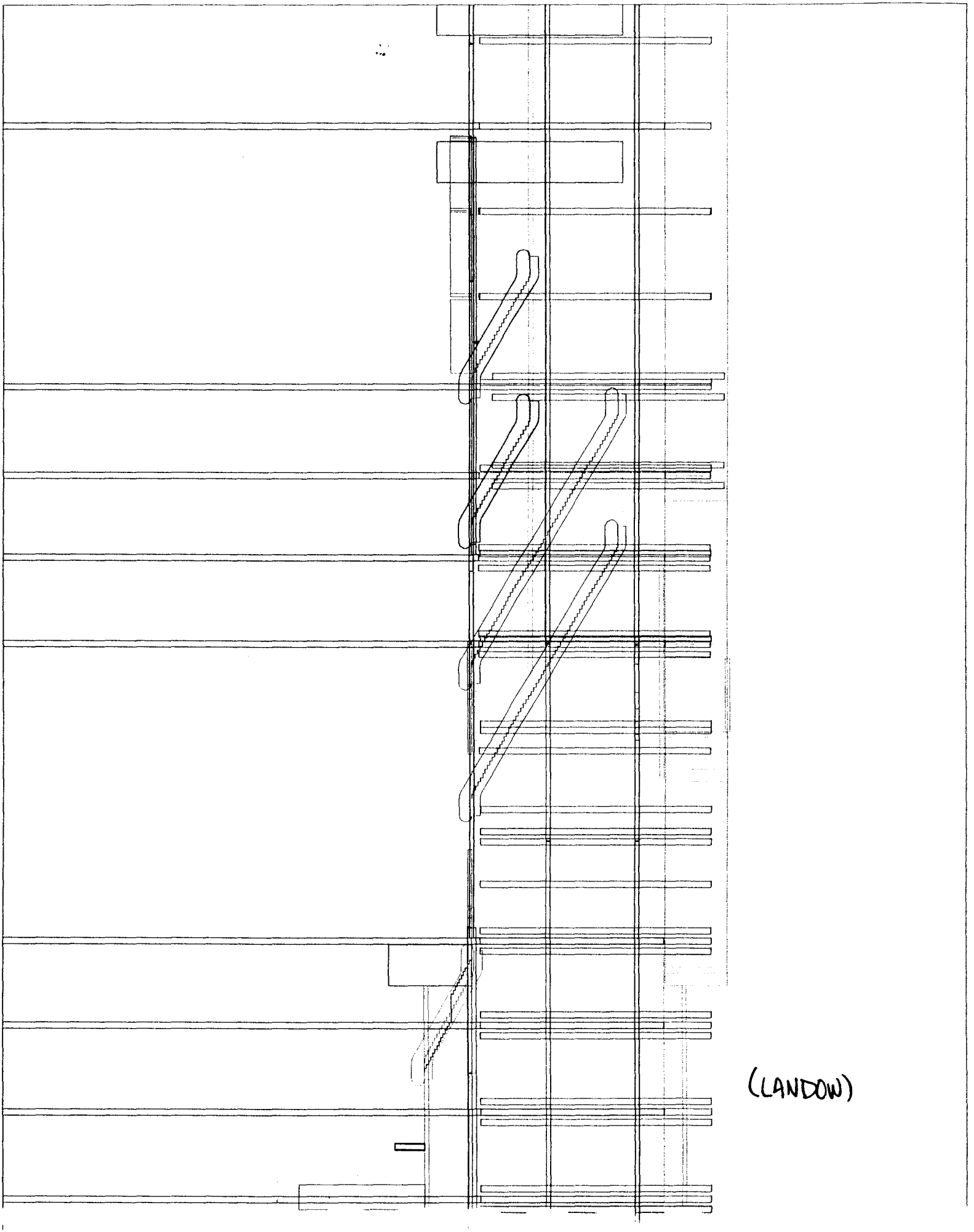
Only three platform elevators are required in the proposal. This is the same as the STV proposal for the same platforms. However, this new proposal serves the upper level tracks 38-42 as well, avoiding the use of the long ramp by ADA passengers.

A fourth elevator connects the 43rd street lobby to the arrival concourse. In this case, there is no headroom problem.

ESCALATORS

The escalators proposed are rated at 100 passengers per minute. This yields a 90-PPM rate in actual practice during crush load. A nominal 6-foot wide unit is suggested. Similar units are used at Penn Station and elsewhere. At the level of the arrival station, the floor must be modified for the 6x20 opening needed together with vertical support. The locations in question are over platform areas and are not in clearance conflict with railway operations.

(LANDOW)


(LANDOW)

TRACK ELEVATIONS
COST SAVINGS

This proposal and that of the PB/GH + STV reports have significantly different track profiles. The original reports assumed that a cross passage was needed from the GCT lower level concourse. The LIRR tracks 13-16 were no problem in this regard having ready access to the lower concourse. However, the LIRR 7-11 track group is too close in elevation to the track 38-42 group to make this possible at current elevations. Accordingly, the LIRR group was to be reduced in elevation by about 4.5 feet at 44th street.

To do this they needed to excavate the rock profile under the track. In addition, the column lines had to be protected, as they would become exposed at their base. The region from 43rd to 47th streets was effected by this reduction in grade. The cost of this phase of the project was very significant. In current dollar terms, we define "very significant" as multiples of $100,000,000.

This proposal, however, eliminates the 44th street cross passage. LIRR tracks 13-16 still have direct access to the lower concourse, but the LIRR group 7-12 has direct access to the upper concourse. The groups are linked by the new escalator bank near the station master's office.

Track 12 (old 117 shifted east) is still changed in elevation, but its proposed alignment is close to only one column at N 7+55.041 on the QA column line. Track 12 can be changed as needed to match track 11 elevation without difficulty.

The proposed 45th street passage is to be **between** the upper and lower levels. This requires some elevation changes to the lower level track. However, the scope and impact is far more limited, thereby reducing costs significantly. The upper level is on a 1% up grade to the north. At a 260 foot per street interval, this is 2.6 feet higher than at 44th street. To achieve the vertical separation the lower level needs to move down only 1.7 feet. This would have only minor effects at 44th street and the GCT arrival station region.

If the 45th street passage were **below** the lower level, **no** track elevation changes are needed except to match tracks 11 and 12 which share a common platform.

(LANDOW)

Major cost savings are associated with any of these basic changes in profile.

ALTERNATIVE DESIGN POSSIBILITIES

1. **Retain the existing ramp system**. Move the LIRR escalators for tracks 7-8, 9-10 to the south about 10 feet. This will clear space for the retention of the ramps to the upper level tracks 39-42. Place an ADA elevator at N 5+80 on the upper level platform to connect to the lower level. Elevator users would access the lower level from the concourse, ramp and upper level platform. This option does not expand the arrival station area. ADA users would still face the 140' ramp climb of 12' in exiting the system.

2. Replace the ramps, but move the escalators for the west two platforms (MNRR 42-39, LIRR 7-10) 10' to the south. This changes which columns are effected and shifts the pedestrian flows slightly.

3. Create the 45th street passage **under** the lower level track. It is already excavated (in part) just south of the street line. It is 20 feet wide, then hooks northwest, opening to 30 feet under tracks 7-8. No track excavation (lowering) of tracks 7-11 would be needed. It also becomes a natural extension of the existing 45th street passage built for the North End Access Project. The width mentioned is partially used by the steam lines, but the width is expandable. It may be far less costly to widen the underpass system than to lower the track level.

(LANDOW)

AUTHOR

Mr. Landow has over 4 decades of railway experience. In the NY region, he worked for PB/GH on the 1976 study of LIRR entry to GCT. His work related to both the operations plans and the required infrastructure. The three track grade separated approach under Park Avenue and the 10 track station was the direct outcome of the train volume required by the client in 1976. This required the arrival of 30 trains per hour, the return of 18 trains per hour and the storage of 12. These requirements have changed, but only minor infrastructure changes have been made to date.

Following the GCT project he developed the basic concepts for the *West Side Yard*, presenting 100 and 40 scale plans to the LIRR President. The MTA then authorized detailed studies and the project was eventually completed.

At NJT, Mr. Landow developed high-density plans related to the future of *Penn Station*. This required studying the operations and needs of all three users at the station.

His experience ranged from the operating department of the DL&W (1956-59) to *AVP-Planning* of the IC RR in 1969. He performed operations and economic studies for the New York Central RR as well as consulting work with Peat Marwick, Bechtel and Parsons Brinckerhoff on a wide range of projects.

Questions and comments on this proposal are welcomed and should be addressed to:

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(LANDOW)

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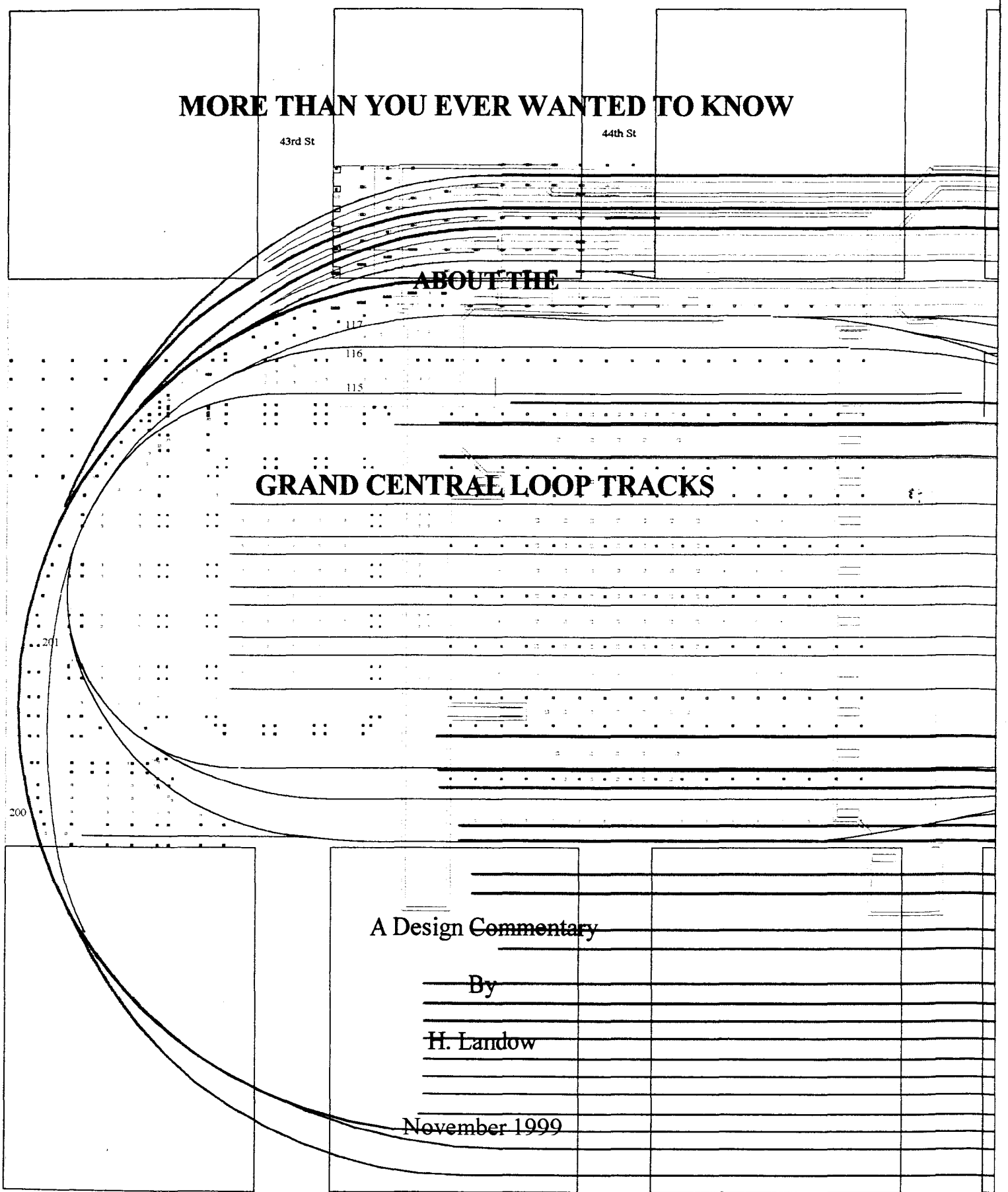

ABOUT THE

GRAND CENTRAL LOOP TRACKS

A Design ~~Commentary~~

~~By~~

~~H. Landow~~

~~November 1999~~

(LANDOW)

EXECUTIVE SUMMARY

At a loop speed of 6 MPH, the loops have insufficient capacity to move all of the LIRR trains. As a result:

Auxiliary stub ended platforms are needed.

An interlocking to the north is required.

Grade separation of the approach is needed.

Grades of 3% are needed to climb from the East River.

At 12 MPH around the loops, sufficient capacity exists.

No auxiliary stub ended platforms are needed.

No interlocking to the north is required.

No grade separation of the approach is needed.

Grades can be reduced to 2%.

1/3 BILLION DOLLARS IS SAVED AT 12 MPH

Proofs regarding the validity of 12 MPH for the loop are given, including :

1. Past NYC RR Operating Timetable
2. Ride Quality – Lateral G Forces on Curves
3. Engineering Equations
4. Standard Railroad Practice On Turnouts
5. Former LIRR Track Criteria
6. GCT Loop Radius Values

(LANDOW)

INTRODUCTION

The LIRR station design at GCT is critically effected by the way we use the loop tracks. Judgements as to the speed and capacity of the loop underlie much of the design. It is vital, therefore, that this issue be thoroughly understood.

Three loop systems exist at GCT. They are the *upper* loop, the lower *outer* loop and the lower *inner* loop. In addition, there is a connection between the inner and outer lower level loop on track 201.

Track 117 can connect to the outer loop via track 201. In addition, it can be superelevated with the removal of the other inner loop tracks. Thus, a 6 track through station could be created in lieu of the 10 track (5+5 stub) proposed.

This essay will explore a series of interrelated proofs that point to a more economic and efficient station at GCT. The basic loop proposal is an old one, having been suggested many times. However, we demonstrate in 6 different ways that the basic premise of the refusal to fully use the loop (low speed on ride quality grounds) is insufficient to ignore the major economic advantages of full loop usage.

1. NEW YORK CENTRL RR - SPEED LIMITS FOR GCT

The Electric Division NY Central timetable for Sept 26, 1926 (73 years ago) showed special instructions for operations at GCT. (Appendix A)

The general speed limit East of 57th street was 20 MPH. (Note: Dispatching to the "East" is physically to the South). (Special Instructions, page 4, top/left item of table).

However, special restrictions included eastward moves down the ramps to the lower level (ladders A,B,F,J). These were limited to 12 MPH, probably because of the heavy grades (2.7% and 3%). (Special Instructions, page 4, Local, 2nd item.).

In addition, crossover, switch or slips were limited to 12 MPH. (Spec. Instructions middle of page 5, East of 57th St). The station has many instances of turnouts with #6.5 and #7 frog designs. The radius of a #6.5 is close to 300', even tighter than the loop at 333'. Since the upper loop had turnouts, we may assume the 12-MPH limit applied there. **There is no specific mention of any upper level loop limit.**

(LANDOW)

Also included was a speed limit of 6 MPH on the lower level loop. (Spec. Instructions, page 4, Local, first item.).

Today we are warned to obey the 6-MPH limit. However, the 6-MPH limit only pertained to the **inner** lower level loop. The **outer** loop tracks on the lower level were *not opened until the following year* (1927) and the special instruction referenced could not relate to them. The geometry of the upper and lower **outer** loops is identical, sharing the same radius elements.

Thus, the inner loop had a 6-MPH limit while the outer loops had a 12-MPH limit.

PENN CENTRAL - SPEED LIMITS FOR GCT

By 1974, the speed limits in GCT had deteriorated significantly. The Penn Central Metropolitan Region Timetable listed rule 1157-D1. It limited the loops (outer) and platform tracks at 6 MPH. Diverging switches and crossovers were limited to 8 MPH.

This was *48 years* after the 1926 NYC RR Timetable. In the interval, the track had deteriorated and the PC RR was very cautious about its operations. Also, by this point, the volume of activity on the loops had diminished with the loss of intercity business. Capacity of the loop was not considered an issue of note. Although the crews had trouble holding speed as low as indicated, the company was protected by its notice in the timetable.

Our concern is with the speed as it should be set, that is, in the context of a very active facility in **a state of good repair.**

(LANDOW)

2. PHYSICS of CURVE BALANCING

In order to establish a reasonable speed limit for these tracks one must go back to the engineering fundamentals.

A vector force analysis yields the standard equation for lateral acceleration on a tilted plane.

The lateral acceleration on a superelevated track is derived from the gravitational force (G @ 32fps/s). The ratio of superelevation / gauge ratio gives the basic angle of the "tilt" (alpha). Alpha is the angle whose tangent is E / 56.5. The sine of alpha gives the portion of G that pulls a mass down along the plane of the tilt. The cosine of the angle gives the sub-portion along the plane of the track's route. Thus cos(alpha) · sin(alpha) · G gives the acceleration which counters the outward motion away from the curve.

The factor 100 · cos(alpha) · sin(alpha) is the percent of G that pulls inward along the curve. At various E values, the G percent is:

E, inches	Percent of One G	
0.5	0.88	
1.0	1.77	
1.5	2.65	Current LIRR maximum, except LIRR turnouts
2.0	3.53	
2.5	4.42	
3.0	5.29	Former LIRR maximum (1 / 19 of G)
3.5	6.17	
4.0	7.04	
4.5	7.91	
5.0	8.78	

3. STANDARD EQUATIONS

The standard equation for the "balancing" speed on a curve is:

$$V^2 = K(Ea + Eu) / D$$

where:

V = Velocity, mph
Ea = Superelevation, actual
Eu = Unbalance (additional superelevation needed to achieve a balance)
K = Constant
R = Radius
D = Degrees of curvature subtended by a 100' chord = 2(Arcsine(50/R))

(LANDOW)

If V is in MPH and elevation is in inches, then K is about 1500. In fact, K is not a true constant. It is an inelastic variable (of E and D) that runs about 1495-1508 over a range of small angles of superelevation. However, this variance is under 1% and is typically ignored.

The Eu component measures the amount lacking in the Ea component to achieve balance. At high values (e.g., 10) it indicates possible derailment or rail overturning. At low levels (1.5 - 3) it merely indicates a minor lateral force on the passenger. Passengers in cars and buses experience far more extreme lateral forces than rail operations.

Worldwide research has been done on "cant deficiency" and "tilt" train design. A current example is the "ACELA". The carbody and running gear experience large lateral forces. Nonetheless, they are considered safe on curves at high speeds.

The LIRR track design criteria use the standard equations described above or minor variants as mentioned below.

ALTERNATIVE & RELATED EQUATIONS

Where precision is not required, some designers use alternative forms of the basic equations. In fact, precision is **not** sought as there is no absolute measure as to human tolerance of lateral pressure. However, it is best to begin with minimal error, and then introduce the judgmental variables afterwards.

K is sometimes crudely used in denominator form as 0.0007. The reciprocal of 1500 is 0.000666. Rounding to 0.0007 is a 5% error.

Another convenience is to simplify the relation of D (degrees of curvature) and R (radius). The Arcsine procedure is cumbersome. A very close answer is:

$$D = 5729.65 / R.$$

The 5729. etc. is the radius for a 1-degree curve. If the chord was one unit of distance instead of 100 units, the key number would be 57.29 etc., also equal to the degrees per radian (180 / pi). The error accepted by this shortcut is only 0.5% at 20 degrees.

Some criteria simplify the equations to the form $V^2 = (E R) / 4.01$. The factor of 4.01 is the result of dividing the factor 5729 by 1428. The 1428 figure contains the 5% error mentioned above. It is the reciprocal of 0.0007 rather than 0.000666. The latter, of course, is the 1/1500 ratio. The correct factor would be 3.819, not 4.01.

(LANDOW)

4. STANDARD PRACTICE ON TURNOUTS - LIMITS OF UNBALANCE

In the 1970's, the LIRR specifications for track geometry used 3.0 inches of unbalance as the maximum recommended on circular curves. This was reduced at a later time (see section on Criteria below).

A common railway "rule of thumb" defines turnout speed as twice the frog number. Following the AREA Plan 910, we have the following radius values for various turnouts: The "E" factor is based on D, V squared and K @1500.

Frog #	Radius	Degrees	V	E	
5	177.80	32.665	10	2.177	
6	258.57	22.299	12	2.141	
7	365.59	15.721	14	2.054	
8	**487.28**	**11.779**	**15**	**1.767**	**typical use**
8	"	"	16	2.010	
9	615.12	9.324	18	2.014	
10	**779.39**	**7.356**	**20**	**1.962**	**standard**
12	1104.63	5.188	24	1.992	
14	1581.20	3.624	28	1.894	
15	**1720.77**	**3.330**	**30**	**1.988**	**standard**
16	2007.12	2.855	32	1.949	
18	2578.79	2.222	36	1.920	
20	3289.29	1.741	40	1.857	
20	"	"	**45**	**2.350**	**used for 45 mph**

Many of these "rule of thumb" values are near 2.0

The common #8 has an E of 1.767 at 15 MPH

The #20 is often used for *limited* (45) speed moves in interlockings. At 45 the Eu is 2.350.

(LANDOW)

5. LIRR - TRACK CONSTRUCTION CRITERIA

The STV study (1973) discusses the LIRR criteria on page 2-17. It is worth quoting in full.

> "It is noted that previous MTA studies performed in the mid 1970's utilized alignment design criteria which have since become more restrictive by recent revisions of the LIRR's CE-1. The changes include a reduction in the allowable amount of unbalanced superelevation from three inches to 1 ½ inches and a reduction in the allowable maximum gradient undercover from 3.00 percent to 2.00 percent. Based on the analysis performed for this study, it was determined that the maximum gradient undercover of 2.00 percent cannot be adhered to for the profiles either in Manhattan or in Queens. A 3.00 percent maximum gradient undercover is being used with the concurrence of the LIRR Chief Engineer."

In some cases a design criteria may define an *absolute* limit based on safety concerns. An example would be an unbalance allowance related to possible rail overturn or derailment potential.

However, the criteria may also define a targeted *quality* such as passenger comfort. These are not absolutes. They are used as *desirable* conditions. When practical design necessity forces a review, there may be change (such as the maximum grade referenced above).

The unbalance factor on the loop tracks is a targeted *quality* issue. Given the reality of the GCT loop alignments and the economic advantage of using the loop productively, one must clearly reexamine the criteria

(LANDOW)

6. GCT LOOP TRACKS – SPECIFIC CURVES

In the case of GCT, a variety of radius values are used on the loop systems. Radius can be converted to degrees of curvature, and the curves analyzed for speeds at varying levels of E.

INNER LOOP

TRACK	RADIUS	DEGREES	MPH @ E 1.5"	MPH @ E 3.0"
117	400	14.36	12.51	17.70
117-116	241.5	23.89	9.70	13.72
115	163	35.72	7.93	11.22
101-103	136.5	42.97	7.23	10.23
102	265	21.75	10.17	14.38
101	205.9	28.10	8.94	12.65
101	419.3	13.69	12.81	18.12

INNER LOOP TO OUTER LOOP

TRACK	RADIUS	DEGREES	MPH @ E 1.5"	MPH @ E 3.0"
201	600	9.56	15.34	21.69
201	250	23.07	9.87	13.96

OUTER LOOP

TRACK	RADIUS	DEGREES	MPH @ E 1.5"	MPH @ E 3.0"
40-42,1	335	17.16	11.44	16.19
40-42	500	11.47	14.00	19.80
41	375	15.32	12.11	17.13
39	695	8.25	16.51	23.35
39	333	17.27	11.41	16.14
ALL	339.1	16.95	11.51	16.28
1-2	450	12.75	13.27	18.78

The lower and upper level **outer** loop use the same curves in the west section. The lower loop follows the route to track 3 in the east section.

Interpreting the 12-MPH limit south of 57th street, we can solve for the E value on the tightest radius of the outer loops. It comes to 1.65 inches. Thus, the NYC RR regarded 12 MPH as a safe operating speed on the **outer** loop. Assuming no physical superelevation at GCT, they found 1.65 inches of unbalance as reasonable.

(LANDOW)

INNER LOOP

The loop was abandoned in the late 1960s with the retirement of the 65'-72' cars.

Only employees (not passengers) were expected to go around the **inner** loop. The balancing speed on these routes was 7.23 MPH @ 1.5 unbalance. If any engineer got a bit rambunctious, the result was still comfortable.

The inner loop is quite short, if only because the radius values tighten it up so much. Given the short route, short trains etc, the 6-MPH rating was reasonable from a capacity point of view.

OUTER LOOP – *UPPER* LEVEL

The arrival station (tracks 38-42) opened in 1914, just after the official opening dedications of the terminal. It has always been a productive tool, turning intercity trains for their return to Mott Haven Yard in the Bronx.

With the decline of intercity trains, Mott Haven was reduced in size, then finally closed. As an economy measure, trains were serviced in GCT itself. The extra crews and engines used for the Mott Haven run were abolished.

Today, the loop remains active although used below its full capacity. Some trains are turned and stored in the Waldorf Yard. Others turn and move north for second trips or mid-day layup in yards to the north. Even GCT cannot store all of the trains delivered to it.

Over time, the condition of the loop track has deteriorated. It is due for a rebuild which may restore confidence in using higher speeds than are currently allowed.

As indicated, however, it was rated at 12 MPH with a very modest level of unbalance. The physics of motion analysis demonstrates the reasonableness of that limit. The former LIRR criteria offer the same conclusion.

(LANDOW)

OUTER LOOP – *LOWER* LEVEL

When the **lower *outer*** loop opened in 1927, new possibilities opened for GCT manipulations. Some trains arriving on 117-115, used 201 to double over to the Madison yards for storage.

The proposed use by the LIRR provides the first high density use of this track region. The overall station design must reflect the capacity of the loop system. Its geometry would allow the full 12-MPH rating given to the upper level loops.

TRACK 117 AS LIRR TRACK 12

It is suggested here, that 117 be used as a loop track. This would transform the station proposed from 5 to 6 tracks connected to the loop.

While 117 is connected to the original *inner* loop, it has radius values that are not as extreme as the balance of that group. The tightest radius is 241.5'. Another short segment is at 250'. The other curves are 400' and 600' which exceed the outer loop limit of 333'. In addition, with tracks 116 and 115 stub ended, lateral clearance exists to actually **superelevate** 117 (See Appendix B).

Only the turnout connecting tracks 201 and 200 remain as an issue. It has a 250-foot radius. It is rated at 13.96 MPH at an unbalance of 3.0. At Eu 2.2", 12 MPH would be the standard limit.

In using 117 curvature to reach the new Track 12 alignment, the curve would continue north past its current point of tangency. This would allow for a short tangent and a curve back to the final alignment *parallel* to track 11.

(LANDOW)

TRAIN OPERATOR - SPEED MANAGEMENT

The engineer should not move the train faster than the prescribed limits. However, if he drags the train too slowly, we suffer time losses and capacity losses that are not tolerable in a high density situation.

The speedometers on the trains are **not** a good guide in the lower speed ranges. Some other technique should be provided to assist in proper speed control.

We suggest borrowing a technology from the communications field, specifically the "moving light" or "Zip" banner. At Times Square and elsewhere, are public displays in which characters "Zip" along. Our need is not so complex. All we need is a series of light and dark sections on a row of lights that "move" at the targeted speed. If we want to move the train at 12 MPH, we move the stripes at that speed. The engineer avoids "passing" a stripe as this would be an overspeed condition. However, he can accelerate up to the stripe's velocity.

The Zip lights would be interlocked with the signals so that they could only "move" when the route is cleared for the movement and the signal ahead is set to restricting.

If some routes were operated at 11 MPH and others at 12, the Zip would be programmed to conform to the appropriate route.

MOVING PASSENGERS AROUND THE LOOP

Two minutes is added to a trip *from* GCT if the train must go around the loop before heading North. This is a minor annoyance, but it is not likely to dip into passenger loads. Market demand will exceed LIRR capacity to GCT in any case.

The NYC RR had no rule against running loaded trains around the loop. It was not necessary, of course, *except in emergencies*. On several occasions, the author has been routed via the loop on a fully loaded rush train when train failures blocked the normal exit routes.

(LANDOW)

LOOP CAPACITY

Speed

The 12-MPH limit on the loop should be restored after the loop is returned to a state of good repair. The speed rating at 12 MPH is 17.6 feet per second (fps). A full 12-car train is 1020 feet long. This length takes 58 seconds for a train to pass.

Braking Distance

A standard brake rate for signal design purposes (de-rated conservative figure) is 1.713 fps/s. At 12 MPH it takes 91 feet to stop. Allowing a 8 second reaction time we travel an additional 141 feet for a total of 232 feet.

Signal spacing can be set for very short blocks if desired. Only two aspects are expected. These are stop and restricted. Special instructions for the loop would set the limit at 12 MPH). In this context, a 350 foot signal interval is possible. At a velocity of 17.6 fps, this takes only 20 seconds to traverse.

Headway Distance and Time

The minimum headway between trains equals the time to pass the train length plus the time to pass a signal block. This is 78 seconds (58+20). Allowing 5 seconds to establish the next route, we have a total of 83 seconds minimum headway.

Load Factors

At 24 trains per hour, there is an average headway of 150 seconds per train. With a minimal requirement of 83 seconds, there is a load factor of only 55%.

If the volume should grow to a full 30 TPH in the future, the average headway would reduce to 120 seconds. This is a load factor of 69%, a still workable value.

(LANDOW)

PLATFORM CAPACITY

The intent is to bring in 24 trains per hour (TPH). Using 6 platform tracks instead of 10 averages 4 trains per hour per platform track. The resulting 15 minute headway is more than adequate for the station. It allows a 13 minute "trickle" load period followed by a 2 minute "headlight/marker" move to refill the track just vacated.

If the volume were expanded to 30 TPH, the 6 platform tracks would handle 5 TPH on a 12 minute headway. This still allows for a 10-minute load period. In some cases, this exceeds the time allowed at Penn Station.

CONCLUSIONS & RECOMMENDATIONS

The efficient use of the loop is the key to an efficient and cost effective design.

The loop can be used at moderate speeds and have a load factor that allows for reliable operation with normal off-schedule conditions.

Track 117 can be turned into a loop track. It can be super-elevated into track 200.

The remaining 4 stub tracks 13-16 can be deleted from the design.

GCT would run as an all through station for the LIRR. This gives maximum operating and cost efficiency. No stub operations are needed.

The Park Avenue approach trackage (tracks 1-6) are reduced to only two.

The East River grade to Park Avenue is reduced to 2.2% or better. Grade reductions are of major benefit (downgrade) by reducing train and block spacing, thus improving capacity and reliability.

Radical reductions in cost, complexity and construction time will result from these elements.

(LANDOW)

DATA SOURCES

- The New York Central Railroad Company, Electric Division
  Employee Time Table No. 24
  Effective, Sunday, September 26, 1926
  Special Instructions, Pages 1-6

- Penn Central Transportation Company, Metropolitan Region
  Employee Timetable No.6
  Effective, Sunday, December 8, 1974
  Special Instructions. Page 223, Turnouts, Rule #1157-D1

- NYC & HR RR **COMPOSITE** Plan Tracks and Columns **BOTH LEVELS**
  Grand Central Terminal Improvement New York City
  January 15, 1910 Revised 1-14-1914
  Scale 30 ft. Issue #11. Scope: 0+00 to E 8+00, N 28+50

  This drawing is 30" wide by 8 1/2 ft. long. **It gives dimensions to 0.001 ft.,** e.g., station 2+38.335. All columns are shown as of the date of revision. Prior revisions are noted as issues 6-10. This includes Yale Club columns between 44th and 45th.

  Columns are coded to show separately those:
  Suburban Level base *up to* Express Track Level
  Above Express Track Level
  Suburban Level *up through* Express Level
  Similar coding is used to separate independent building columns from those supporting trackwork.

  This drawing has been encoded in a CAD file and used in this study. References to this source will use the name **COMPOSITE.**

- Similar to NYC & HR RR above. Tracks and Columns
  1. **SUBURBAN LEVEL**
  2. **EXPRESS LEVEL**
  Grand Central Terminal Improvement New York City
  March 15, 1933
  Scale 50 ft.
  Dimensions stated are given to 0.001 ft.
  Track curvature is indicated by degree or radius specification.

- Operational & Physical Feasibility Study of Long Island Rail Road Access to Manhattan's East Side
  Prepared for the Long Island Rail Road
  April 1993
  by STV/Seelye Stevenson Value & Knecht
  References to this source will use the name **STV.**

(LANDOW)

AUTHOR

Mr. Landow has over 4 decades of railway experience. In the NY region, he worked for PB/GH on the 1976 study of LIRR entry to GCT. His work related to both the operations plans and the required infrastructure.

Following the GCT project, he developed the basic concepts for the *West Side Yard*, presenting 100 and 40 scale plans to the LIRR President. The MTA then authorized detailed studies and the project was eventually completed.

At NJT, Mr. Landow developed high-density plans related to the future of *Penn Station*. This required studying the operations and needs of all three users at the station.

His experience ranged from the operating department of the DL&W (1956-59) to *AVP-Planning* of the IC RR in 1969. He performed operations and economic studies for the New York Central RR as well as consulting work with Peat Marwick, Bechtel and Parsons Brinckerhoff on a wide range of projects.

Questions and comments on this proposal are welcomed and should be addressed to:

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(LANDOW)

N. Y. C. R. R.
N. Y., N. H. & H. R. R.
N. Y. & HARLEM R. R.

Grand Central Terminal

AND

The New York Central Railroad Company

ELECTRIC DIVISION

Time Table No. 24

FOR EMPLOYES ONLY

Effective 2.00 A.M.

Sunday, Sept. 26, 1926

EASTERN STANDARD TIME

Superseding Time Table No. 23A.
dated June 13, 1926.

MILES BRONSON,
Superintendent, Electric Division

C. K. BRODHEAD,
Superintendent, Grand Central Terminal

THE DE VINNE-HALLENBECK COMPANY, INC., PRINTERS, NEW YORK

(LANDOW)

APPENDIX A

SPECIAL INSTRUCTIONS

Rules referred to by numbers are the Rules for the Government of the Operating Department, unless otherwise specified.

N 2. THIRD RAIL.

Cars that do not clear third rail tell tales must not be run where there is a third rail.

When emergency requires that power be shut off third rail, telephone nearest substation, stating what tracks are affected and immediately notify train dispatcher. If pipes carrying transmission cables are involved, the load dispatcher must be notified promptly.

Power will not be restored until load dispatcher has been notified by responsible person that it is safe to do so. Load dispatcher must secure permission from train dispatcher to restore power if trouble was due to train accident.

If engineman desires power shut off, he will stop and sound whistle signals prescribed by Special Instruction 14, and repeat same until power is shut off. Conductor of such train will immediately communicate with nearest substation, load dispatcher or train dispatcher, requesting power to be shut off tracks affected and asking for other necessary relief. All employes hearing these whistle signals must also make immediate request by telephone to have power shut off tracks affected. Maintainers, trackmen and other employes must go to point of trouble promptly and render any assistance possible.

To shut power off in Park Ave. tunnel, give cord, suspended from wall on adjacent track, a steady pull first from the west and then from the east, which will shut power off track affected between 56th St. and 110th St. As a further precaution, go to nearest alarm box and send in a second alarm from the box. These boxes are located approximately three blocks apart. When cord is pulled, or when trains are stopped in tunnel because of loss of power, report must be made at once to train dispatcher from nearest telephone. Train employes and others who do work in the tunnel must familiarize themselves with location of cords and boxes to which they are attached. These cords and appliances belonging to this system must not be tampered with.

When emergency requires that power be shut off third rail on any track between 110th St. and Mott Haven Jct., third rail switch at Signal Station NK, or at cabin at east end of Park Ave. Drawbridge will be closed and held closed 3 seconds. The closing of one of these switches shuts power off all tracks between 110th St. and Mott Haven Jct. Employes shutting power off must at once notify Load Dispatcher that third rail switch has been closed, and the same employe must also notify Load Dispatcher promptly when it is proper to have power restored.

When communicating by telephone to have power shut off, use words "power emergency," and when by telegraph, use numeral "21" to obtain circuit. All others using line must give way at once.

When two or more electric trains have been stopped on the same track short distances apart, a period of 30 seconds must elapse between the starting of each train.

3. STANDARD CLOCKS.

Croton-on-Hudson.....	Passenger station.
Grand Central Term....	Conductors rooms.
	Yard building, enginemens room.
	Station masters office.
	Train dispatchers office.
	Yard building, yard masters office.
Harmon.....	Engine dispatchers office.
	Steam enginemens room.
High Bridge.....	Train masters office.
Mott Haven Yard.....	Yard masters office.
Sedgwick Ave.....	Engine dispatchers office.
White Plains, North Sta.	Engine dispatchers office.
	Yard masters office.

6. SIGNS.

† Stop to receive passengers.
‡ Stop to discharge passengers.
□ Stop Sunday.
⊕ Stop Saturday.
E Stop to receive passengers Saturday.
K Stop on signal to receive or discharge passengers to and from Albany and beyond.
M Stop on signal to receive or discharge passengers to and from Utica and beyond.
U Stop on signal to receive or discharge passengers to and from west of Buffalo.
V Stop to receive or discharge passengers from Millerton and west.
• Use Track No. 3 westward or Track No. 4 eastward.
+ Use Track No. 4 westward G. C. T. to Mott Haven Jct.
B Will not carry baggage.
B-2 Will not carry baggage Saturday.
B-3 Carry baggage Sunday only.
B-4 Will not carry baggage Sunday.
O Originate at Albany, Sunday.
O-1 Originate at Poughkeepsie, Sunday.
O-3 Originate at Mount Pleasant, Sunday, until December 12, 1926; originate at White Plains, No. Sta., Sunday, after December 12, 1926.
O-4 Originate at White Plains, No. Sta., Sunday.
O-5 Originate at Chatham until Oct. 31, 1926, inclusive, only.
P Will not carry passengers.
P-1 Will carry passengers between 125th St. and Croton only.
P-2 Will not carry passengers to or from White Plains, No. Sta.
P-3 Will not carry passengers to or from White Plains, No. Sta., Sunday.
P-4 Will handle passengers at White Plains, No. Sta., Sunday only.
P-5 Will handle passengers at White Plains, No. Sta., Sunday after Dec. 12, 1926.
R Will not run Nov. 25, Dec. 25, 1926; Jan. 1, or Feb. 22, 1927.
R-1 Will not run Oct. 12, Nov. 2, 1926, or Feb. 12, 1927.
R-2 Will not run October 12, or November 2, 1926.
R-3 Will not run November 25, 1926, or February 22, 1927.
R-5 Will not run December 26, 1926 or Jan. 2, 1927.
R-6 Will not run January 1, 1927.
R-7 Commence running December 5, 1926.
R-10 Run to October 31, 1926, inclusive, only.
R-11 Run to November 19, 1926, inclusive, only.
R-12 Run to November 20, 1926, inclusive, only.
R-13 Run to November 28, 1926, inclusive, only.
R-15 Run October 16 to October 30, 1926, inclusive, only.
R-17 Run to Chatham only until October 31, 1926, inclusive.
R-18 Run to Mount Pleasant only, Sunday until December 12, 1926. Run to White Plains, No. Sta., only, Sunday, after December 12, 1926.
R-19 Run to Peekskill, Saturday.
R-20 Run to Brewster only, Saturday.
R-21 Run to Mount Pleasant, Sunday.
R-22 Run to Peekskill, Sunday.
R-23 Run to Pawling, Saturday.
T Use Track No. 1 at Signal Station PF.
T-1 Use Track No. 2 at Signal Station PF.
T-2 Use Track No. 3 at Signal Station DV, Saturday.
T-3 Use Track No. 2 at Signal Station GD.
T-4 Use Track No. 2 at Signal Station OW.
T-6 Use Track No. 4 at Signal Station MO, Sunday.
T-7 Use Track No. 1 at Signal Station U, Sunday.
T-8 Use Track No. 1 at Signal Station MO, Saturday.
T-11 Leave from Track No. 105, Saturday.
T-14 Leave from Track No. 115, Saturday.
T-15 Leave from Track No. 26, Sunday.
T-16 Leave from Track No. 104, Sunday.
T-18 Leave from Track No. 33, Sunday.
T-19 Leave from Track No. 113, Saturday.
T-20 Leave from Track No. 24, Saturday.
T-21 Leave from Track No. 112, Sunday.
T-22 Leave from Track No. 25, Sunday.
T-23 Leave from Track No. 16, Saturday and Sunday.
T-25 Leave from Track No. 103, Saturday.
T-26 Leave from Track No. 114, Saturday.

12. HAND, FLAG AND LAMP SIGNALS.

Grand Central Terminal:

Locomotives of eastward storage trains on Tracks D, E, G and H, will be cut off and run around train between Signal Station U and Signal Station A, when "run around" white light is displayed from following locations:

Track D—On ground at Signal 466.
Track E—On ground at Signal 469.
Track G—On protection pier at Signal 505.
Track H—On protection pier at Signal 456.

14. WHISTLE SIGNALS.

Sound	Indication
oo —— o	Relief engine required. To be sounded passing first 2 signal stations after defect develops.
o —— o	Shut power off Track No. 1.
oo ——	" " " " No. 2.
ooo ——	" " " " No. 3.
oooo ——	" " " " No. 4.
o — — —	" " " " No. 5.
o — —	" " " " No. 6.
ooooo ——	" " " N. Y., N. H. & H. tracks.
oo oo	Member of crew of MU train go to head end and assist engineman.

Rule 14 (l) applies approaching signal stations when view of trackmen may be obscured by snow. Rule 14 (l) is modified accordingly.

Rule 14 (m) does not apply. This does not affect Rule 14r

APPENDIX A (LANDOW)

High Bridge:
Rule 14 (l) applies at public grade crossing to MU trains only. Rule 14 (l) is modified accordingly.

17. HEADLIGHTS.
When rules require the headlight to be displayed, it must be dimmed while passing through yards where yard engines are employed; approaching stations at which stops are to be made or where trains are receiving or discharging passengers; approaching train order signals, junctions, terminals, or meeting points or standing on main track at meeting points and on two or more tracks when approaching trains in the opposite direction.
When making switching movements in yards, the headlight must be displayed on both ends of electric engines and MU cars operated under their own power. Rule 17 is modified accordingly.
East of Spuyten Duyvil and Mount Vernon:
When rules require the headlight to be displayed, electric headlights must be dimmed at all times.
East of 96th St.:
The headlight will be displayed to the front of every train, at all times. Rule 17 is modified accordingly.

19. MARKERS.
Trains with rear car not equipped to display markers, as per Rule 19, will display red flag by day and red light by night on rear of train.
East of Mott Haven Jct.:
Storage trains will display one red light on rear platform of rear car or on rear of engine, to indicate rear of train, at all times. Rule 19 is modified accordingly.
East of 125th St.:
Trains on Track No. 2 (except when having N. Y. C. multiple unit car on rear) will display northerly marker on rear platform. Rule 19 is modified accordingly.
East of 96th St.:
Night signals will be displayed on rear of every train, as markers, at all times. Rule 19 is modified accordingly.

21. EXTRA TRAINS.
Extra N. Y. C. trains will omit display of white signals on two or more tracks.

22. ENGINE SIGNALS.
When two or more electric engines are coupled, only the leading engine will display signals. Rule 22 is modified accordingly.

34. COMMUNICATION OF SIGNAL INDICATIONS.
Indication of signals day and night will be communicated as follows: "red," "yellow" or "green." When other than the top arm, or top light, of an interlocking signal is "yellow" or "green," add "middle arm" or "middle light," or "bottom arm" or "bottom light," as the case may be. Rule 34 is modified accordingly.

72. SUPERIORITY OF TRAINS.
Between Westchester Ave. and Port Morris:
11.00 P.M. Saturday until 11.00 P.M. Sunday, Mott Haven Switch Engine is superior to all trains.
At all other times—Port Morris Switch Engine is superior to all trains.
Between White Plains and White Plains, North Sta.:
Multiple unit car operated for convenience of employes is superior to all trains on Track No. 5 between east end of White Plains station platform and White Plains, North Station, 4.00 A.M. until 7.00 A.M.
No's. 1080 and 1094 are superior to all trains on Track No. 5 between White Plains, North Station, and Substation No. 9 White Plains, 6.30 P.M. until 10.30 P.M.
Between Yonkers and Mount St. Vincent:
Yonkers Switch Engine is superior to all trains on Track No. 6 between hand throw switch to Track No. 4, Yonkers, and Mount St. Vincent 11.00 P.M. until 7.00 A.M. daily.

83. TRAIN REGISTERS.
When trains running against the current of traffic by train order return to track with the current of traffic, conductor will leave register card with signalman or operator, or if there be no signalman or operator, with a flagman left there for that purpose to notify all opposing trains that the train running against the current of traffic has arrived.
Van Cortlandt, Putnam Div. trains:
Where train is not required to stop, conductor may throw off register card, except when train displays signals for a section, conductor must register in person.

83. CLEARING OF TRAINS.
On two or more tracks, trains will be cleared at initial stations by signal indication.

High Bridge:
Permission to leave yard must be obtained from signalman at Signal Station MJ before opening main track switch.
Mount Vernon:
Westward trains must receive permission from signalman at Signal Station VO before opening main track switch.
White Plains, North Station:
Westward trains must receive permission from signalman at Signal Station NW before opening main track switch.
Croton-on-Hudson:
Westward trains must receive permission from signalman at Signal Station CD before opening main track switch.

93. YARDS. **Limits defined by signs.**
Getty Square, west of Kellinger St.
G. C. T., east of 60th St.
Kings Bridge.
Sedgwick Ave., east of 176th St.
V. C. P. Jct.
Passenger trains must be given full protection at all times. Rule 93 is modified accordingly.

94. DELAYED TRAINS.
Between Mount Vernon and White Plains, North Sta.:
When a train is delayed or disabled so that delay will result to following trains, the conductor will immediately arrange to flag such trains around on opposite main track. Where possible, authority should first be obtained from the Superintendent; if this is impracticable full information must be telegraphed the Superintendent as soon as possible.
When making movements against current of traffic, passenger trains and trains following passenger trains must be held until track is clear to next signal station, or point where flagman is stationed.
In making such movements, two flagmen must be used to hold trains running with the current of traffic, one at the crossover where diverted trains return to their proper track, and one a sufficient distance beyond to stop and notify trains before they reach such crossover. The conductor in charge must make his instructions to his flagmen clear and explicit, in writing if practicable, and flagmen must repeat the instructions so as to avoid misunderstanding. Trains must not move over a track so used without personal instructions from the conductor in charge. Where possible, the Superintendent will notify conductors and enginemen of all trains involved of the conditions, and instruct them to report at a designated point to the conductor in charge. If authority has been received from the Superintendent for such movement, normal operation must not be resumed without his permission; and under any conditions whenever the obstructed track is again in use the conductor in charge must provide for notice to conductors and enginemen who have been instructed to report to him and who have not arrived with their trains at the designated point. Rule 94 is modified accordingly.

97. WORK EXTRAS.
On double track, or three or more tracks, conductors of work extras must advise Superintendent by wire before leaving initial station specifying working limits and must not proceed beyond such limits without permission from Superintendent. When work is completed for the day and train clear of main track, conductors must so report.

98. DRAWBRIDGES.

Location		Signals
Park Ave.	Harlem River	Interlocking.
Spuyten Duyvil	Harlem River	Interlocking.

98. SIDINGS.

		Capacity, based on 43-foot cars
Between Signal Stations:		
CD and HM	Track No. 6, Eastward	60
	Track No. 5, Westward	79
CR and HM	Track No. 5, Westward	61
PF and CR	Middle, Eastward	89
	Middle, Westward	88
Signal Station:		
PF to Ossining	Track No. 6, Eastward	112
OW...Middle—Eastward	West of crossover	31
	East of crossover	72
HS to Greystone	Track No. 6, Eastward	124
GD to Mount St. Vincent	Track No. 6, Eastward. Yard Masters office to hand throw switch to Track No. 4	57
	Hand throw switch to Track No. 4 to Mount St. Vincent	208

Spuyten Duyvil.....	Middle, Eastward.....	283
V. C. P. Jct.....	South siding.....	56
	North siding.....	23
Woodlawn.....	Middle, Eastward.....	30
White Plains to Signal Station NW.....	Track No. 5, Westward....	194
White Plains, North Sta.	Track No. 7, Yard B, Westward.....	41

99. FLAGMEN.
Between Grand Central Terminal and Woodlawn:
Fuses will not be used. Rule 99 is modified accordingly.

103. PUBLIC GRADE CROSSINGS.
Trainmen must flag trains or engines over the following crossing:
Croton-on-Hudson.....Track No. 23

106. PASSING TRAINS.
Passenger trains will, if practicable, be moving when passed by a train on an adjacent track.

108. WATER STATIONS.

Croton-on-Hudson.	Port Morris.
Dobbs Ferry, Tracks No. 3, No. 4.	Sedgwick Ave.
Getty Square.	Tarrytown, Tracks No. 1, No. 2, No. 3.
Grand Central Terminal, Tracks No. 63, No. 64, No. 83, No. 84.	Chevrolet Motor Co., Track No. 6.
Harmon.	Tuckahoe, main tracks.
High Bridge.	Van Cortlandt.
Kings Bridge	White Plains, North Station, main tracks.
Mott Haven Jct.	Yonkers.

Except when scooping at track pans, engines of freight trains of more than 25 cars must be detached before taking water unless, in the judgment of the engineman, it is unnecessary. Rule 108 is modified accordingly.

108. TRACK PANS

	Tracks
Croton-on-Hudson.....	No. 1, No. 2.

109. BULLETIN BOARDS AND BOOKS.

Croton-on-Hudson.....	Rest car.
Grand Central Terminal...	Conductors rooms.
	Brakemens rooms.
	Yd. bldg. conductors room.
	Yd. bldg. enginemens room.
	Yd. bldg. train masters office.
Harmon.....	Enginemens rooms
Kings Bridge.....	Car inspectors car
High Bridge.....	Engine house.
	Train masters office.
Mott Haven Yard.....	Yard masters office.
Sedgwick Ave.....	Engine dispatchers office.
	Station.
White Plains, North Sta...	Engine house.
	Enginemens room.
	Yard masters office.
Yonkers.....	Yard masters office.

110. DESIGNATION AND USE OF MAIN TRACKS.
Double Track:
Between Signal Station VO and west end of division.
Signal Station FH and Signal Station DV.
Signal Station DV and a point 490 feet east of Spuyten Duyvil drawbridge.
Signal Station MX and crossover west of Westchester Ave. freight station.
Tracks are numbered from the south:
No. 2, No. 1.
Tracks will be used as follows:
No. 2, Eastward.
No. 1, Westward.
Between Sedgwick Ave. and Getty Square.
Tracks are numbered from the south:
No. 6, No. 5.
Tracks will be used as follows:
No. 6, Eastward.
No. 5, Westward.

Three Tracks:
Between Signal Station MO and Signal Station MJ.
Tracks are numbered from the south:
No. 4, No. 2, No. 1.
Tracks will be used as follows:
No. 4, Eastward—Passenger.
No. 2, Eastward—Passenger.
No. 1, Westward—Passenger.

Four Tracks:
Between 57th St. and Signal Station VO.
Signal Station MJ and Signal Station FH.
Mount St. Vincent and west end of division.
Tracks are numbered from the south:
No. 4, No. 2, No. 1, No. 3.
Tracks will be used as follows:
*No. 4, Eastward—Passenger.
No. 2, Eastward—Passenger.
No. 1, Westward—Passenger.
No. 3, Westward—Passenger.
*Between Signal Stations MO and U.
No. 4, Eastward and Westward—Passenger.

Five Tracks:
Between 140th St. and Signal Station MO.
Between Signal Station DV and Mount St. Vincent.
Tracks are numbered from the south:
No. 6, No. 4, No. 2, No. 1, No. 3.
Tracks will be used as follows:
No. 6, Eastward—Passenger.
No. 4, Eastward—Passenger.
No. 2, Eastward—Passenger.
No. 1, Westward—Passenger.
No. 3, Westward—Passenger.

221. TRAIN-ORDER SIGNALS.
The home interlocking signal will be operated and observed as a Train-order signal when necessary to handle train orders. When trains proceed with clearance card while "stop" is indicated they must run to next signal at slow speed prepared to stop. Rule 221 is modified accordingly.
Rules 1021 to 1033 inclusive do not apply.

251. MOVEMENT OF TRAINS BY BLOCK SIGNALS.
Between G. C. T. and White Plains North Station.
Sedgwick Ave. and Getty Square.
Mott Haven Jct. and Croton-on-Hudson.
If train is not in condition to make usual running time, conductor or engineman must notify signalman.
Trains will run against the current of traffic by block signals, whose indications will supersede time table superiority and take the place of train orders, as shown below. When signal cannot be cleared, this movement will be made only by train order.

Signal Station	Tracks
MO to KY.....	No. 2, No. 4.
Between KY and MX....	No. 2, No. 4, No. 1, No. 3.
MO and MJ.....	No. 2, No. 4, No. 1.
FH and DV.....	No. 2, No. 1.
CR and HM.....	No. 2, No. 4, No. 1, No. 3.

Signal Stations U and NK:
When signal cannot be cleared for westward movement on Track No. 4, train will proceed on Track No. 4 only by train order.

253. TRAINS HAVING WORK IN BLOCK.
Trains must do no work on main track ahead of trains about due or overdue without permission from Superintendent. Rule D-253 is modified accordingly.

751. TIME SIGNAL STATIONS ARE OPEN.
Signal stations are open as specified in list of Stations, Office Calls, Signals and Telephones.

801. INTERLOCKING SIGNALS.
Where a passenger train is to be diverted from a main track over crossover or switch at following locations or to a siding, the signalman must hold signal in stop position until train has stopped:

Signal Station	Track
CD.....	No. 1 to No. 3.
HM.....	No. 1. to No. 3, No. 3 to No. 1.
	No. 2 to No. 4.
CR.....	No. 1 to No. 3.
GD.....	No. 1 to No. 3, No. 3 to No. 1.
	No. 2 to No. 4, No. 4 to No. 2.
DV.....	No. 5 to No. 6.
	No. 5 to No. 1, No. 3 or eastwye.
	No. 2 or No. 4 to No. 5 or No. 6.
	No. 6 to No. 5.
BN.....	No. 1 to No. 3, No. 2 to No. 4.
KY.....	No. 1 to No. 3, No. 2 to No. 4.
MX.....	No. 1 to No. 3.
	No. 2 to No. 4, No. 4 to No. 2.
BG.....	No. 1 to No. 3, No. 3 to No. 1.
JS.....	No. 5 to No. 5 or Putnam Div.

Rule 833 does not apply.
When stopping at signal station for relief engine, engineman will leave room for relief engine to couple on without blocking track circuit.

1002. AUTOMATIC BLOCK SIGNALS.
Between 59th St. and White Plains, North Station.
Mott Haven Jct. and Croton-on-Hudson.
Sedgwick Ave. and Getty Square.

APPENDIX A (LANDOW)

Spuyten Duyvil Rock Cut:
If track is not in condition for movement of trains at normal speed, knife switches in boxes, located every 100 feet, must be operated, or wire on either side of track broken promptly to cause automatic signals to indicate "Stop; then proceed."

1002. SWITCH INDICATORS.
Switch indicators for crossovers between main tracks indicate, for the opposite track, whether or not block is occupied or if there is a train approaching.

1267. LEAVING CARS ON SIDE TRACKS.
Cars with hot journals must not be left on any track in close proximity to where gasoline is loaded or unloaded.

1269. OBSTRUCTING PUBLIC CROSSINGS.
Croton-on-Hudson:
Crossing in Track No. 23 must not be obstructed within 5 minutes of the time trains are scheduled to arrive or leave.

1307. AIR BRAKES.
When stopping freight trains of 25 or more cars for water or coal, air brakes must be applied by engineman and engine detached unless, in the judgment of the engineman, it is unnecessary. If on a grade, hand brakes must be applied to hold train. While taking coal or water, engine brake must be held applied. Rule 1549 of the Rules for the Operation and Supervision of Air Brake, Train Air Signal and Steam Heat Equipment is modified accordingly.
Harmon and White Plains, North Station:
When changing power, engineman will leave brakes applied before engine is cut off.
Mott Haven Yard:
Conductors of storage trains backing around wye must use back-up hose equipped with whistle.
Storage trains which regularly go around wye must have hose attached before leaving G. C. T. Head brakemen of other storage trains must take hose from locomotive to rear end of train as soon as it is known train will go around wye.

1401. SPEED RESTRICTIONS.
Speed restrictions are shown in miles per hour and apply to the entire train

	Passenger, mail, express and milk trains				
	Multiple unit or electric engine	Steam engine	Freight and work trains	Engines light or with caboose	Trains with steam cranes, except as shown below
East of 57th St	20	20	20	20	
Between 57th St. and 96th St	35	35	35	35	35
96th St. and Mott Haven Jct	45	45	40	45	35
Mott Haven Jct. and White Plains, North Sta.	55	60	40	45	35
Mott Haven Jct. and Glenwood	55	60	40	45	35
Glenwood and Signal Station PF	55	65	40	45	35
Signal Station PF and Croton-on-Hudson	40	40	40	40	35
Sedgwick Ave. and V. C. P. Jct	45	45	25	35	25
V. C. P. Jct. and Getty Square	40(MU)	40	25	35	25

	G. C. T. Electric Crane No. 1	Steam Crane X 21
East of 59th St	6	4
Between 59th St. and 110th St	25	35
110th St. and Park Ave. Drawbridge	20	15
Park Ave. Drawbridge	10	10
Between Park Ave. Drawbridge and 140th St	20	15
West of 140th St	35	35

Restrictions shown above are modified as follows:

GENERAL

Circus trains with freight equipped cars		30
Engines running backward		30
Engines running backward by night over public crossings		15
Engines, Classes B, M and U under steam or being towed		15
Engines, Classes E-1 and F-3 in passenger service		35
Engines, Classes F-12 and F-12A		35
Engines, Classes G-6 and (H-5, N. Y. C. and B. & A.) light		35
Engines, Class Q		35
Engines, Class R		45
Freight trains with pushers		25
Over track pans		45
Passenger trains with engines, Classes (H-5, N. Y. C. and B. & A.) or L		40
Passenger, mail, express and milk trains with freight equipped cars		40
Revenue freight trains with cranes moving on their own wheels		25
Trains consisting of 50 per cent or more of 55-ton capacity or greater coal cars, loaded		30
Trains with dead engines not having all side or main rods		20
Troop trains with freight cars		30
Work trains with locomotive cranes		30

LOCAL

Lower Level loop tracks		6
54th St. to 50th St.	Tracks A, B, F and J, Eastward	12
58th St	Track No. 2 to No. 1 or No. 3 and Track No. 1 to No. 3	15
Signal Station NK	Crossovers, except between Tracks No. 1 and No. 2	30
125th St. Station		30
132nd St. curve		25
Park Ave. Drawbridge		25
138th St. Station		35
137th St. and 140th St. inc	Engines, Classes K-2, K-3, K-11, K-41	10
Mott Haven Jct	Harlem tracks, except crossovers	30
	Track No. 3 to No. 1, Harlem	15
Signal Station KY to Signal Station MQ	Tracks No. 2 and No. 4	40
Signal Station BG	Track No. 4 to No. 2	30
Signal Station JO	N. Y., N. H. & H. Track No. 1 to N. Y. C. No. 2	30
	Track No. 2 to No. 4	30
	Track No. 3 to N. Y., N. H. & H. R.R.	30
	Track No. 1 to No. 3, east of signal station	20
	Track No. 1 to No. 3, west of signal station	30
Signal Station VO	Track No. 2 to No. 4 and Track No. 3 to No. 1	30
Bridge H48, 4000 feet east of Bronxville	Engines, Classes G-4A, G-6, G-46 (H-5, N. Y. C. and B. & A.), H-6A, K, U and cars 210,000 lbs. or more	20

Bronxville, Tuckahoe, Scarsdale and Hartsdale.	To discharge mail	25
Bridge H55, 1300 feet west of Scarsdale.	Engines, Classes G-4a, G-6, G-46 (H-5, N. Y. C. and B. & A.), H-6a, K, U and cars 210,000 lbs. or more	20
White Plains	Station curve	35
White Plains, North Station	Track No. 1, reverse curve, 1000 feet east of Signal Station NW	20
	Track No. 2, curve opposite station	35
Between Signal Station MJ and Signal Station MO, Track No. 4		20
Between Signal Station MO and 140th St., Track No. 6		20
Signal Station MJ	Track No. 1 to No. 3 and Track No. 4 to No. 2	30
	Track No. 2 to No. 1	20
East of High Bridge	Tracks No. 2 and No. 4, reverse curves at I. R. T. Co. bridge	35
Signal Station BN	Track No. 3	35
Signal Station FH	Track No. 3 to No. 1 and Track No. 2 to No. 4	30
Signal Station FH and west end of Spuyten Duyvil curve, inclusive		30
Spuyten Duyvil	West wye and east wye	10
Spuyten Duyvil Drawbridge	Engines, Class (H-5, N. Y. C. and B. & A.) and K-14 with 15,000 gal. tanks	10
Signal Station DV	Track No. 4 to No. 2 and Track No. 1 to No. 3	30
Between east end Spuyten Duyvil Drawbridge and Signal Station DV, Tracks No. 1 and No. 2		30
Mount St. Vincent to Signal Station DV, Track No. 6		30
Ludlow	Track No. 6, reverse curve	10
Yonkers	Between signals 1504, 1502, 1501, 1503 and west end of island platforms	40
Signal Station GD	Crossovers	20
Signal Station HS	Crossovers	30
Signal Station OW	Crossovers, except between Tracks No. 1 and No. 2	30
Tarrytown	Track No. 4, Main St	30
Signal Station PF	Crossovers, except between Tracks No. 1 and No. 2	30
Signal Station CR. Croton River Bridge	Engines, Class K-30	20
	Engines, Class (H-5, N. Y. C. and B. & A.), with 15,000-gal. tank, Tracks No. 1 and No. 2	20
Signal Station HM	Track No. 4 to No. 2	30
Signal Station CD	Track No. 3 to No. 1	30
East of 57th St.	Crossover, switch or slip not shown above	12
West of 57th St.	Crossover, switch or slip not shown above	10
V. C. P. Jct.		10
V. C. P. Jct.	Curve immediately west	30
West of V. C. P. Jct., Engines, Class C-12		15
Bridge Y4, Lowerre St., Lowerre		25
Bridge Y6, School St., 1100 feet west of Park Hill		25
West of point 2000 feet west of Park Hill		15

1402. ENGINE AND CAR RESTRICTIONS.

When engines or cars are cut out because of damage or defect, they must not be moved over main track except upon authority from Superintendent.

When electric locomotives assist freight trains hauled by steam engines, the electric locomotive must be placed at least 5 cars from steam engines.

Agents and yard masters must see that steam cranes or similar machinery and open cars loaded with bridge or structural iron or similar material, are moved only in slow freight trains, and know that equipment and lading is properly inspected prior to such movement.

Cars weighing 210,000 lbs. or more must not be operated on trestles or east of 140th St.

Grand Central Terminal.

Equipment, except N. Y. C. M. U., Roger ballast, X series freight cars and steam engines with 10-foot wheel base, must not be operated as shown below:

Tracks	Between Signals
101	1135 and 1115
102	1137 and 1115
103	1138 and 1115

Electric locomotives must not be operated on Track No. 115 between Signals 1111 and 1114.

N. Y., N. H. & H. electric locomotives of the 0300 series must not be operated on Track No. 116 between Signals 1110 and 1114 and on Track No. 117 between Signals 1109 and 1114.

Mott Haven Yard.

Movements of equipment must not be made at the same time over the following routes:

From Track No. 18 Yard C under 153rd St. bridge and over crossover from Yard B lead to Yard C lead.

On Tracks No. 10 and No. 11 Yard F within 50 feet of 153rd St. bridge.

Two turnout movements or one straight and one turnout movement over two opposite slips on east and west leads at entrance to Track No. 5 Yard E.

On adjacent tracks from Yard B lead to scale track Yard C and from Yard B lead to Track No. 14 Yard B.

From Yard B lead to Track No. 5 Yard C and from Yard B lead to Track No. 19 Yard B.

V. C. P. Jct. to Getty Square, inc.

Cars 110,000 lbs. or more, except multiple unit cars, must not be operated.

ENGINES MUST NOT BE OPERATED AS SHOWN BELOW:

Locations	Classes (Class H includes B. & A.)
East of 96th St.	F-40, I-10, B-55.
East of 137th St.	K-2, K-3, K-11, K-41.
East of 140th St.	B-10, B-11, B-56f, B-56g, G-4a, G-6, G-46, H, K-14, L, M, N, U.
140th St. and White Plains No. Sta., inc.	H-6a double-headed, G-6, H-5 and K-14 with 15,000-gal. tank, L, NE.
Mott Haven yard. All tracks except in freight yards.	F-2, F-12, G-6, H-5, I-10, K-2, K-3, K-11.
Melrose: Tracks Nos. 15, 29.	F-2, F-12, G-6, H-5, I-10, K-2, K-3, K-11.
Melrose: Tracks Nos. 19, 33.	F-2, F-12, G-6, H-5, I-10.
Melrose: Other tracks except Nos. 5, 7, 9, 11.	G-6, H-5, I-10.
Port Morris Branch. East of Melrose.	F-2, F-12, G-6, H-5, I-10.
Westchester Ave. Tracks Nos. 31, 33.	K-2, K-3, K-11, R.
Port Morris. Tracks Nos. 35, 37.	All except B-2, B-10, B-55, C, D, Q.
Port Morris. Tracks Nos. 22, 27, 28, 31.	R.
Bot. Garden. Bronx Hay and Grain Co. Track No. 12a	F-2, F-12, G-6, H-5, I-10, K-2, K-3, K-11.
Botanical Garden. Raymond coal trestle.	G-6, H-5, K-2, K-3, K-11.
Woodlawn. Schwiers coal trestle westerly 75 feet.	All.
Mount Vernon. West Side Coal Co. coal trestle.	G-6, H-5, K-2, K-3, K-11.
Bronxville. Lawrence Park Co., Track No. 5a.	G-6, H-5, K-2, K-3, K-11.
Tuckahoe. Conlin Co. Track No. 7.	F-2, F-12, G-6, H-5, I-10. K-2, K-3, K-11, R.
White Plains. Young Bros. coal trestle.	G-6, H-5, K-2, K-3, K-11.
White Plains No. Sta. Track Nos. 8, 18, 19 Yard C.	F-2, F-12, G-6, H-5, I-10.

APPENDIX A (LANDOW)

Locations	Classes
Morris Heights. Con. Ship.. Bldg. Co. Track No. 6a.	F-2, F-12, G-6, H-5, I-10.
Morris Heights. Con. Ship.. Bldg. Co. Track No. 6d.	All.
Kings Bridge Freight Yard...	H-5, I-10.
Kings Bridge Freight Yard.. 471 ft. west end Track No. 41.	F-2, F-12, G-6.
Ludlow. Natl. Sugar Re-... finery. Tracks No. 8a, 16.	All except B-2, B-10, B-55, C, D, Q.
Yonkers. Otis Elevator.... Co. Track No. 13.	F-2, F-12, G-6, H-5, I-10, K-2, K-3, K-11, R.
Glenwood. Power House... trestle. Track No. 12.	F-2, F-12, G-6, H-5, I-10, K-2, K-3, K-11, R.
Hastings. American Brass.. Co. Track No. 14.	F-2, F-12, G-6, H-5, I-10.
Hastings. Hastings Pave-... ment Co. Track No. 16.	F-2, F-12, G-6, H-5, I-10, K-2, K-3, K-11.
Tarrytown. Chevrolet Motor. Co. Tracks No. 8, 10, 12, 14, 16, 18.	All except B-2, B-10, B-55, C, D, Q.
Ossining. Prison. Track No.. 24.	G-6, H-5, I-10, K-2, K-3, K-11.
Ossining. Ossining Chem... Co. Track No. 30.	F-2, F-12, G-6, H-5, I-10. R.
East of Signal Station PF...	L.
Sig. Sta. CR. Croton River.. Bridge. Tracks No. 1 and No. 2.	K-14 with 15,000 gal. tank. L with 15,000 gal. tank.
Harmon. Coal trestle.....	F-2, F-12, G-6, H-5, I-10, K-2, K-3, K-11.
Sedgwick Ave. and..... V. C. P. Jct., inc.	L, NE.
V. C. P. Jct. and..... Getty Square, inc.	All (including electric engines) except C-12, D-1A, D-2A single-headed, C-6A.

Electric and Steam Cranes.

No cranes except G. C. T. No. 1 and X21 will be moved on main tracks without permission from the Superintendent.

Between 59th St. and 95th St.:
Steam crane X21 must not be operated on Track No. 2.

Between 110th St. and 140th St.:
Cranes G. C. T. No. 1 or X21 may be moved under own power or may be hauled by steam or electric locomotive when 2 cars of moderate weight not heavily loaded are placed between locomotive and crane, with the following restrictions on adjacent tracks:

On drawspan and the 2 westerly approach truss spans no equipment except M. U. trains, may come abreast of or pass crane on adjacent track normally operated in the same direction as the track occupied by the crane.

Between 110th St. and easterly end of drawspan and between westerly end of westerly approach truss span and 140th St., N. Y. C. electric locomotives, classes S-1, S-2, S-3 and N. Y., N. H. & H. electric locomotives No. 071, and of the 0300 series, shall not come abreast of or pass crane on adjacent track normally operated in the same direction as the track occupied by the crane.

Cranes shall not lift any load on Park Ave. viaduct unless structure is properly braced and the Division Engineer or his representative has given authority.

G. C. T.
Cranes G. C. T. No. 1 and X21 must not lift to exceed 25 tons on tracks supported by steel structure unless Division Engineer or his representative has given authority.

Between V. C. P. Jct. and Getty Square:
Cranes G. C. T. No. 1 or X21 must not be operated.

1403. EMERGENCY OPERATION.

In event of irregularity or accident occurring to a train which endangers safety of passengers or train, notice must be given promptly to the engineman who will proceed with train, if safe to do so, to nearest station or first opening to street, if necessary to discharge passengers. In Park Ave. tunnel, exits to street are located at 59th, 72nd and 86th Sts. On the viaduct, passengers may descend to street at 110th St. If train is on descending grade, it may be possible to proceed without power to points at which passengers may be discharged.

If necessary to operate a multiple unit train from other than head car, conductor and engineman will confer, and be held jointly responsible for safe movement of train, at speed permitting full control.

1405. SPECIAL USE OF TRACKS.

Harmon:
Regular movement for traffic over loop track is from engine house to Signal Station HM. Movements in opposite direction must not be made except under flag protection.

1406. TELEPHONES.

Conductor or engineman must use telephones whenever necessary to facilitate the movement of trains. Instructions received by telephone must be repeated, and name and occupation of the employes exchanged to avoid misunderstanding.

Substation telephone circuits are exclusively for the use of employes in controlling current to third rail and signal lines, and in train emergency.

1407. ELECTRIC EQUIPMENT.

Electrically propelled trains must not be operated through water when it is above the top of the running rail.

Three or more electric locomotives or electric locomotives and steam engines coupled must not be moved on main tracks except upon order of the Superintendent.

If more than 2 electric locomotives are coupled, power must be used on 2 only.

When third rail shoes are broken off, shoe fuses over broken shoes must be removed.

When overhead shoes are broken off, train or locomotive must come to a stop immediately and remove broken parts from track and train.

If emergency button of master controller on MU car is inoperative and car cannot be cut out, an employe must be assigned to ride with engineman.

West of 56th St.:
The cut-out cock in air pipe leading to overhead shoe on electric locomotives must be closed when not in use.

MILES BRONSON, Superintendent, Electric Division.

C. K. BRODHEAD, { Superintendent, Grand Central Terminal, Asst. Superintendent, Electric Division.

E. L. GOLDEN, { Asst. Superintendent, Grand Central Terminal, Train Master, Electric Division.

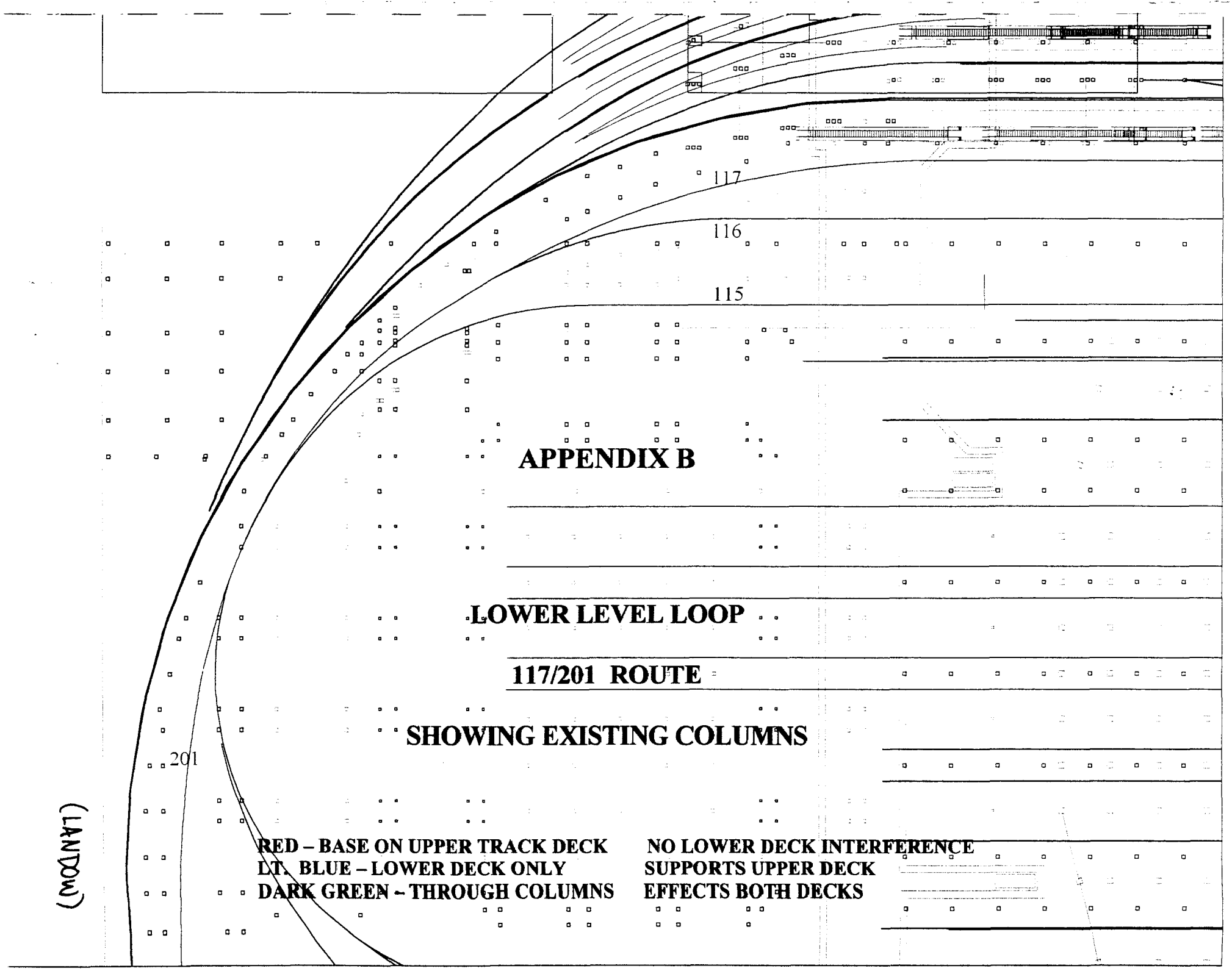
DAVID HUGHES, Train Master, Grand Central Terminal.

W. WEAVER Train Master
J. P. FLANIGAN Train Master } Electric Division.

W. T. KILFOIL
W. T. LITTLE
H. G. STEGMAN
F. N. De CAMP } Chief Train Dispatchers.

W. C. ROYER, Asst. Chief Train Dispatcher.

R. STONE
A. J. HEMPSTEAD
A. P. SWITZER
J. J. BURNS
W. TUCKER
C. P. JOHNSON
S. STECKER } Train Dispatchers.



APPENDIX B

LOWER LEVEL LOOP

117/201 ROUTE

SHOWING EXISTING COLUMNS

RED – BASE ON UPPER TRACK DECK
LT. BLUE – LOWER DECK ONLY
DARK GREEN – THROUGH COLUMNS

NO LOWER DECK INTERFERENCE
SUPPORTS UPPER DECK
EFFECTS BOTH DECKS

A

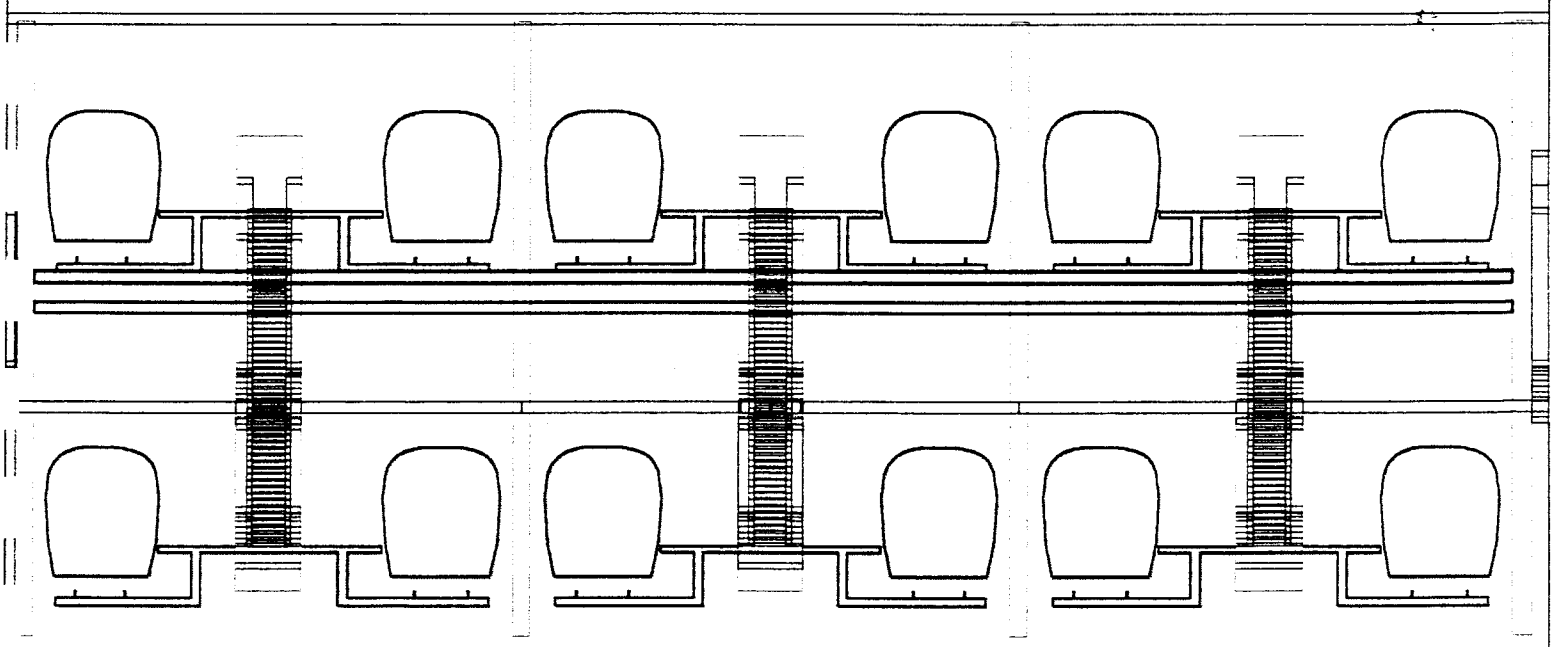
METRO NORTH RR & LONG ISLAND RR

STATION

EN ROUTE TO GCT

AT

PARK / 55



A Design Suggestion

By

H. Landow

hlandow@banet.net

December 1999

(LANDOW)

EXECUTIVE SUMMARY

- A new station is proposed serving **both** MNRR and LIRR trains.
- All trains would stop at Park and 55th, one half-mile north of GCT, before finishing their trip.
- The time saved for riders destined into the 50's is 10 minutes per one way trip.
- The station would attract 35% of the GCT market. (Page 2)
- The net value of the time saved is $123 M / year. (Page 10)
- The project cost is estimated at $800 M, annualized to $48 M / year.
- Payback would occur in 6.5 years (800 / 123).
- The net time value exceeds the cost by a factor of 2.56 (123 / 48).

- The station has 12 tracks (6 on each of two levels).
- A station concourse between the levels provides 3 acres of station space.
- No visible signs exist of the station along Park Avenue. Entrances are on the side streets.
- The station can handle 144 trains per hour on its 12 tracks with a 5 minute headway per track. (12 * 60 / 5).

- Passengers would arrive and depart closer to their true destinations.
- Excessive densities at GCT would diminish.

(LANDOW)

AUTHOR

Mr. Landow has over 4 decades of railway experience. In the NY region, he worked for PB/GH on the 1976 study of LIRR entry to GCT. His work related to both the operations plans and the required infrastructure.

In November 1999 he submitted a report to the LIRR, *"More Than You Ever Wanted To Know About The Grand Central Loop Tracks"*. It provides detailed engineering and historical evidence supporting full usage of the lower level loop tracks by the LIRR.

Following the 1976 GCT project, he developed the basic concepts for the *West Side Yard*, presenting 100 and 40 scale plans to the LIRR President. The MTA then authorized detailed studies and the project was eventually completed.

At NJT, Mr. Landow developed high-density signaling and operating plans related to the future of *Penn Station*. This required studying the operations and needs of all three users at the station.

His experience ranged from the operating department of the DL&W (1956-59) to *AVP-Planning* of the IC RR in 1969. He performed operations and economic studies for the New York Central RR as well as consulting work with Peat Marwick, Bechtel and Parsons Brinckerhoff on a wide range of projects.

Questions and comments on this proposal are welcomed and should be addressed to:

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e-mail hlandow@banet.net

(LANDOW)

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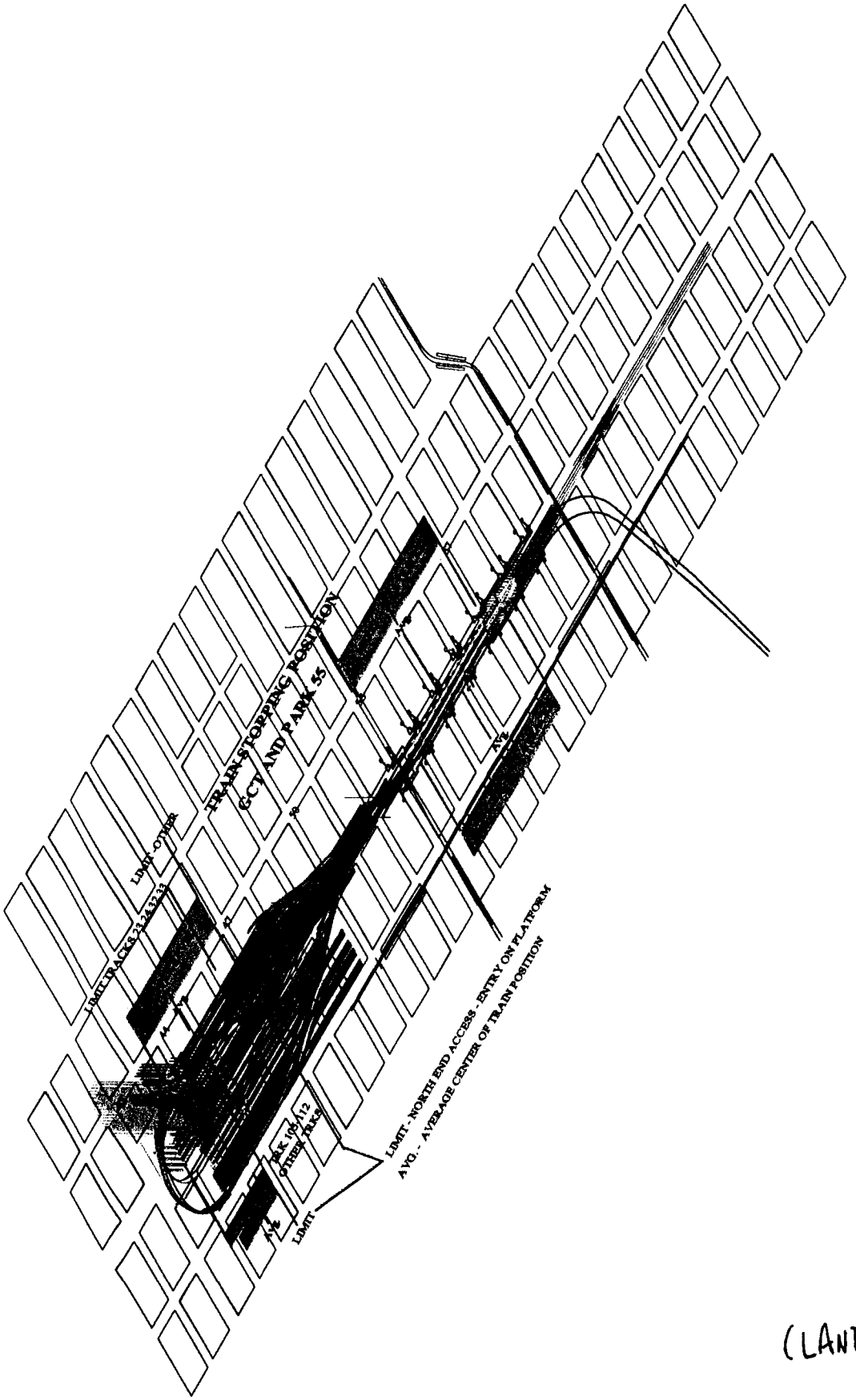
(LANDOW)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AVE
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OTHER TRKS
LIMIT
LIMIT - NORTH END ACCESS - ENTRY ON PLATFORM
AVG. - AVERAGE CENTER OF TRAIN POSITION

(LANDOW)

INTRODUCTION

Like other cities in the world, we wish to make our rail suburban services more closely linked to the urban core.

Paris and London have been in the forefront of this effort. New York has opportunities in this respect. One such opportunity is described here.

PROPOSAL

We propose to split the east midtown area into two zones. One is GCT. The other is a half-mile north of GCT on Park Avenue. GCT trains center on 45th street. We propose a new stop centered on 55th street. It is termed **Park55** in this report. The 10 block interval is one half mile, a critical break point in walking distance for a busy commuter.

The new station would be underground. At the street surface, there would be few visible signs of its presence. Access from the street would be through entrances on the side streets.

The overall objective is to minimize the commute time of the customer who has a destination in the 50's. The walk/subway time from station to office would be reduced. The service would also reduce the travel time by 4 minutes per one way trip. Hopefully, the easy access to corporate headquarters in this zone would reduce the impetus to relocate to outer suburban towns. Overall, commuting time may reduce by 20 minutes per day.

SERVICE TARGET

Both MNRR and the LIRR would be served. **All** trains going to/from GCT would stop at the new station.

The station would be 1020 feet long (about four blocks). It would stretch from 53rd to 57th streets. Underground passageways would extend the pedestrian limit to 59th street and east/west toward Madison and Lexington Avenues.

(LANDOW)

TRAFFIC VOLUMES

After expanding for long term growth (2020), the morning rush hour would involve:

MNRR Inbound	60 trains @ 900 passengers per train	=	54,000
LIRR Inbound	25 trains @ 1500 passengers per train	=	37,500
Total Inbound	85 Trains		91,500
MNRR Outbound	25 trains @ 200 passengers per train	=	5,000
LIRR Outbound	25 trains @ 200 passengers per train	=	5,000
Total Outbound	50 trains		10,000
Total In + Outbound	135 Trains		101,500

For a three-hour rush period these numbers would be doubled to 203,000.

For daily weekday, the totals would add another 50%, for a total of 304,500 per day.

TRAFFIC SPLIT

The volumes above apply to all GCT trains. However, with the new **Park55** station, the passenger volumes would be split between the two stations. The traffic split varies between the railroads due to their differing circumstances. A rough estimate of the rush hour split is as follows:

MNRR - Final Destination in Manhattan

To Lower Manhattan	25%
To Midtown - South of 48th Street	40%
To Midtown - North of 48th Street	35%

This allocates 65% to GCT and 35% to Park55. The split at 48th street reflects the shorter customer trip time with the Park55 station, thereby biasing the zone split to the south from 50th street.

(LANDOW)

LIRR – Destinations in Manhattan

The customer's **timing** preferences may compel a choice of train, quite apart from the question of terminal location. Therefore, some *lower* Manhattan bound commuters may opt for GCT. In addition, some riders destined for points north of 40th street may prefer PSNY.

Penn Station

Penn Station (PSNY) would continue in service, although with somewhat shorter trains. A split (after Park55 is built) may be:

PSNY-- To Lower Manhattan	30%
PSNY -- To Midtown - South of 40th Street	50%
PSNY -- To Midtown - North of 40th Street	20%

GCT and Park55

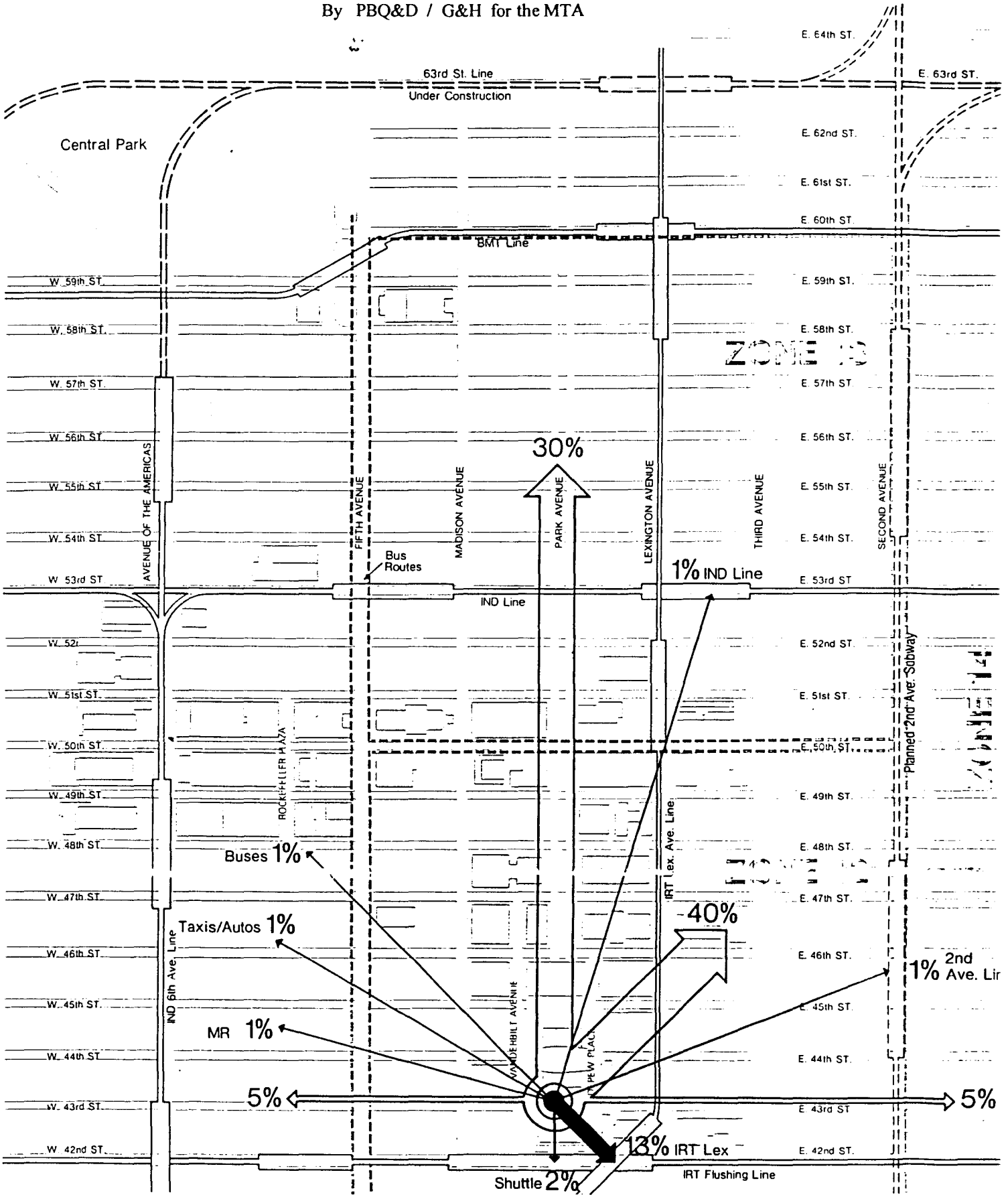
For The GCT and Park55 stations, we estimate a split as follows:

GCT - IRT	15%
GCT - To Midtown- South of 48th Street	45%
Park55- To Midtown - North of 48th Street	35%
Other	5%

This allocates 60% to GCT and 35% to Park55. These estimates are slight variations on the PB/GH 1976 study of GCT. A copy of that estimate follows. The 5% to points west of 5th and 5% east of 2nd are split between GCT and Park55. In the 24 years since the report, more development has occurred in the 50's than the 40's. Therefore, we can expect to shift the 50's estimate upward. In addition, the concept of a station at 55th pulls the Zone12/13 split from 50th to 48th. The shorter trip time at 55th favors its use for mid zone destinations.

(LANDOW)

Source: Grand Central Alternative
Long Island Rail Road East Midtown Terminal
October 15, 1976
By PBQ&D / G&H for the MTA



6.1 LIRR Passenger Distribution

(LANDOW)

PEDESTRIAN MOVEMENT

The impact of the new station is **very significant.** At GCT, the LIRR station area needs diminish. While the train volume at GCT is not effected, the pedestrian flows at GCT are reduced by 35%.

This largely eliminates concerns about overcrowding at GCT after LIRR entry. It disperses the crowds more efficiently over the full street grid of Midtown.

The reduction in pedestrian density will be visible both within GCT and on the street grid. The only increase in street pedestrian density will be the flows from the Park55 station in the 50's. By Manhattan standards, this area has only moderate density. Much of this is GCT related and will be redirected to a more east - west axis. The multiple entry points (53rd – 59th) will disperse the volume instead of concentrating it.

Subway crowding will diminish as well. Fewer short haul subway trips will occur between the 40's and 50's. More walking to final destination will occur as more destinations are viewed as "walk-able".

TRAIN HANDLING CAPACITY

No discussion of a station in this location would make sense if it had no capacity to handle the large volume of trains involved. All platforms are designed for 12 car trains.

MNRR has a 4-track system under Park Avenue. The LIRR approach from the East River complex has two more tracks. Therefore, 6 lines of flow exist to the new station. The traffic density in trains per hour (TPH) is 20-30 on each line. At 24 TPH per track, this yields 144 trains per hour. We propose to handle the volume on 12 station tracks, averaging 12 TPH on each track. This offers a 5-minute headway in the peak period per platform track.

In effect, each line of flow (6) has two platform tracks. A train can stop and dwell while the following train is approaching an adjacent but empty platform track. This ensures that a "following" train will find platform space and favorable approach signals. No delays will result from any limits on station size or track availability. The MNRR is assigned 8 tracks and the LIRR 4 tracks. This is in proportion to the approach trackage ratio.

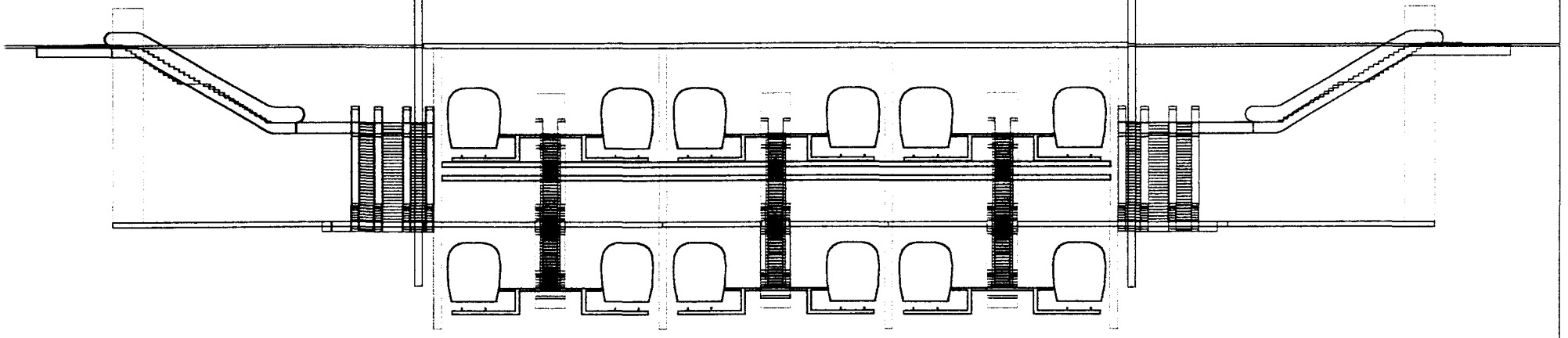
The station design will allow the trains to load passengers from Park55 within 2 minutes. This is well within the design criteria. A more detailed discussion of this will be found under "Loading Process" below.

(LANDOW)

PARK 55

CROSS SECTION

INCLUDING VERTICAL CIRCULATION



(LANDOM)

All platforms are column free. Elevators from street to concourse are shown together with stair/escalator elements.

SITE DIMENSIONS

The Park Avenue site is unusual among the Avenues in its width. At 140 feet, it is the widest in the city. This dates from the mid 19th century and heavy rail use.

The 140' distance is measured from building line to building line. This space limitation requires that the station split its 12 tracks among two levels. Each level has three island platforms. (See cover) The spacing details are in a separate section below. The proposed platforms are 20 feet wide.

Each of the three platforms is in a separate construction bay. On the outer periphery are columns adjacent to the existing building line. On the interior of the system, there are two other column lines. These divide the area into three parallel segments.

At the moment, the area is filled by 10 MNRR tracks in the "U" Tower zone. This is replaced this six tracks and three platforms. The cross section of the station follows.

STATION DESIGN

The concourse is placed between an upper and lower track level. Circulation to all platforms is from the concourse. Street access comes directly to the concourse.

The station pedestrian concourse has 130,000 square feet of space. This huge three-acre space has generous room for the crowds expected. It is partially occupied by shafts for vertical circulation, ticket offices, service facilities, and commercial space. The commercial space should be very valuable as 107,000 persons should pass by twice a day. Placed along the outer walls of the concourse, about 17,000 square feet should be available for retail services.

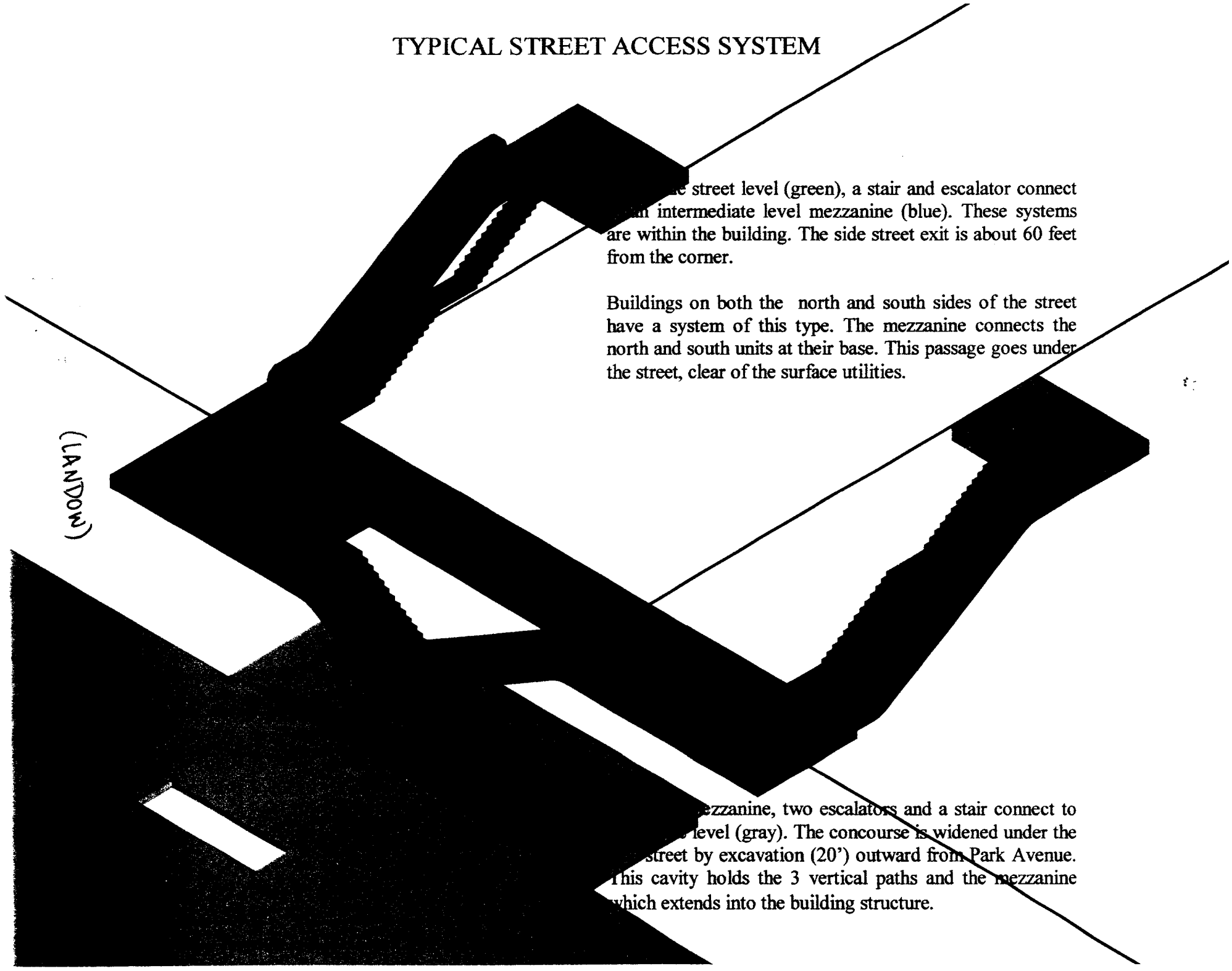
VERTICAL CIRCULATION

Platform Access
Vertical circulation to each platform is by 5 stairways, 5 escalators and one elevator. There is approximately one vertical line of flow for each car in the train.

Street Access
The concourse, in turn, has access to the street via a network of stairs and escalators at each cross street. This is replicated on each side of Park Avenue. For five cross streets (53-57), we have 10 exit systems. Each of these, in turn, has 3 units (2 escalators and a stair) from the concourse. At a mid-level to the street, this triple flow splits into 2 escalators and 2 stairs. Of these 4 units, two connect to the north side and two to the south side of the street.

(LANDOW)

TYPICAL STREET ACCESS SYSTEM



e street level (green), a stair and escalator connect
n intermediate level mezzanine (blue). These systems
are within the building. The side street exit is about 60 feet
from the corner.

Buildings on both the north and south sides of the street
have a system of this type. The mezzanine connects the
north and south units at their base. This passage goes under
the street, clear of the surface utilities.

(LANDOM)

ezzanine, two escalators and a stair connect to
level (gray). The concourse is widened under the
street by excavation (20') outward from Park Avenue.
This cavity holds the 3 vertical paths and the mezzanine
which extends into the building structure.

PURCHASE OF SPACE

The sidewalks are too narrow on the side streets to create entrance kiosks. The entry system must be *within the building* and have exit doors to the sidewalk.

Space within a building has commercial value. The MTA must purchase its space as part of the capital budget for the project. Income from the retail stores on the concourse will help offset the cost of space used at the street.

The vertical flow system has a mezzanine below street level. This projects to the inside of the building at a basement level. A 15' penetration is all that is needed. The customer then enters a stair/escalator that parallels the side street and rises to street level. This takes up about 30' of space at street level. This forms an area of 450 sq.ft. in the prime retail area of the main floor.

The exact design would vary in accordance with each buildings unique characteristics. The owner may benefit by advertising direct lobby access without going outside. In this case, a door into the lobby can be provided. Alternatively, if the owner prefers to isolate his building from the station passenger flow, only a street exit door will be provided.

ADA ACCESS

Two ADA entrances are planned for the station. They are at 56th street on the opposite sides of Park Avenue. This avoids the need to cross Park Avenue.

Elevators are provided between the concourse and street level. Once on the concourse, other elevators provide a linkage to the 6 platforms and 12 tracks. Advance posting of track assignments will enable users to position themselves to the correct platform elevator in time for the train's arrival.

EMERGENCY EGRESS

Platform Clearing

If two fully loaded trains were in the station simultaneously (3000 passengers), the l0 lines of escape would clear the platform within 4 minutes.

Concourse Clearing

There are 10 exit systems to the street. Each has 3 lines of flow. These 30 exit lines are supplemented by routes to the platforms. These too can act as an emergency refuge. These are 60 such exits (6 platforms at 10 each).

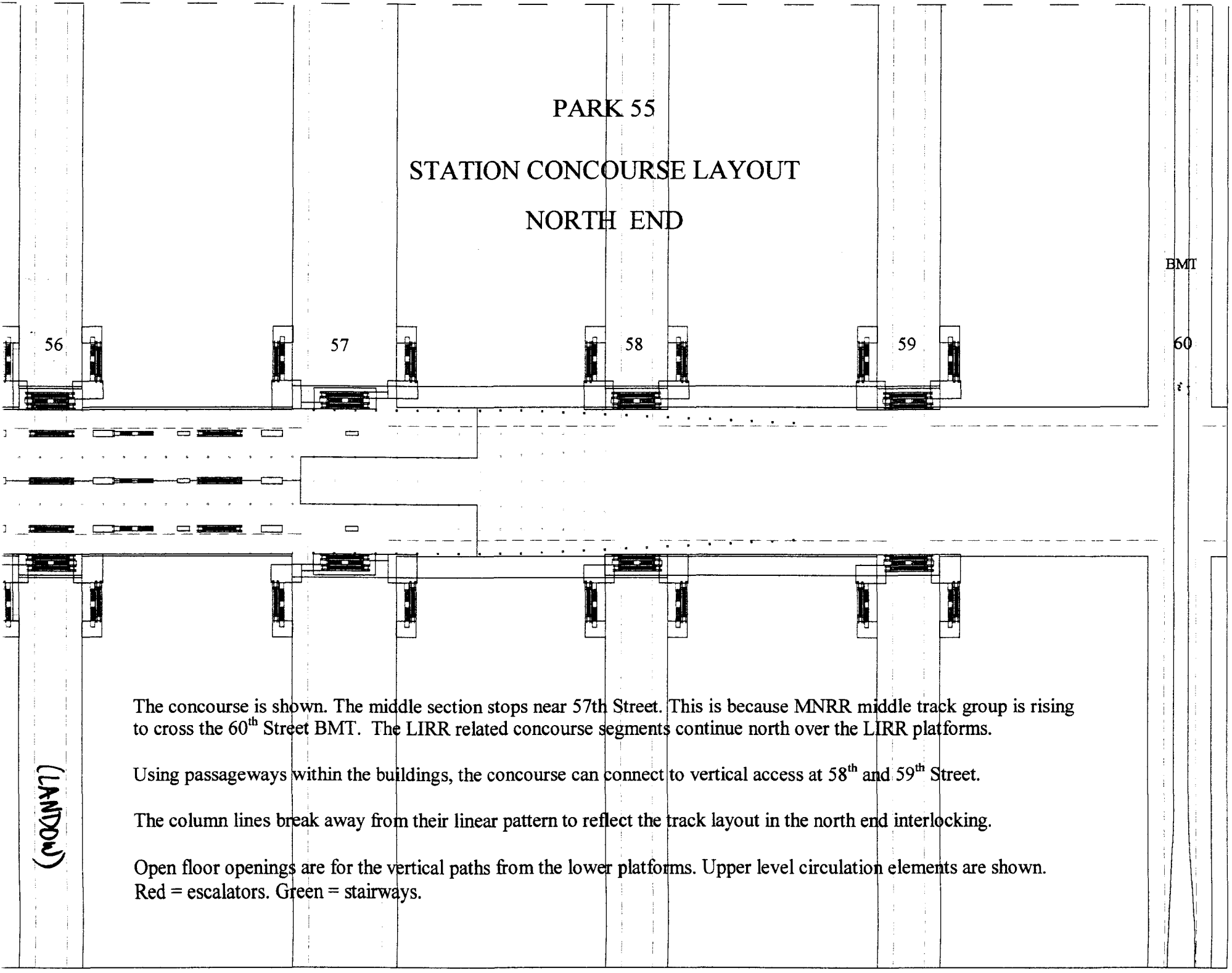
In all cases, the concourse can be cleared rapidly and safely despite its large size. The 90 lines of flow provide extraordinary egress capability.

(LANDOW)

PARK 55

STATION CONCOURSE LAYOUT

NORTH END



The concourse is shown. The middle section stops near 57th Street. This is because MNRR middle track group is rising to cross the 60th Street BMT. The LIRR related concourse segments continue north over the LIRR platforms.

Using passageways within the buildings, the concourse can connect to vertical access at 58th and 59th Street.

The column lines break away from their linear pattern to reflect the track layout in the north end interlocking.

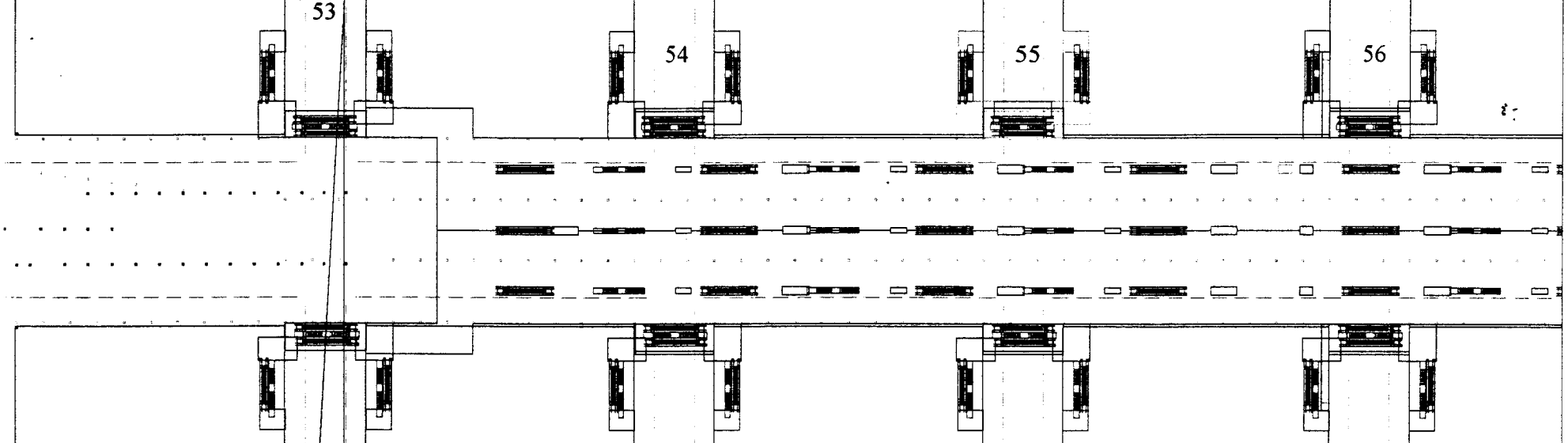
Open floor openings are for the vertical paths from the lower platforms. Upper level circulation elements are shown. Red = escalators. Green = stairways.

PARK 55

STATION CONCOURSE LAYOUT

SOUTH END

The concourse is shown with a wing to 53rd Street. The column lines break away from their linear pattern reflecting the "U" Tower layout.



Open floor openings are for the vertical paths from the lower platforms. Upper level circulation elements are shown. Red = escalators. Green = stairways.

The escalators and stairs rise to the upper platforms. Also shown are rectangles on the floor where the lower level rises to penetrate the concourse floor to the lower level.

The basic pattern is that each level has a new vertical element every 80 feet. Thus, there is 160 feet between escalators. Because this is repeated from both levels, the floor has a new vertical element each 40 feet. Since each takes a 20 foot footprint taken away from concourse circulation, the floor has alternating 20 foot circulation paths followed by a vertical path (up or down).

(LANDOM)

LOWER LEVEL PLATFORMS

The center platform is for MNRR use. It is positioned to the south in comparison with the platforms. This is due to the need for a grade on the north end to cross the BMT.

The outer two platforms are for the LIRR. Each connects to a 63rd street tunnel track.

All three platforms have 10 lines of egress. In addition, an elevator links the concourse and platform near 55th street. Platform length is set for 12 car trains.

UPPER LEVEL PLATFORMS

These platforms are all for MNRR use. Platform length is set for 12 car trains.

All three platforms have 10 lines of egress. These are 5 escalators and 5 stairways. In addition, an elevator links the concourse and platform near 55th street.

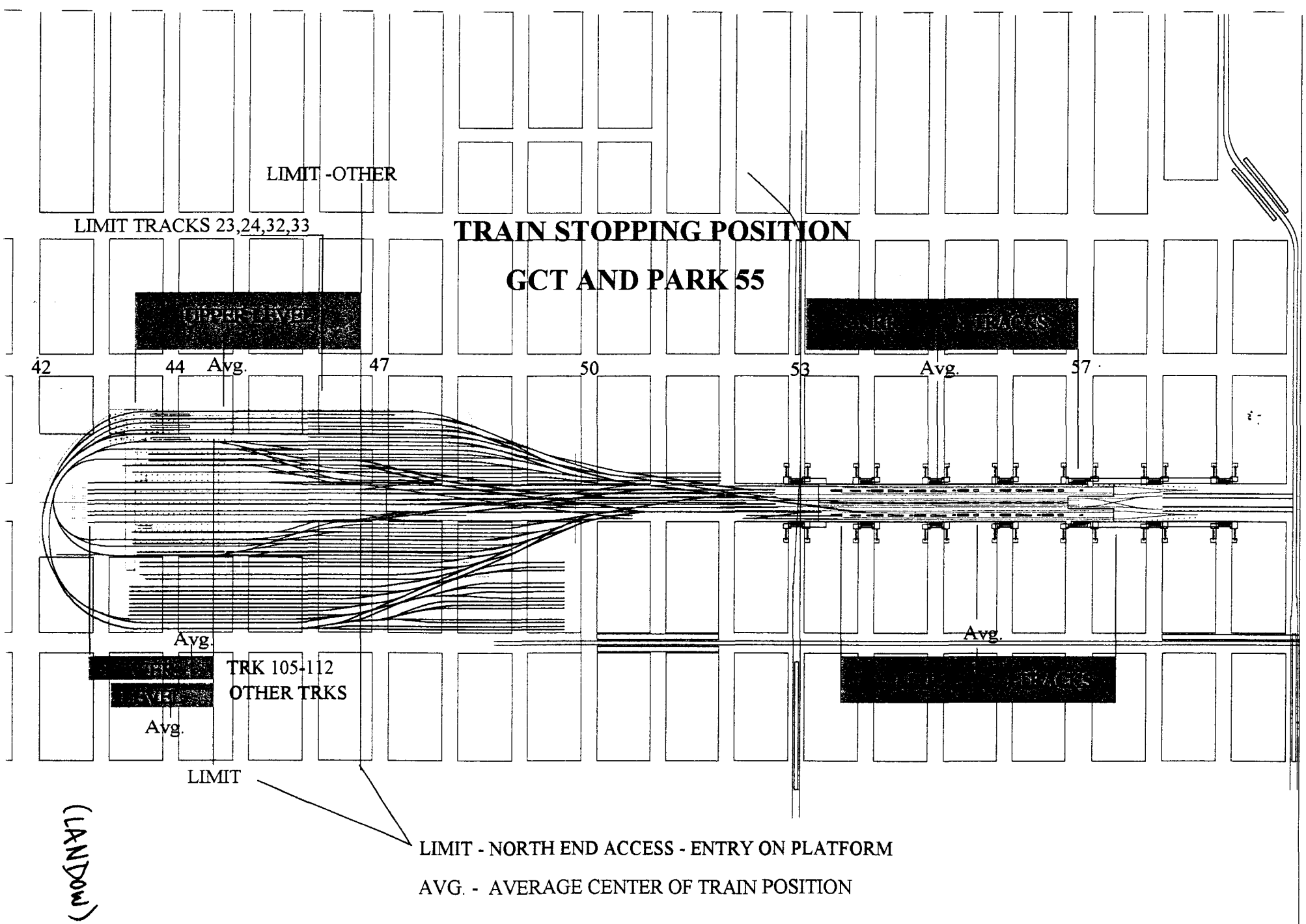
UNLOADING PROCESS

Trains arriving from the suburban regions unload in a "surge". That is, as fast as they can de-board, they do so. Using the M-1 class as a model, we note that a full car can unload 80% of its passengers in 60 seconds. The entire car can be empty in two minutes. This lag for the last 20% reflects the fact that some customers know that they are going to queue up on the platform for a while. They ask, "what's the rush".

At Park55, 35% of the riders will get off. The balance remain to GCT. By allowing 2 minutes for the surge unload, we are allowing plenty of time for some customers to maneuver past others. Of 125 persons per car, 44 will get off. At two doors per car, this will average only 22 per door. This will often be done in less than one minute. With a five-minute average headway, it is clear that no delay will accrue from the unloading.

Access to the concourse will be by 10 paths. They stretch out over the 1020-foot platforms and offer almost one path per rail car. Unlike most stations in the world, the vertical flow will not create a queue of any note. At 60 passengers per minute (PPM) the egress of the 600 passengers would take 60 seconds. This is faster than the unload of the rail car itself.

(LANDOW)



(LANDOW)

LIMIT - NORTH END ACCESS - ENTRY ON PLATFORM

AVG. - AVERAGE CENTER OF TRAIN POSITION

LOADING PROCESS

For planning purposes, we will assume a design for 40% of the trainload, not 35%.

The opposite of a surge load, is the "trickle" load. This occurs when the train has sufficient time at origin to "just sit there" and wait. GCT is famous for this insofar as a huge track network exists to accommodate it.

At Park55, only 12 tracks exist in the midst of a major flow. We must board up to 40% of the customers and yet operate a 5-minute average headway per track.

In the evening rush period, the customers arrive several minutes in advance of their train time. This allows for unforeseen delays and ensures a departure as planned. However, to arrive "too early" is seen as a waste of valuable time. Thus, the pre-departure curve of persons arriving before train time starts to develop 10-15 minutes before that time.

For the LIRR, 600 customers must accumulate (40% of 1500). The large waiting area of the 3-acre concourse holds these persons without undue crowding. A train is not announced for a track until **after** the prior train has departed. Despite good platform size, waiting on the platform is discouraged.

The 600 customers can get to the platform over 10 lines of flow. This should take about 1 minute, less than the train replacement time. They start to move to the platform when the prior trains starts to pull out. They will all be on the platform by the time their train has arrived.

With 12 cars and 24 doors, the 600 passengers will average 25 persons per door. This is obviously not a problem. Even with other passengers already on board, it should take about 90 seconds to load and be ready to move out.

Thus, the arrival of passengers from the street grid to the concourse is a "trickle" load. The movement to the platform and onto the train is a "surge" load. Train dwell is minimal (2 minute max).

(LANDOW)

GCT - NORTH END ACCESS

The MNRR recently opened the North End Access (NEA) corridor system. It extends street access points as far north as to 47th/Madison and 48th/Park. It is a beautiful and useful addition to GCT.

The question arises as to whether this corridor system replaces the need for the Park55 station. Our view is in the negative. The new corridors correct the "reverse" walk penalty for a northbound customer. Nevertheless, his walk still begins at the train stopping location. Also, if a passenger's car is north of the NEA entry point, a "reverse walk" is still required.

GCT: The trains stopping location at GCT varies by train length and track location. Street position is given in decimal notation. For example, a location 20% north of 44th toward 45th will be noted as 44.2

Upper Level: The south end is at 43.5. Maximum train length is 3.9 blocks at 12 cars. Average train length is 8 cars (2.6 blocks) which centers at 44.8.The NEA entry point is at 46.8. Four of the 29 tracks enter at 46.1.

Lower Level: The lower level trains center close to 44th street. The NEA entry point to the 45th street cross-passage is located at 44.7. The south end of these trains is near 43rd (42.9-43.1).

Park55: At the Park55 station, the platforms extend:

Upper Level	MNRR	53.0 – 56.9	Av. 55.0	N 28+30 to N 38+50
Lower Level	MNRR	53.1 – 57.0	Av. 55.1	N 28+70 to N 38+90
	LIRR	53.6 – 57.5	Av. 55.6	N 30+00 to N 40+20

The center of the system is at 55.3. For the LIRR 12 car trains expected, the center is at 55.6. For the MNRR, the train center would be at 55.1 The composite of these figures suggests a mid-value at 55.3.

Result:

In sum, there is a half-mile (10 blocks) between the train centers at GCT and Park55.

The customer will see Park55 as a shorter train journey (trip time) than GCT. It will save 4 minutes per trip. In addition, the walking time to the building destination will be shorter. At 6 minutes saved, this is 10 minutes each way, or 20 minutes per day. This saving is the value basis of the project.

(LANDOW)

VALUE OF TIME SAVINGS

The one way ridership was estimated on page 2. The data can be converted to an annual basis and translated into dollar values. This must be done for any major project to test its economic worth.

1. One way, daily ridership, page 2	304,500	
2. Mon-Friday #1 * 5	1,522,500	
3. Weekend day @ 15% of weekday	45,675	
4. Weekend #3 * 2	91,350	
5. Total Per Week #2 + #4	1,613,850	
6. Total Per Year, Trips #5 * 52	83,920,200	
7. Ridership to Park55 @35% * #6	29,372,070	
8. Hours saved at 20 min #7 * 1/3hr	9,790,690	hrs.
9. Ridership to GCT @ 65% * #6	54,548,130	
10. Hours lost from P55 delay, 4 min #9 * 1/15hr	3,636,542	hrs.
11. Net Hours Saved/Yr. #8 - #10	6,154,148	hrs/year
12. Time Value @$20/Hr * # 11	123,082,960	$/year
13. Payback @Project cost $800M / #12	6.5 years	
14. Project cost/year * CRF 6%, 50 years	48,000,000	$/year
15. Ratio Value / Cost/year #12 / #14	2.56	
16. Ticket Price Increase to cover costs/year #14 / #6	$.572	round trip
17 Ticket Price Increase per one way #16 / 2	$.286	each way
18 Ticket Price Increase per monthly ticket #14 / #6 * 20	$11.44	per month
19 Percent Increase re Average Monthly @150/mo #18 / $150 * 100	7.63%	

(LANDOW)

COMPATIBILITY WITH OTHER PROJECTS

ESA

There are now several planning versions of the ESA project. These include:

1. STV 1993 Report Madison Ave Yards, Tracks 7-16
   Involves Partial Use of the loop

2. Deep rock chamber

3. Full use of the loop tracks,
   Involves six through tracks 7-12
   Entry on "J", exit on "A" slot
   Saves 5700 ft of tunnels

The last item is a recent suggestion submitted to the LIRR in November 1999. It is fully and totally compatible with the Park55 concept.

While Park55 can be modified to some extent, there are some basic limits. For example, it is not compatible with item #1 above. This is because #1 has a two level approach track system in the 50's. This is required because of the failure to use the loop for all trains. This causes some trains to come east against the westbound flow. The numerous route conflicts are resolved with a flyover. The Park55 uses the same space for the station itself.

The Deep rock concept is a stub end concept. This will cause similar problems in the approach. This will use the same space, making it impossible to stop a train in the 50's.

In conclusion, full use of the loop reserves room for the Park55 station.

ARC

Numerous ARC proposals are under study. Most involve a tunnel network between GCT and Penn Station.

Through operations at GCT are inherently compatible with the Park55 concept.

If NJT comes to GCT, turns and returns to Penn, it will fail to take passengers into the 50's. Given the passenger interest in this market, this would be a major failure.

CONCLUSION

Park55 is fully compatible with both loop and through plans. It is not compatible with plans that use the same space (53 –57th) for other functions.

(LANDOW)

EAST / WEST ALIGNMENT WITHIN THE PARK55 STATION

GENERAL

In order to lay out a preliminary plan, it was necessary to make certain assumptions as to the space allocation within the project area.

COLUMNS

There are 3 bays within the station. Four lines of columns on a north/south axis define these. The columns are assumed to be 20' apart. An excavation of 30' below the existing grade is needed. This is 233,000 cubic yards of rock in the project area.

All columns are positioned on the East line of the GCT grid as follows:

1. West side of Park Ave	E 4+82.75
2. Between west and center bay	E 5+27.5
3. Between center and east bay	E 5+72.5
4. East side of Park Avenue	E 6+17.25

The west side building line is at E 4+80. The inner face of the wall is at E 4+83.5. The east side building line is at E 6+20. The inner face of the wall is at E 6+16.5.

The wall must be supported as the area is excavated for the station and lower level tracks. Latter studies will determine the final width of the lower level. If the space is narrowed, it will narrow the platforms a bit from their intended 20-foot width.

Column width was assumed to be 18" at the wall, effectively placing the inner edge at the existing wall face. In the middle of the station (items 2,3 above) the column width was assumed to be 2'. Clearances between the column face and the vehicles were set at 1 foot.

TRACK CENTERS

The six tracks on each level have centers as follows:

1. E 4+89.75
2. E 5+20.25

3. E 5+34.75
4. E 5+65.25

5. E 5+79.75
6. E 6+10.25

Car width is assumed as 10'6" above the platform. Width at platform height is assumed to be 10'.

(LANDOW)

PLATFORM ALIGNMENT

Platform lines on the west, center and east side of the platform are:

	West	Center	East
1. West Platform	E 4+95	E 5+05	E 5+15
2. Center Platform	E 5+40	**E 5+50**	E 5+60
5+50 = Park Ave centerline			
3. East Platform	E 5+85	E 5+95	E 6+05

ELEVATIONS WITHIN THE STATION

The street level changes as one moves north/south. The elevation is 46.8' at 55th street. To simplify the discussion, we will focus on the elevations at this cross street. Rail elevations are defined at the top of rail.

The upper level trackage is essentially on the same elevation as the "U" Tower trackage. It is at Elev. 25.8 at 55th street. Both the street and upper level track are on subtle gradients.

The station ceiling (interior finish) is set 5' below the upper level track. (20.8)

The station interior height is 8'. While not generous, it may suffice in this tightly packed context. Therefore, the floor is at 12.8. Only 1 foot is allowed for the floor structure. This places the upper clearance line for the lower deck trains at 11.8.

The criteria used for rail vertical clearance was 16'. This places the lower track at –4.2. The platform at 4' height is at elevation –0.2.

The 16' clearance is to the GCT standard as constructed. It allows for catenary if needed and bilevel cars on Metro North. The LIRR fleet cannot use such clearances into GCT because of the limited vertical clearance in the East River Tunnel.

(LANDOW)

GENERAL ROUTE PROFILE

The upper level track profile matches the current track. This creates a saucer shaped profile with the low spot near 55th street. A detail of the entire profile is available from the author. It uses a 50 scale horizontal and 10 scale vertical axis.

The lower track level is more complex than the upper level. The MNRR and LIRR are on a different profile. The two LIRR tracks are on a 1% grade. This is the same grade used by MNRR in the arrival station of GCT (tracks 38-42). The use of this grade helps the LIRR to descend to the East River (elev.-95.07 at Sta.77+19) while not placing the station itself on a 2% grade. The average to the East River would be 1.95% without the 1% grade segment proposed. The result is a final grade to the East river of 2.246%.

The LIRR rail elevation is –1.5 at Sta. N 30+00. It moves down to the North on the 1% grade. At Sta. N 40+00 the elevation is –11.5. However, the later point is a PVI on a vertical curve leading into the final 2.2% grade.

The MNRR platform parallels the upper level track, maintaining the internal clearances described earlier regarding overall heights, station clearances etc. At station N 38+63, elevation –2.85, the profile changes. This point is a PVI for the vertical curve needed to lift the track to the north and over the BMT subway at 60th street. A 3% grade is used for this purpose.

The concourse floor follows the profile required by the MNRR. This increases the escalator/stair depth from the concourse floor to the LIRR platforms that continue to descend to the north. At Sta. N 38+50 at 7-foot elevation differential has developed.

The design can be modified in terms of which platforms on the lower level serve which railroads. Depending on the matching plan for GCT services, the LIRR could be on the two west or two east platforms instead of the side platforms. However, this is an issue that should be decided early in the planning process, as it effects the tunnel alignments and other fundamental issues.

(LANDOW)

INTERLOCKING CONNECTIONS

North End

Exhibits follow which illustrate the north end approach track arrangements. MNRR numbering of the main tracks are used here. The sequence is 4,2,1,3 from west to east. The new tracks in the station are:

Lower Level A-D
Upper Level 11,22,33,44,55,66

The first exhibit describes a shift from the MNRR 4-track main line to six tracks. This occurs between 63rd and 61st. The two extra tracks (C&D) are destined for the lower level at the station. The turnouts are drawn as #15. An upgrade to #20 would probably be advisable.

South of the BMT at 60th, tracks C&D descend a 3% grade into the station. The second exhibit shows the lower level. A #8 crossover is shown between C&D. This allows either track to reach any of the mains 4,2,1,3.

The LIRR approach is very simple. The inbound track splits to form tracks A&B. The LIRR north approach is designed for 30 MPH. Radius values are 1720'. Tracks E&F are for outbound LIRR trains. The geometry is symmetrical to A&B.

The third exhibit shows the upper level approach. Curve radii are set at 500'. The interlocking is compressed between the platforms and the need to clear the C&D tracks rising from the lower level. The operational flexibility sought is obtained by using some equilateral and lap turnouts. Each main (4,2,1,3) can reach any of 3 platform tracks. This is detailed on the exhibit.

South End

On the upper level one must connect the Park55 tracks 11-66 to the existing layout. There are 6 ladders now in position on the upper level. (C,D,E G,H,I). The old ladders to the lower level (A,B,F,J) are replaced. Thus, any of 10 slots could be used.

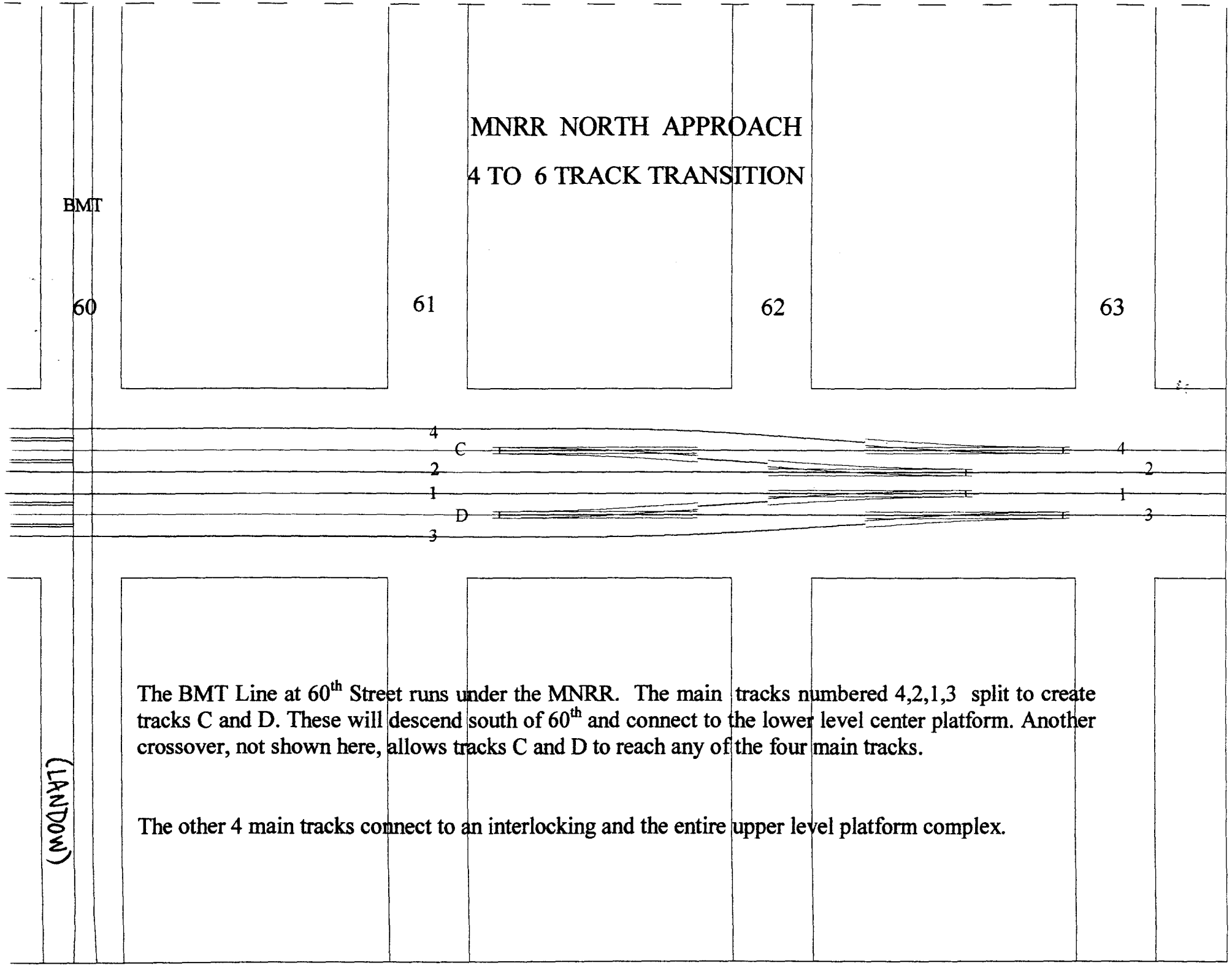
The lower level Park55 tracks (A-D) also have numerous connection options. They are complicated by the various column lines now in place.

The connection options are too numerous to discuss here. Studies of the situation indicate, however, that the connections are very readily made.

(LANDOW)

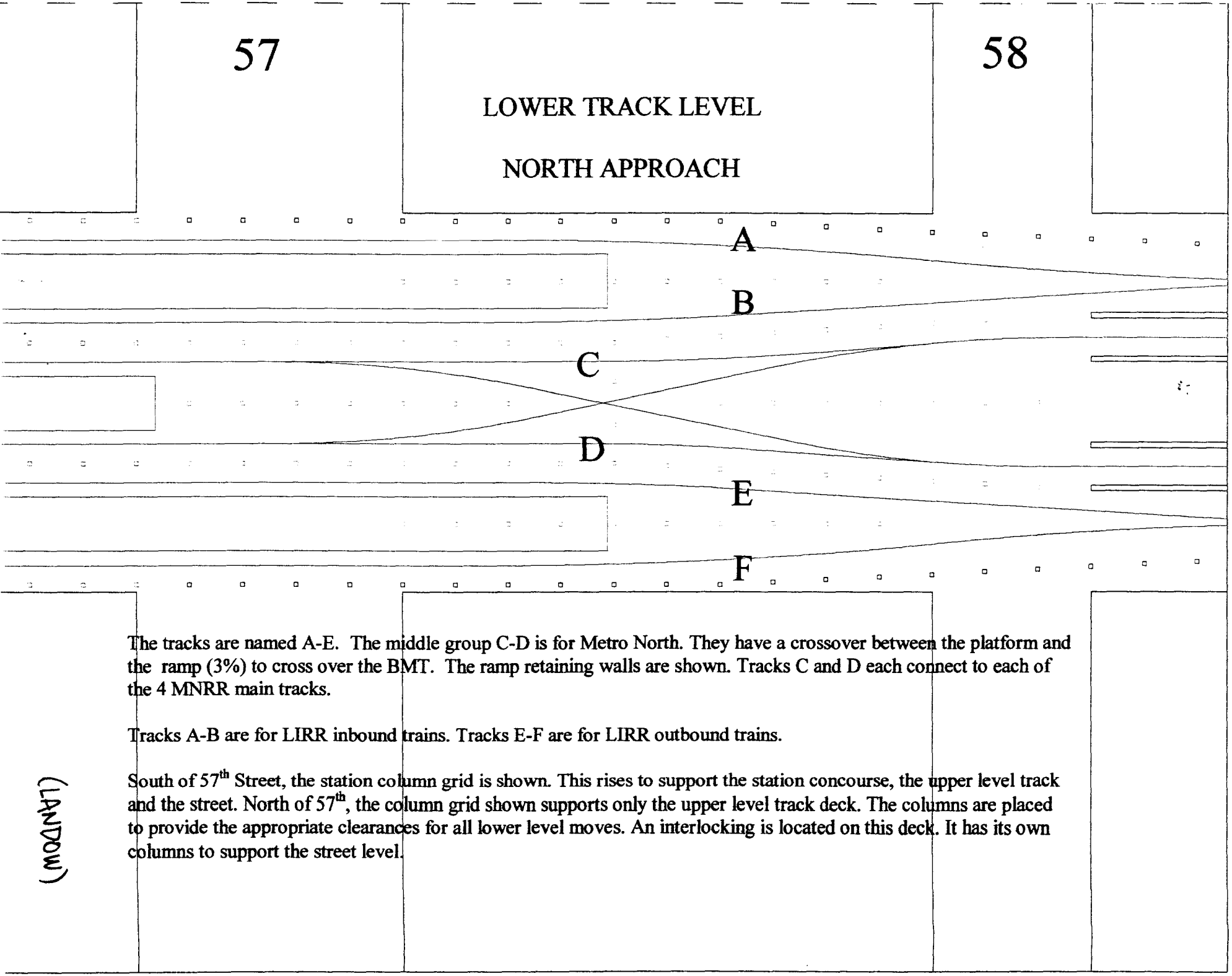
MNRR NORTH APPROACH

4 TO 6 TRACK TRANSITION



The BMT Line at 60th Street runs under the MNRR. The main tracks numbered 4,2,1,3 split to create tracks C and D. These will descend south of 60th and connect to the lower level center platform. Another crossover, not shown here, allows tracks C and D to reach any of the four main tracks.

The other 4 main tracks connect to an interlocking and the entire upper level platform complex.

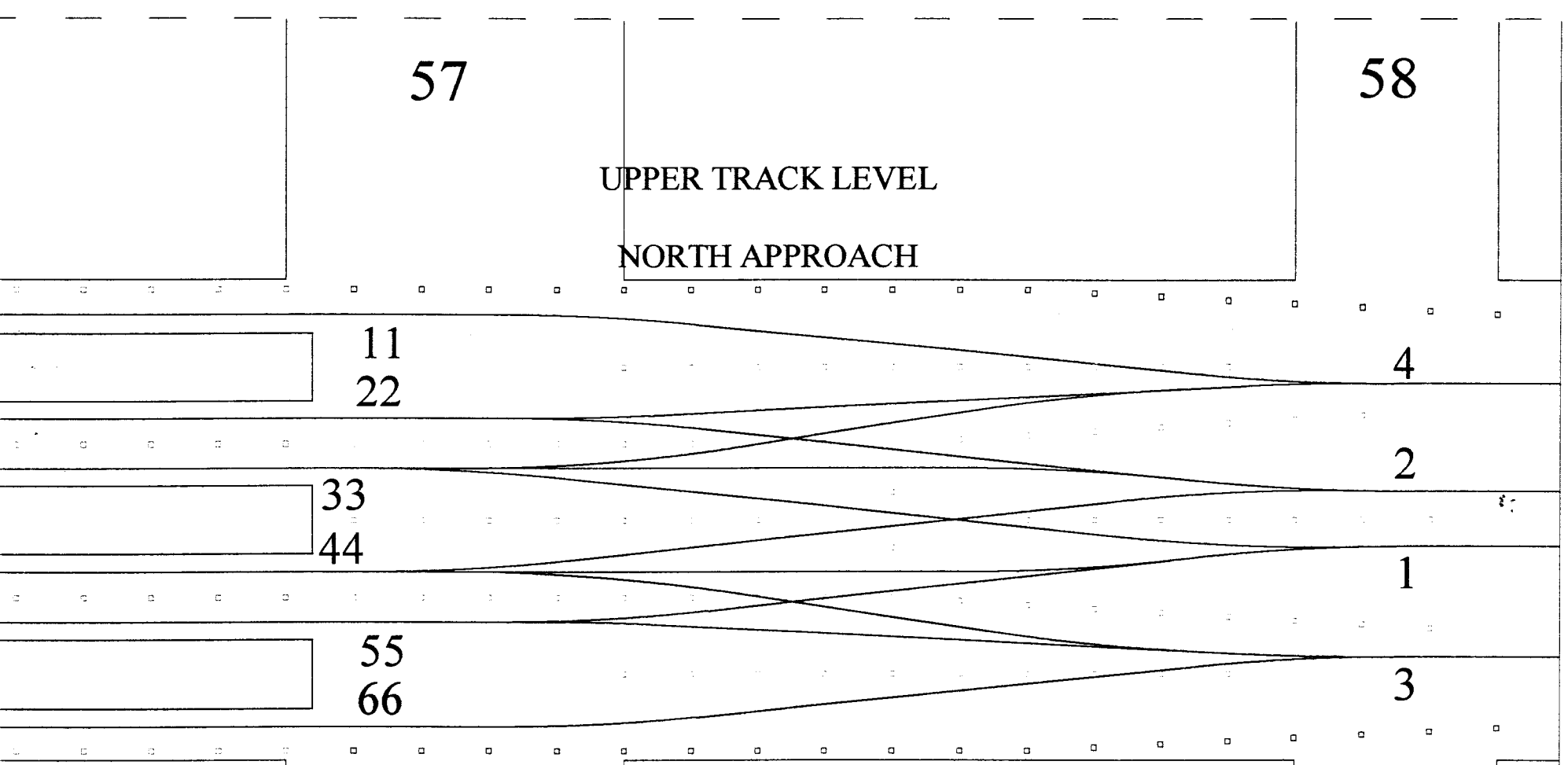


The tracks are named A-E. The middle group C-D is for Metro North. They have a crossover between the platform and the ramp (3%) to cross over the BMT. The ramp retaining walls are shown. Tracks C and D each connect to each of the 4 MNRR main tracks.

Tracks A-B are for LIRR inbound trains. Tracks E-F are for LIRR outbound trains.

South of 57th Street, the station column grid is shown. This rises to support the station concourse, the upper level track and the street. North of 57th, the column grid shown supports only the upper level track deck. The columns are placed to provide the appropriate clearances for all lower level moves. An interlocking is located on this deck. It has its own columns to support the street level.

(LANDOW)



The main tracks from 125th Street (4,2,3,1) split in a short interlocking to the six platform tracks (11,22,33,44,55,66). **Each main track can reach any of three platform tracks.**

The platform tracks reach the mains as follows:

11	to	4
22	to	4, 2
33	to	4, 2, 1
44	to	2, 1, 3
55	to	1, 3
66	to	3

Some equilateral and lap turnouts are used to achieve this connectivity in a short distance. The north end of the interlocking is limited by tracks C, D rising from the lower level. The south end is limited by the platform position. Radius values are limited to 500 feet with #8 frogs. The interlocking is on a deck supported by the columns shown. These are positioned to clear the lower level interlocking (not shown).

(LANDOW)

DATA SOURCES

- NYC & HR RR **COMPOSITE** Plan Tracks and Columns **BOTH LEVELS**
  Grand Central Terminal Improvement New York City
  January 15, 1910 Revised 1-14-1914
  Scale 30 ft. Issue #11. Scope: 0+00 to E 8+00, N 28+50

  This drawing is 30" wide by 8 1/2 ft. long. **It gives dimensions to 0.001 ft.,** e.g., station 2+38.335. All columns are shown as of the date of revision. Prior revisions are noted as issues 6-10. This includes Yale Club columns between 44th and 45th.

  Columns are coded to show separately those:
  Suburban Level base *up to* Express Track Level
  Above Express Track Level
  Suburban Level *up through* Express Level
  Similar coding is used to separate independent building columns from those supporting trackwork.

  This drawing has been encoded in a CAD file and used in this study. References to this source will use the name **COMPOSITE.**

- Similar to NYC & HR RR above. Tracks and Columns in 2 drawings:
  1. EXPRESS LEVEL
  2. SUBURBAN LEVEL
  Grand Central Terminal Improvement New York City
  March 15, 1933
  Scale 50 ft
  Covers issues 8-19. Issue 12 here is equivalent to issue 9 above.
  Dimensions stated are given to 0.001 ft.
  Track curvature is indicated by degree or radius specification.

- Grand Central Alternative
  Long Island Rail Road East Midtown Terminal
  October 15, 1976
  By PBQ&D / G&H for the MTA
  References to this source will use the name **PB/GH.**

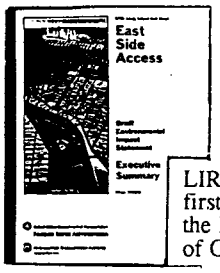
- Operational & Physical Feasibility Study of Long Island Rail Road Access to Manhattan's East Side

  Prepared for the Long Island Rail Road
  April 1993
  by STV/Seelye Stevenson Value & Knecht
  References to this source will use the name **STV.**

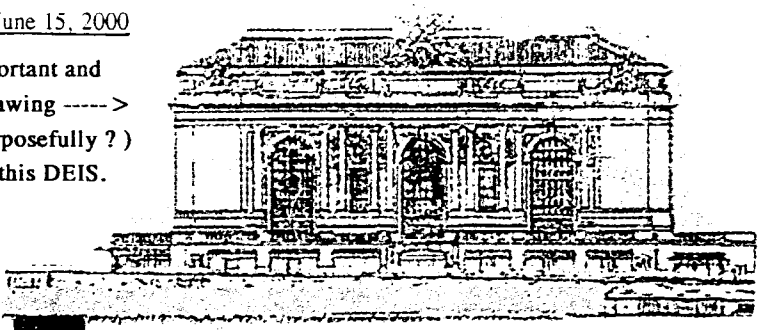
(LANDOW)

SCHUMACHER

Submission to Public Hearing June 15, 2000



One very important and significant drawing -----> has been (purposefully ?) omitted from this DEIS.



LIRR trains were first assigned to the Lower Level of Grand Central.

Under Option 1, located one level below, 65 feet down.

Under Option 2, located in a cavern blasted out of rock, 125 feet down.

On page S-10 of the Executive Summary of the DEIS

> "the distance from platform to street (for LIRR trains terminating at Grand Central) would be less under Option 1 - 65 feet as compared to 125 feet under Option 2."

Yet, "Option 2 is the preferred option." (page 9)

It seems likely that the reason why the above drawing has been (purposefully ?) omitted from this DEIS is to bury, almost unnoticeably, in the text that the LIRR trains will be in Grand Central even lower than the Lower Level by an astounding **60 additional feet** of vertical distance !

Page S-8 states,

> "Option 2 . . . would construct a new LIRR station beneath the lower level of GCT."

Those words, "beneath the lower level of GCT" carry an ominous tone of their own. The Lower Level of Grand Central has second-class status, is used mainly only during the peak periods. Should the new LIRR service to Grand Central be assigned at all times to a level even lower ? Those words might also convey to many people an impression that, for Option 2, the "new LIRR station" would be immediately "beneath the lower level of GCT." Civil engineers know that a vast cavern could not be blasted out of rock directly below an existing structure; that would require a cover of about 40 feet of rock as specified here.

Page S-10 assures that escalators (not elevators) will be provided. But even so

Escalators from a depth of 125 feet is equivalent to traveling by escalators up to the 12th floor of a building !

In department stores, many people who use escalators to go up or down a few floors find that it's a slow way to travel. Is there any place in the world where people ride escalators up or down 12 floors ?

Is there any place in the world where a transit platform is 125 feet below the street ? I have seen the long bank of escalators to PATH at World Trade Center, also in Washington, London, Moscow, Tokyo; none of those are as deep as 125 feet.

In this case, entire trainloads of commuters will empty at the station. Depending upon how many escalators are on each platform, the back-up and the time for passengers to reach the surface could be horrendous.

Not infrequently an MTA escalator is out-of-service as has been the case for quite a while now at the Flushing line platform at Grand Central. (That platform is deep down but not nearly as deep as 125 feet.)

Even from that very deep-down platform, many people use the stairs even when the escalator is operating. But to climb stairs up to the 12th floor of a building ?

The constituency from Long Island that anticipates the attractiveness of riding directly to Grand Central would not be as supportive of the very costly route via 63rd Street if they could see so graphically how deep down in Manhattan's rock they will be.

(1)

Funding

Deep in the text of page S-18,

> "Capital costs for the Preferred Alternative are estimated at $4.7 billion for Option 1 and $4.3 billion for Option 2"

Either of those would be about the most expensive transit plan ever proposed. That cost would determine whether the project can be implemented.

Yet, that obscure location is the only place in the 104 pages of the DEIS where the item of "cost" is even mentioned.

Former Senator Alfonse D'Amato, in his effort to win re-election, performed a Herculean task of obtaining $353 million in Federal funds for the route from 63rd Street to Grand Central. But that's less than 10% of the amount needed.

On the reverse side is a montage of newspaper headlines warning of financial chaos and fare increases that could result from MTA's present Capital Program

A Staff Summary for the "Revisions to MTA 2000-2004 Capital Program", April 19, 2000, states,

> "The revised $17.1 billion capital program now assumes support from the proposed $3.8 billion Transportation Infrastructure Bond Act of 2000. A total of $1.6 billion will be allocated to the MTA capital program".

If a majority of voters of New York State vote

- -- in favor of fiscal prudence,
- -- against financial chaos for State, MTA budgets,
- -- against large fare increases

that $1.6 billion will not become available.

But even if it is approved, there would still be tremendous amounts of funding needed that is not now indicated other than by wishful thinking. Projections of federal, state, city funds seem overly optimistic. An increase in federal funding for New York City transit of one-third more than in the recent past does not seem to be likely from the present Congress.

(2)

There is good reason to raise the question: --

Will LIRR Access to East Side Manhattan become a 50-year disaster, exactly like the 2nd Avenue Subway -- and for exactly the same reasons ?

For more than 50 years, ever since the demolition of the 2nd and 3rd Avenue Elevated lines, a proposed 2nd Avenue subway has been a series of disasters -- a bright promise, then a false start followed by abandonment of the project because of lack of funds.

If the project to extend the 63rd Street tunnel to Grand Central proceeds under the flimsy, wishful-thinking funding assumptions indicated above, 50 years from now transit planners may still be seeking a way to provide East Side Access for LIRR riders.

But there is an alternative plan -- the "31st Street Proposal" -- that is much better, see over ----->

"31st Street Proposal"

The "31st Street Proposal", details available on request, would save literally billions of dollars and provide the same benefits as the 63rd Street - Grand Central - Penn Station - New Jersey plan -- except only that the station for suburban commuters would be at 31st Street instead of Grand Central. Granted, Grand Central is the more desirable location but it is not so superior as to be worth billions of dollars additional.

A station at Park Avenue & 31st Street is on the East Side and would offer a far better connection to the East Side IRT than Grand Central. Both the platform and trains at the subway station there are completely uncrowded even during the peak hour -- the diametric antithesis of Grand Central. And would it really be desirable to add tens of thousands more peak-hour commuters into the Grand Central complex that is already very congested?

(4)

In addition, the "31st Street Proposal" would provide, for the first time ever, full-size freight service directly from New Jersey to Long Island, Southern New England, and Manhattan (not via Albany or Poughkeepsie or by carfloat). That would remove many trucks from Long Island Expressway, Canal Street, Jersey Turnpike, and other congested streets, highways, bridges, tunnels of the Region. (The route via 63rd Street makes no provision whatsoever for freight service.)

The "31st Street Proposal" would provide East Side Access for both LIRR and NJT and would also provide increased peak-hour commuter capacity to Manhattan of 17% for LIRR, 37% for NJT. (Those percentages could be increased to 50% and 100% at an additional cost of building two new tracks under the Hudson instead of one.

That presents an astonishing choice of alternatives: --

$1-billion vs. $5-billion

in which the $1-billion plan offers the same benefits as the $5-billion plan plus a rail freight track and at no additional cost -- on the contrary, it would save billions of dollars compared to the present plan.

Such an incredible bonanza is made possible because that freight track would be included with an increased capacity and improved access to Manhattan's East Side for commuters from New Jersey and Long Island -- which has the support of a powerful political constituency.

The increased passenger traffic would operate only during the 20 peak hours per week. At all other times the present capacity for passenger trains to Penn Station is more than adequate. That leaves 148 out of the 168 hours per week when freight trains would have exclusive use of the new tunnel. There is no foreseeable future freight traffic for Long Island, Southern New England, and Manhattan that could not be accommodated during those intervals by a single-track gantlet 7 miles long.

Other Alternatives

(5)

Third Avenue -- Terminating the route from 63rd Street on Third Avenue in the Grand Central area, as originally contemplated by Dr. Ronan when the 63rd Street tunnel was built, would be cheaper, simpler, and better than all the complexities and deep station platforms involved with the Grand Central Terminal.

(6)

43rd Street -- Astonishingly, it would be cheaper as well as simpler and better to ignore the existing lower level of the 63rd Street tunnel and build a new river tunnel between Sunnyside Yard and 43rd Street. A 2-level, 4-track stub-end terminal could be located adjacent to the existing mezzanine of the East Side subway at Lexington Avenue & 43rd Street with excellent access to the subway, to Grand Central, and all parts of that area.

Through Running -- Together with any other plan should be Through Running of NJTransit and LIRR trains through Penn Station. At present, NJTransit and LIRR trains go through the hassle of reversing direction there. That station is designed for through operation. In addition to benefits to any passenger who desires to travel between points in New Jersey and Long Island, there would be major operating benefits. There would be no cost, on the contrary there would be savings in the number of trains required along with reduced crews. (Crews could change at Penn Station to eliminate any immediate problems of union jurisdiction.) Service could be implemented as soon as some limited number of special catenary - third rail trains (New Haven type) could be obtained through the regular car-procurement procedures of NJTransit and LIRR. (No added cost.) Details available on request.

(7)

THE NEW YORK TIMES **METRO** WEDNESDAY, NOVEM

Dire warnings of financial chaos and fare increases under present MTA Program

CITY

New M.T.A. Spending Plan Badly Flawed, McCall Says

A fiercely contested proposal by ... The capital spending plan, which ...

M.T.A.'s Plan Spawns Warnings Of a Debt Crisis and Higher Fares

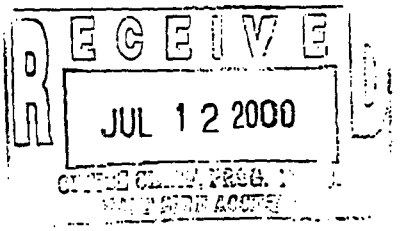
M.T.A. Chief Won't Rule Out Higher Fare to Pay for Expansion Plan

Official says a 30-cent increase over five years would be 'modest.'

The Consequences (SCHUMACHER)

Robert Schumacher, P.E., Transit Consultant S53 June 15, 2000
311 Packman Ave. Mt. Vernon, N.Y. 10552 (914) 668-2117

Committee for Better Transit
P.O. Box 3106
Long Island City, NY 11103



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July 12, 2000

Mr. Anthony Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, NY 10018

Re: Additional Comments on DEIS for LIRR Access to Grand Central Terminal

Dear Mr Japha:

Established in 1962, the Committee for Better Transit (CBT) is a volunteer, not-for-profit organization advocating improved public transportation in the New York Metropolitan Region. Its members include engineers, lawyers, financial analysts, public affairs experts, community activists and other concerned citizens.

CBT is pleased to submit the following additional comments on the DEIS for the MTA LIRR East Side Access Project. These comments augment those submitted at the June 15, 2000 hearing (copy attached).

CBT prepared its June 4, 1996 APPLE CORRIDOR plan to breath new life into the long-stalled LIRR East Side Access plan. CBT proposed a "streamlined" plan that would greatly simplify the proposal, substantially reducing its cost and cutting the time needed to build it. The plan also calls for a one-seat ride express train service to Kennedy Airport from Grand Central Terminal. By combining both features into its plan, CBT hoped to broaden the constituency to finally achieve this much needed project. A copy of that plan is attached for inclusion in the record as part of this submittal. 1

CBT is disappointed that the LIRR has not embraced this plan, even though it would save MTA an estimated two billion dollars in capital cost and would lead to completion of this important project in roughly half the time. CBT has repeatedly requested that the LIRR conduct a targeted analysis of several key issues where there is disagreement. (Copies of these requests, and other related correspondence, are attached to this submittal for inclusion in the record.) Rather than conduct the requested analysis or to even describe it in some detail in the DEIS, the LIRR has chosen to repeat its original objections to the CBT plan, in Appendix A of its DEIS. In the interest of providing full public disclosure of these areas of disagreement, we are offering the following additional comments for the record:

CBT Plan has only modest, if any, impacts on Metro-North Operations

CBT strongly disagrees with the LIRR assessment of the relative negative impacts of the CBT plan, compared with its own plan, on Metro-North operations. It is CBT's position that neither plan will have significant adverse impacts on Metro-North, and in many ways either plan will be beneficial to Metro-North. Because the CBT plan is less costly, and can be completed more quickly these benefits will be realized sooner. A direct, high speed one-seat rail service from Kennedy Airport to Grand Central will be an attractive plus for Metro-North, generating new riders and new revenues. Airport service opens the opportunity for leasing space to airlines for ticketing and baggage handling at Grand Central Terminal, producing an important new revenue source. Bringing LIRR service to Grand Central will facilitate interchange of passengers between the two railroads, increasing ridership and revenue. Adding LIRR passengers will increase lease revenues from existing retail operations within the terminal.

The CBT plan calls for using the five westernmost upper level platform tracks (tracks 38-42) and the upper level loop track for LIRR 63rd St. tunnel service. This plan will eliminate access to fourteen relatively short storage tracks located directly beneath the Waldorf-Astoria Hotel. Removal of these tracks would be a economic windfall to Metro-North, releasing over 160,000 square feet of useable underground floor space, which could be sold to the hotel for expansion of its exposition and banquet facilities or other related commercial use. Trains stored in the Waldorf Yard can be relocated to other areas in the terminal. This will occur temporarily in the near term, in any event, since Metro-North plans to rehabilitate the upper level loop, the only practical access route to the yard. (2)

Similar, relatively modest negative impacts to Metro-North operations will occur if either LIRR plan is implemented. Both LIRR plans call for removal of four lower level platform tracks, 10 storage tracks in the lower level Madison Yard and both lower level loop tracks. The LIRR Option 1 plan would replace them with 10 new tracks and five platforms for the LIRR. LIRR's Option 2 plan would replace the same Metro-North trackage with a new concourse to access a deep-level ten track station.

The New York Central Railroad built Grand Central Terminal during the heyday of long distance rail passenger service. It remains by far the largest passenger station in the U.S., built to accommodate trains carrying coach and sleeping car passengers, baggage, mail and express. It is now used entirely for commuter rail service. Currently Metro-North schedules 49 trains during the morning peak hour into the terminal, spread out over 46 platform tracks. Each platform accommodates an average of one arriving train every 56.3 minutes. This an extraordinarily inefficient use of space. In contrast, Penn Station's nine platform tracks normally assigned to the LIRR handle 37 inbound morning peak hour trains, or one train arriving every 14.6 minutes. If Metro-North were to give up the 5 platform tracks at Grand Central called for in the CBT plan it would still have a very comfortable average of 50.2 minutes per arriving peak hour train per track, over three times as much space as the LIRR has for operations at Penn Station.

Opportunities for accommodating the loss of train storage space at Grand Central would be similar for the CBT and LIRR plans. The LIRR proposes replacing this lost space with a new yard at High Bridge along the Harlem River waterfront in the Bronx. As an alternative CBT

suggests increasing reverse peak service to benefit the growing number of city residents who work in the suburbs. Either strategy would be possible regardless of which track plan is selected at Grand Central.

Two planning studies now underway -- the Access to the Region's Core (ARC) study, jointly sponsored by the MTA, NJ Transit and the Port Authority of NY and NJ, and MTA's Lower Manhattan Access Study -- envision substantial changes in Metro-North operations at Grand Central Terminal. Links to Penn Station and/or to Wall Street would transform Grand Central into a "through" terminal, greatly reducing dwell time and train storage requirements at the station. By locating LIRR trains on the upper level, CBT's plan would permit extension of Metro-North Lower Level tracks south and west for the connections envisioned in the MTA studies. LIRR Option 1 forecloses, or least greatly complicates, this long-proposed connection. (2)

In 1968, early in its program development, MTA backed away from its original plan to construct a new East Side Terminal in a costly and disruptive underground terminal beneath Third Avenue. In response to strong community opposition, MTA agreed to consider an alternative that would use the abundant track capacity at Grand Central Terminal. Now, the LIRR, in its Option 2 plan, proposes to mine deep beneath this 46 track terminal, apparently to avoid even a modest change in Metro-North operations. MTA will impose a substantial financial burden on Metro-North riders, as well as on city and L.I. riders, through its issuance of system-wide fare-backed bonds to pay for its inability to get its two commuter rail subsidiaries to cooperate on a plan that would utilize existing track capacity at Grand Central.

The CBT plan provides equivalent capacity for LIRR operations at Grand Central

CBT's plan and the LIRR plan both make use of the 63rd St. tunnel lower deck for access to Manhattan's East Side. Both plans envision bi-directional use of this two track tunnel, with one track inbound to Manhattan and one track outbound to Queens. **This is the primary capacity constraint for either plan.** CBT's plan calls for fanning out the single inbound tunnel track into five existing platform tracks. These five tracks then merge back into a single track for trains to circle the loop and return to Long Island. In effect "parallel moves" are the key feature of the CBT plan since an arriving train can approach the terminal while a departing train exits. Crossovers between the two 63rd St. tunnel tracks can be installed to facilitate late night track maintenance but would be of little use during normal hours. (3)

Train operation proposed by CBT for Grand Central would be functionally identical to existing PATH train operations at the World Trade Center Terminal, where a single inbound track feeds a five track terminal and leads to a single outbound track. Figure 9 of the APPLE CORRIDOR paper shows track diagrams for these two terminals at the same scale. The PATH terminal, and its functionally similar predecessor -- the Hudson Tubes terminal, have operated successfully for over ninety years. PATH trains operate at ninety second intervals during peak periods.

The five-to-one ratio of platform tracks to mainline tracks at the PATH terminal, and as proposed by CBT for LIRR operation into Grand Central, is slightly more generous that the current nine-to-

two ratio of platform tracks to approach tracks for the LIRR at Penn Station. This operating practice has provided satisfactory LIRR service at Penn Station for the past 90 years.

There is no question that scarce commuter rail track capacity in the tunnels leading to the Manhattan business district should be intensively used. A CBT goal is to have typical rush hour train capacities reach 30 trains per hour per track on lines where multiple berths are available at central terminals. NJ Transit expects that its new high capacity signal system, to be installed on its Hudson River tunnels to Penn Station, will permit reliable scheduled operation of 29 trains per hour, virtually reaching the CBT goal. Many transit advocates argue that with even more advanced signaling systems, and improved rolling stock, considerably higher capacities are attainable. The CBT APPLE CORRIDOR plan proposes that 30 trains per hour be operated through the 63rd St. lower deck tunnels, with 24 trains allocated to the LIRR and six for direct Kennedy Airport service.

The CBT plan calls for operating trains around the 333 foot radius upper level loop track at 15 mph. Transportation consultant Herb Landow, in his November 1999 report on the loop tracks, points out that the New York Central's original speed limit was 12 mph, when the tracks were first placed in service in 1914. The LIRR argues that trains cannot negotiate the loop at speeds above the current 6 mph speed restriction and that this limits capacity of the CBT plan to 18 trains per hour. Landow argues, in his report, that the lower speed limit was imposed in the declining years of the New York Central, when maintenance expenses were sharply curtailed and tracks were allowed to deteriorate. As mentioned earlier, Metro-North plans to rehabilitate the upper level loop track. (3)

CBT has called for instrumented tests to determine safe, practical speeds on the loop, LIRR has declined to make these tests. (CBT members have informally observed Metro-North trains traveling at speeds as high as 12 mph on the loop.) The cost of tests would be small compared to the potential two billion dollar capital cost savings of the CBT plan.

The impact of speed on capacity is also subject to debate. A 12 car, 1020 foot train moving at 12 mph will take 58 seconds to move one train length. At 120 second headways this leaves ample time for a following train. Even at speeds of 8 or 9 mph, two minute headways would be possible. Track speeds at the north end of the terminal are also a concern, where trains must traverse tight radius switches to reach the five platform tracks. The LIRR has chosen not to conduct a computer train simulation analysis of the CBT plan and cannot substantiate the negative claims made in its DEIS.

The LIRR has also questioned the practicality of operating its evening outbound rush hour service on four platform tracks (with a fifth track reserved for airport trains) at Grand Central. (LIRR did not challenge the suitability of this track arrangement for morning peak hour service.) CBT envisions a gradual transformation of the region's commuter rail lines into "regional rail" lines modeled after those operating in Europe and Japan. Instead of random, occasional service to each of LIRR's nine branches, the CBT plan expects the LIRR to operate frequent, fixed interval service from Grand Central to its three to five busiest branches. Passengers destined for diesel branches would have to transfer at Jamaica in any event since recently purchased LIRR bi-level cars and dual mode locomotives cannot fit limited 63rd St. tunnel dimensions. The vast majority

of commuters to or from Grand Central, on electrified lines, would not have to change trains at Jamaica in the CBT plan.

The CBT plan calls for the LIRR to use four upper level tracks (tracks 39-42) with two platforms fed by ramps from the south and stairways from the north. The ramps are a popular feature at Grand Central Terminal and offer ample capacity for access to the platforms. Though platforms are narrower than at Penn Station, there are no columns to obstruct passenger flow. At the north end improved access is possible by constructing escalators leading directly up into the lobby of 383 Madison Avenue, now under construction (see attached October 6, 1998 letter). With excellent access at both ends of the platforms, CBT does not see the need for additional cross-passageways or access systems in its plan. Presumably, existing Metro-North operations on these tracks already meet current access and egress fire code requirements, although if this is not the case then changes must be made in any event. LIRR passengers will find it far easier and quicker to reach their trains on the upper level platforms, the key feature of the CBT plan, than using long escalators to reach trains in the deep level terminal proposed in LIRR Option 2. (3)

The fifth upper level track in the CBT plan is served by a single side platform. This would be ideal for the discrete Kennedy Airport service envisioned in the CBT plan. Air travelers, encumbered with luggage and new to the city, would avoid mixing with fast-paced LIRR commuters under normal circumstances. Flexibility would remain if service irregularities required a change in track assignment.

CBT proposes that only two single track tunnels be built to connect the 63rd St. tunnels to LIRR trackage in Queens, rather than three, proposed by the current LIRR plan, and four in the earlier plan. In the CBT plan each tunnel portal track would be located between the local and express tracks heading to or from Jamaica. While not shown in the CBT plan's original schematic, additional crossovers could be installed at Harold Interlocking to permit direct train operation from the 63rd St. tunnel to the Port Washington Branch. The CBT layout does not preclude three-and-one operation on the mainline to Jamaica, if that were desirable.

CBT's plan for midday storage of rail cars

Most subway lines in NYC lay up cars in midday in the same yards used for overnight storage and repair. The LIRR proposes, instead, building two separate berths for each railcar, one at the eastern end where trains originate in the morning, and one near the western terminal for daytime storage. CBT has questioned the wisdom of this capital-intensive solution, particularly in light of the shortfall in capital funds to complete other segments of the plan and the need to fund these investments through fare-based revenue bonds. Also, CBT would like to see a major increase in reverse peak service to increase opportunities for NYC residents to reach job opportunities in the suburbs and improved off-peak service to attract discretionary riders. These service improvements would result in the need for relatively few non-revenue runs for midday storage at overnight storage yards in Nassau and Suffolk Counties. (4)

The trade-off between building midday storage near the city center and returning cars to their origin yards in the suburbs is largely economic. The extra labor cost, and the incremental power and maintenance cost, attributed to returning cars to the suburbs for midday storage can be

compared with the substantial capital cost for constructing duplicate facilities and the higher maintenance cost for keeping these facilities in a good state of repair. Midday storage at Yard A in Sunnyside is especially costly because it requires two extra tunnel links to the 63rd St. tunnel and because it takes up valuable land in Queens that could be used for other economic purposes.

Other, less costly opportunities for midday storage exist. East of Woodside the LIRR mainline includes two unused trackbeds extending eastward nearly three miles to Forest Hills. Mainline storage is often deployed on the NYC subway system where yard capacity is inadequate. This remains an unexplored opportunity for some LIRR midday car storage

The LIRR has not undertaken a "value engineering" trade-off concerning its midday car storage proposal, as requested by CBT. Instead it has selected a capital-intensive solution requiring MTA to issue more fare-backed revenue bonds, increasing the need to raise fares for NYC bus and subway riders and Metro-North commuters, as well as for LIRR riders. Since over 60% of LIRR commuters are from Nassau County, which has one of the nation's highest per capita incomes, shifting the cost burden to other less well off constituencies is clearly unfair.

(4)

More productive use of existing Penn Station tunnels can be accomplished in the near term

It makes sense to use existing facilities more productively even as major investments are considered. The LIRR transportation systems management (TSM) plan falls far short of using existing facilities effectively. If NJ Transit can plan a new high-density signal system increasing track capacity to nearly 30 trains per hour, the LIRR can do so as well. Even the Empire State Development Corp. (ESDC) expects LIRR to improve peak hour capacity. To make more effective use of its Farley Post Office addition to Penn Station, ESDC issued a Request for Expressions of Interest (RFEI) from prospective suppliers of a new one-seat ride express train service from Kennedy Airport to Penn Station. At NYU's Conference on the Future of Aviation held on June 20, 2000, American Airlines executive William Hood confirmed that four such proposals had been received by ESDC. No mention of the ESDC initiative is made in the DEIS.

(5)

Capacity would be increased even more by "through operation" of trains from New Jersey to Long Island. As evidenced in public meetings of the ARC study, the LIRR has steadfastly refused to even analyze this concept and no mention of it is made in the DEIS. This is a serious omission. If through operation, and an advanced signal system, could boost capacity to 30 trains per hour per tunnel, 60 morning trains could be operated from Long Island to Penn Station. Almost all of this capacity could be available for regional rail service. Even if Amtrak operated hourly three-hour Acela Express service from Boston to New York, an early train departing Boston at 6am would only reach Penn Station at the very close of the busiest commuter hour. High capacity operation at Penn Station would allow the LIRR to reduce its very high New York City commuter fares, which keep riders from Southeastern Queens -- a community of color -- from using its trains. Some of this higher capacity through the East River tunnels could be used for a new regional rail service from points on the New Haven Line, serving Co-op City, East Tremont and Hunt's Point communities in the Bronx via the Hell Gate Bridge.

Several other TSM issues could also be considered. The Sunnyside Station could be built in the short term rather than awaiting completion of the LIRR access to Grand Central. By operating all

of its diesel service, with dual-powered locomotives, directly to Penn Station, the LIRR could close its waterfront terminal at Long Island City, allowing a more appropriate use to be developed on this valuable site. By using the Sunnyside Station as an en route stop for Penn Station trains, and not terminating trains at Long Island City or Hunters Point the LIRR could greatly simplify its track layout at Harold Interlocking. This would also simplify track diversion requirements during construction of the tunnel connections at this location, substantially reducing cost.

Another overlooked TSM opportunity is improving existing subway connections at Penn Station. With the completion of the local-express connection to Queens Blvd. Subway line next year, it will be possible to double the number of subway trains passing Penn Station on the E route. This will reduce overcrowding on subway trains carrying LIRR commuters heading to or from the 53rd St. and Fifth Avenue or Lexington Avenue stations. Another short term opportunity would be to restore the Gimbel's passageway under 33rd St which links Penn Station with the eight track subway station at Herald Square. Diverting passengers to this station will ease the burden on the 7th and 8th Avenue subway stations at Penn Station. (5)

Many residents of Manhattan's upper East Side have raised serious concerns about additional overcrowding of the Lexington Avenue subway resulting from LIRR access to Grand Central. MTA's Lower Manhattan Access Study explored a number of short term mitigation measures to resolve this problem. One proposal called for encouraging subway passengers from the Bronx to shift to the Concourse line from the Lexington express by providing a second 6th Avenue express service, running locally in the Bronx and express on the Central Park West subway line in Manhattan. Another proposal suggested creating the equivalent of a new north-south subway along Sixth Avenue in the Manhattan business district by using existing track connections at West 4th Street. By outfitting two of the four trackbeds of the Times Square-Grand Central shuttle with moving walkways linking Grand Central with the Sixth Avenue subway station at 42nd Street, a new downtown route could be established from Grand Central to Lower Manhattan. This would shift some of the commuter rail load off of the Lexington Express. These proposals are not discussed in the LIRR DEIS, suggesting that MTA is not effectively coordinating these related studies.

CBT's estimate of cost savings

The CBT plan focused on reducing construction cost of the LIRR Grand Central connection. As shown in the DEIS, the LIRR estimates this cost, for Option 2 at $3,296 million (dollars escalated to year of midpoint of construction). In June 1996 CBT estimated that its "streamlined" plan would cost $739 million (midpoint of construction, mid-year 1999) reducing construction cost by two-thirds. This estimate was based on cost shown, by segment, in the 1992 STV report. Allowing for inflation at perhaps four percent per year, and assuming a new midpoint of construction of midyear 2003, CBT's cost estimate would become $865 million. This is barely a quarter of the cost of the LIRR plan. (1)

LIRR consultants have not made their own independent estimate of the cost of the CBT plan despite requests from CBT. Instead they have assumed the amount estimated by CBT to be correct and have added what they claim are necessary items that should be included. CBT strongly disagrees with these claims for the reasons dsicussed in this DEIS submittal..

In its statement at the June 15, 2000 DEIS hearing, CBT pointed out that its rough estimate of excavation requirements in Manhattan, for its "streamlined" plan, were only 18% of those required for the LIRR Option 2 plan. Since the CBT uses existing track, platforms and access systems already in place on the upper level of Grand Central, no significant costs are needed for these elements. The LIRR Option 2 plan requires outfitting its excavated tunnels with escalators, ventilation systems and other station requirements. At the Queens end CBT's plan, which envisions only two connecting tracks, requires only 40% of the tunneling needed for the LIRR plan, which includes five tracks. In the earlier LIRR plan six tracks were specified. Besides avoiding the cost of a new midday storage yard at Sunnyside, discussed earlier, CBT sees no need to extend the bellmouth of the 63rd St. subway tunnel under Northern Blvd. With the Queens Blvd. local-express subway connection nearly complete, new options for providing eastward extension of express regional transit can be considered. In it APPLE CORRIDOR plan CBT suggested linking the 60th St. tunnel to LIRR trackage at Sunnyside. Committing a substantial amount of funds for a 63rd St. subway extension under Northern Blvd. when no specific plan is in place, and when other viable options exist, is unwise. MTA should move quickly to consider a range of alternate plans before making a decision to proceed on the 63rd St. subway structure. As part of this planning analysis it should request that the LIRR produce a cost estimate of its connection without the subway structure. (1)

In its DEIS the LIRR estimates that $264 million is needed for right of way acquisition for the LIRR deep level Option 2 plan. Presumably this is largely for acquisition of sub-surface easements. The amount estimated seems excessive considering this is excavation in solid rock with no known mineral or petroleum resources. CBT has not made an estimate of right of way acquisition cost for its plan, but it would be considerably less, perhaps proportional to its reduced excavation requirements -- about 18% of LIRR requirements. MTA should consider requesting new state legislation permitting it to acquire subsurface rights at their true value – in this case essentially zero.

Finally, the LIRR estimates its rolling stock acquisition cost associated with the Grand Central project at $790 million. CBT challenges this claim. If CBT is correct in its argument that an advanced design signaling system can increase peak hour train capacity to 30 trains per hour per tunnel track into Penn Station, then the LIRR can increase service independently of completing its East Side access project. The additional riders attracted to the LIRR due to East Side access is modest, and would be similar for either the CBT or the LIRR plan. In its plan CBT suggested that a modern articulated car modeled after an innovative car design constructed in the 1930s for the BMT subway system be considered. CBT still supports the concept. LIRR's plan to acquire M-7 electric MU cars represents a step backward, at least based on a preliminary design shown in the June 2000 issue of Railway Age. Where the M-1 car represented a real pioneering effort, producing a car that weighed about 90,000 pounds and seated 118 to 120 passengers, the M-7 will weigh over 125,000 pounds and seat as few as 93 persons per car. If this is the case then the MTA should not exercise options for additional cars of this flawed design. In CBT's plan an articulated train, capable of meeting FRA standards, but still able to negotiate the tight geometry of the PA's on-airport rail system at Kennedy, would be the prototype for a new car fleet for regional rail trains. Articulated trains are much safer for passengers to use when walking between cars.

The LIRR bi-levels pulled by dual powered locomotives offer a short term opportunity to greatly increase capacity into Penn Station. Of the 46 locomotives purchased by th LIRR, 23 are dual powered. The other 23 locomotives should be converted to dual-powered use and additional bi-level cars of compatible design should be acquired by NJ Transit. Then a through NJ-LI rail operation could be put into place, substantially improving transit service in the region in the near term. (1)

Kennedy Airport Access is an important component of CBT's APPLE CORRIDOR plan

A key element of the CBT plan is the inclusion of a high quality express train service from Grand Central Terminal to Kennedy Airport. Throughout the MIS/EIS process LIRR planners have insisted that the East Side Access Project is for the exclusive use of LIRR commuters, and that peak hour capacity constraints preclude direct operation of express trains to Kennedy Airport. CBT takes strong exception to both of these points. As CBT has pointed out, MTA began the 63rd Street lower deck tunnel project as a joint use facility -- for LIRR trains and for airport trains. The tunnel does not "belong" to LIRR commuters. MTA expects to raise a significant part of the funds needed to complete this project, the largest in its capital program, through fare-backed bonds, paid by higher fares imposed on subway and bus riders as well as Metro-North and LIRR commuters. In this submittal, and in related efforts, CBT has shown that there is capacity for both groups of users. The DEIS is flawed in not considering this opportunity. (6)

Port Authority planning studies have shown that the East Midtown area, well served by Grand Central Terminal, contains the densest concentration of air travelers in the region. The MTA has undertaken a "One Seat Ride" planning study as part of a 1998 agreement signed by the Mayor, the Governor, the Queens Borough President and the Executive Director of the MTA. The study was to be completed by August 1, 1999. The DEIS fails to mention this study, even though several of the alternatives under consideration include rail service options to Grand Central Terminal using the LIRR improvements that are the focus of this DEIS. MTA insists that study results are to be kept from public view. CBT takes strong exception to this approach to planning improvements in the New York Metropolitan Region.

Thank you for the opportunity to present these comments on behalf of CBT.

Sincerely,

George Haikalis
Transportation Consultant
Committee for Better Transit

enclosures

List of Attachments
submittal by the Committee for Better Transit
"Additional Comments on DEIS for LIRR Access to Grand Central Terminal"
July 12, 2000

Comments at June 15, 2000 Hearing

"Streamlining LIRR Access to Grand Central Terminal", February 4, 1999
(Distributed at several Citizen Advisory Committee meetings)

October 6, 1998 letter to Lois A. Mazzitelli

November 19, 1997 letter to Thomas Prendergast

August 21, 1996 letter to Pamela Burford

July 8, 1996 memorandum from Pamela Burford

June 4, 1996 APPLE CORRIDOR paper

(HAIKALIS)

Committee for Better Transit
P.O. Box 3106
Long Island City, NY 11103

Comments at June 15, 2000 Hearing on DEIS for LIRR Access to Grand Central Terminal

CBT's "streamlined" alternative cuts construction costs by two thirds

CBT strongly supports completion of LIRR access to Grand Central Terminal a project begun over thirty years ago. But we see no need to spend over three billion dollars to complete this project when only one billion will get the job done. CBT proposed a "streamlined" alternative -- The APPLE CORRIDOR -- in June 1996. The CBT plan would make use of five existing Metro North tracks at Grand Central that connect to the upper level loop track. Two new tunnel tracks would link the existing lower deck of the 63rd Street tunnel near 2nd Avenue to the upper level tracks at 52nd Street and Park Avenue a distance of about 4,000 feet. In Queens CBT proposes that two new tunnel tracks be constructed to link with existing LIRR trackage in Sunnyside.

In contrast the LIRR plan is much more ambitious. The original LIRR "preferred plan" would have reconfigured existing Metro North tracks on the lower level creating a new ten track terminal. Five of the tracks would connect to the lower level loop and five would be "stub" tracks, where trains would leave in the same direction that they entered. To increase capacity an underground "flyover" would be constructed north of the terminal just below Metro North trackage. The original LIRR plan required underpinning four large buildings on Park Avenue, including the landmarked Lever House and Racquet Club, and removing and reframing 70 columns in Grand Central Terminal. In Queens the LIRR plan would include six new tunnels: four to LIRR trackage at Sunnyside, and two leading to a new storage yard to be constructed from the largely disused LIRR freight yard adjacent to Amtrak's Sunnyside Yard.

(1)

LIRR offers its own slightly streamlined plan

The DEIS shows that the LIRR has done some "streamlining" of its own plan. In Queens the LIRR proposes to construct only three tunnel connections to LIRR trackage at Sunnyside instead of four. The two tunnels leading to the storage yard remain in the plan. In Manhattan the DEIS describes a new variation of the preferred plan -- "Option 2". In this new plan the LIRR would construct a new ten track stub terminal deep below the existing lower level of Grand Central. The LIRR estimates that Option 2 would cost $225 million less to construct, or some 6.4% of the $3.5 billion construction cost of Option 1.

CBT estimates that its far simpler plan can be constructed for less than one third of the cost of the LIRR Option 2 plan. In Manhattan the CBT plan requires excavating about 90,000 cubic yards of rock. The LIRR plan with its massive new underground terminal calls for excavating nearly half a million cubic yards. The CBT plan uses existing Metro North platforms on the upper level of Grand Central which have convenient ramps at the southern end and recently completed stairways to the North End concourse. The LIRR plan calls for a complex new access system including a new concourse and several escalators to reach each new platform. In Queens

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the CBT plan proposes two tunnel connections instead of LIRR's five and avoids constructing a new storage yard at Sunnyside on valuable land that could be used for economic development. (1)

CBT's streamlined plan has a higher capacity than the LIRR Option 2 plan

CBT's five track terminal connecting to the upper level loop is a high capacity facility. With a generous ten minute average interval between trains on each of the five platform tracks the plan can easily handle 30 trains per hour. The loop will not be a capacity impediment if a 12 mph operating speed, its original design speed, can be maintained. Operators can remain in their cabs and skip the brake test, required when trains change directions, thus improving labor productivity. In contrast the LIRR Option 2 involves a flat interlocking feeding a stub terminal. Capacity will be restricted since conflicting moves will occur and slow speeds are required as trains approach bumper posts Crews must walk the entire length of the train at the end of each run. (3)

CBT's plan can be completed much more quickly

Because of its substantial cost and complexity the LIRR expects to take 11 years to complete its plan. CBT estimates that its plan can be completed in four to five years. With LIRR access completed sooner, a direct one-seat ride to Kennedy Airport could be offered from Grand Central, a key part of the APPLE CORRIDOR plan, avoiding the costly PA shuttle link. (6)

CBT requests that MTA give full consideration to its "streamlined" plan

During the past four years since it produced its plan CBT has pleaded with the LIRR and its consultants to give the plan careful consideration. The LIRR has raised concerns but has not analyzed these concerns, giving the plan only a superficial review. CBT requests that MTA conduct a detailed technical review that deals with the substantive issues. This review should: (1)

1. Perform instrumented tests of commuter cars to determine practical speed on the loop track
2. Use computer simulation to compare performance of CBT's streamlined plan with Option 2
3. Estimate capital cost and implementation time of CBT's streamlined plan
4. Conduct benefit/cost analysis of the midday car storage facility at Sunnyside

CBT has been one of the earliest and most vocal supporters of completing LIRR access to Grand Central. About half of the LIRR passengers now using Penn Station would shift to Grand Central saving an average of 15 minutes per trip. But CBT cannot support giving the LIRR a blank check to build any facility it wants without adequate justification. Even with budget surpluses, funds for improving public transit are limited. By focusing almost all spending for new rail transit projects on a single constituency - commuters from Nassau and Suffolk County – MTA expects residents of New York City and the Hudson Valley to largely foot the bill. A streamlined plan would reduce this inequity. (1)

We plead with MTA and USDOT to give serious consideration to CBT's streamlined plan before completing this environmental review.

-prepared by George Haikalis, transportation consultant for the Committee for Better Transit

(HAIKALIS)

Streamlining LIRR Access to Grand Central Terminal

I. WHY CONNECT THE LIRR TO GRAND CENTRAL TERMINAL AT ALL?
1. Over half of LIRR Penn Station commuters would shift to Grand Central Terminal
   - saving up to 40 minutes per day
2. Only opportunity for one-seat ride from JFK Airport to Grand Central/Penn Station
3. Makes room for Bronx/Westchester/CT service to Penn Station
4. Increases track capacity under East River for more Queens/LI riders

II. WHAT IS "STREAMLINING" AND WHY DO IT?
1. Removes unnecessary project elements
2. Makes project achievable, given diminished clout in Washington for Federal funds
   - reduces $3 billion project cost by two-thirds, saving $2 billion
   - cuts construction time from eleven years to five years

III. WHAT FEATURES OF THE MTA PLAN CAN BE STREAMLINED?
1. Use existing upper level instead of lower level at Grand Central
   - use five western-most existing tracks, instead of building ten new tracks below
   - use passenger access system in place or soon to be completed
2. Don't build new flyunder directly under Metro-North tracks north of 52nd St
   - not needed, since only one track each way in LIRR 63rd St. tunnel
3. Don't build six tunnel tracks at Long Island City
   - construct only one portal in each direction to connect to existing LIRR trackage
4. Omit new yard in Sunnyside
   - return trains midday to existing yards on Long Island

IV. WHAT ARE ADVANTAGES BESIDE SAVINGS IN COST AND TIME TO COMPLETE THE PROJECT?
1. Reduces competition for Federal funds, allowing other projects
2. Avoids disruptive construction along Park Ave., protects Racquet Club/Lever House
3. Allows lower level to eventually be extended south to Penn Station or Wall Street
4. Permits other commercial development at Sunnyside Yard

V. NEXT STEPS -- SPECIFIC REQUESTS TO MTA:
1. Estimate capital cost savings of streamlined plan
2. Conduct instrumented test of commuter cars around upper level loop
3. Use computer simulation to evaluate performance of streamlined plan
4. Explore feasibility of escalators into Bear Stearns lobby and near Vanderbilt Ave.
5. Conduct benefit/cost analysis of midday car storage at Sunnyside

GEORGE HAIKALIS, TRANSPORTATION CONSULTANT, COMMITTEE FOR BETTER TRANSIT (CBT)
ONE WASHINGTON SQUARE VILLAGE, APT. 5D, NEW YORK, NY 10012 FEBRUARY 4, 1999

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October 6, 1998

Lois A. Mazzitelli
Associate, Skidmore, Owings & Merrill
220 E. 42nd St.
New York, NY 10017

Dear Lois:

I am writing to request that your firm assess the feasibility and desirability of a plan to enhance passenger access between Grand Central Terminal (GCT) and the new 383 Madison Avenue building. I am a public member of the Transportation Committee of Manhattan Community Board Five, and also a transportation consultant to the Committee for Better Transit (CBT), a not-for-profit organization concerned with improving public transit in the New York area.

When Metro-North's north end access project is completed in the near future passengers boarding and alighting trains that use the upper level of GCT that wish to head north must walk down one level to the 47th St. cross passageway and then ascend two flights up to street level. Many of these passengers will make use of the new escalators proposed to be constructed in your building linking the passageway to street level.

The lobby of 383 Madison Ave. will be built immediately above platforms T and U serving tracks 39 thru 42 of the upper level of GCT. CBT has proposed that the developer or the MTA build new escalators (or stairs) directly up from these two platforms into the lobby of 383 Madison, as shown in the attached sketch. The advantage to passengers heading to or from trains using these four tracks is obvious -- they would avoid going down in order to go up to street level. Passengers using Metro-North's 25 other upper level tracks would also benefit since there would be fewer passengers using the narrow cross passageway, significantly reducing overcrowding. The advantage to the developer is that this new link will enhance the value of the building and make it easier for building occupants to reach commuter trains.

The benefits of this new access link will increase in the future when LIRR access to GCT is completed. MTA plans to connect the existing 63rd St. lower deck tunnel to lower level trackage at GCT. Many LIRR passengers will then compete with Metro-North passengers for the limited capacity of the 47th St. cross passageway. More exit capacity is a must, and the new platform to lobby link would be a big help.

An alternative plan for LIRR access, described in the APPLE CORRIDOR paper that I prepared for CBT, is to use the upper level loop tracks, instead of the lower level trackage, for LIRR trains. This would put LIRR passengers much closer to the street. The CBT plan calls for using

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tracks 39-42 for LIRR trains and a fifth track, track 38 for Kennedy Airport trains. These five tracks connect with the upper level loop allowing for a high capacity in-and-out operation. In the CBT plan the four LIRR tracks lie just below 383 Madison. If the proposed escalators or stairs were built they would be quite intensively used. The public open space in the lobby would become a miniature "north end head house" for the LIRR. Some provision for ticketing, seating and customer service could be located in this space.

The major advantage of the CBT plan over the MTA is the dramatic cost reduction. CBT's "streamlined" plan, including simplified connections at Long Island City, would save over $2 billion in construction cost. By placing the LIRR in the upper level, MTA preserves the option to extend lower level Metro-North trackage south to Penn Station or Lower Manhattan.

While I realize that you may not be able to fully evaluate this proposal in time for the community board haring on Thursday, I hope you give it serious consideration before it moves further through the review process.

Many transit activists and civic leaders have suggested that more significant changes could be made in the 383 Madison plan. Clearly the redevelopment of this site presents a rare opportunity to make north end access to GCT far more attractive. The current MTA plan simply allows passengers to escape from the platforms to the street. Using the 383 site as the focal point of a new terminal and shopping complex, though hardly rivaling the much celebrated main terminal to the south, would be in keeping with similar transport/commercial development projects being advanced throughout the world. The thousands of relatively well-off commuters that will pass through this building represents a rare commercial opportunity. The ground floor, and perhaps several levels above could serve as an attractive public space for passengers to buy tickets and wait for trains. A multi-level atrium with shops and restaurants would be possible. In order to preserve the needed trading floors in the new building a zoning variance would have been needed to have increased the bulk at this site. Suffice it to say that neither the community nor the city gains in this lost opportunity. At least the proposed platform-to-lobby link will produce a significant benefit.

Hoping to hear from you soon.

Sincerely,

George Haikalis
Public Member, Transportation Committee, Manhattan Community Board Five
Transportation Consultant, Committee for Better Transit

cc Kevin Finnegan, CB 5
Joseph Clift, CB 5
Tim Forker, Manhattan Borough President's Office

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August 21, 1996

Pamela Burford
Director - Special Projects
Long Island Rail Road
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Jamaica, NY 11435

Dear Pam:

Dr. Stephen Dobrow, President of the Committee for Better Transit (CBT), asked me to respond to some of the technical issues about CBT's "APPLE CORRIDOR" paper -- raised by your consultants, in their memo of July 15,1996.* First, CBT would like to thank you for circulating the paper, together with STV's comments, to the Citizens Advisory Committee of the LIRR East Side Access Study. We hope you will circulate this response as well.

* copy attached

CBT's APPLE CORRIDOR calls for the completion of both the LIRR Grand Central link and the rail line to Kennedy Airport as a single integrated project. Many of us "old-timers" will recall that when the MTA advanced its original plan for the lower level of the 63rd St. tunnel it called for the rail tunnel to serve as an access route to Manhattan's East Side for both LIRR trains and direct Kennedy Airport trains. That made sense in 1968 and CBT believes it still makes sense in 1996.

CBT appreciates STV's effort to address some of the technical issues raised in the paper about LIRR East Side Access. However, CBT regrets that neither the LIRR nor the MTA have chosen to deal with the Kennedy to Grand Central aspect of this paper, including service planning and capital investment issues that would impact LIRR operations. For the LIRR to gain the broad public support it needs to advance its East Side Access project, particularly among New York City residents and business interests, planning for this project must deal forthrightly with the Kennedy access issue. This is particularly true now that Governor Pataki has advanced his "Master Links" plan which calls for the physical linking these two efforts. CBT together with other civic and community organizations have consistently pointed this out at Citizen Advisory Committee meetings.

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To deal with STV's comments, CBT has regrouped them into ten major points, and offers the following response to each STV concern:

STV Concern

1. CBT's plan "no longer provides the necessary infrastructure to meet the...needs of the LIRR."

CBT Response

While STV has done a good job of identifying some of the critical issues that affect the feasibility of CBT's plan, the firm is incorrect in making this categorical assertion. STV misses the "value engineering" issue raised in the paper – that the value of more costly design elements should be compared to the benefits gained from these features. The CBT plan was offered as a practical, doable, "streamlined" alternative to make the LIRR East Side Access Project affordable, and thus to achieve the project's benefits to the riding public, the city and the region sooner, while saving taxpayers a considerable sum. The current LIRR plan has been dormant for over twenty years, because it was too costly and unnecessarily ambitious. CBT's plan would achieve most of the benefits of the STV plan, but would cost only $739 million, instead of the $2.177 billion, in July 1999 dollars, (or $2.5 billion if built in 2005 as proposed in STV's 1993 report). This is a substantial difference and it deserves a serious hearing.

STV Concern

2. CBT's plan provides only four platform tracks at GCT to handle LIRR's nine branches.

CBT Response

Providing a frequent, direct service from each of nine LIRR branches to each of three western terminals, as desirable as it might seem, is simply not affordable, nor is it operationally feasible. CBT assumes that there would be direct, high frequency, regular-interval service to GCT from the three or four busiest electrified LIRR branches. This should make a four track terminal workable. Dual-mode locomotives and bi-level commuter cars, serving the four non-electrified branches, are limited by physical constraints in the 63rd St. tunnel, and would operate to Penn Station. Cross-platform transfers at Jamaica will remain a feature of LIRR operations for many years to come. In the first phase of the CBT plan the Port Washington Branch would continue to operate only to Penn Station as a discrete, high frequency, rapid transit-like service. Clearly planning for train service to Grand Central must be part of an overall service planning strategy for the LIRR. CBT would be happy to participate in such a study.

While CBT believes that its five track terminal plan (four for the LIRR and one for airport trains) will be adequate to meet the needs of the LIRR, other possibilities should be explored by STV. One opportunity for increasing platform space on the upper level, without greatly increasing cost, is shown in the attached schematic track diagram, labeled Figure 8a. This option evolved from suggestions made by several members of the Technical Construction Subcommittee of the Citizen's Advisory Committee at an informal meeting held on July 30th, although it does not

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represent an official subcommittee position. Some subcommittee members felt that a second departure track heading north, back to the eastbound 63rd St. tunnel track, in addition to the loop track would improve operational flexibility and provide redundancy. This track would use Metro-North approach track "H" as shown in the diagram. Given the existing track layout in the terminal it becomes possible to use two additional Metro-North upper level platforms -- "Q" and "R" and four tracks -- 34 through 37 -- for LIRR service. This option produces a five track "through" terminal and a four track stub terminal. All track, signals, turnouts and platforms are in place, and functioning, although the third rail would be converted to the overrunning LIRR mode. Approximately 1,000 feet of additional tunnel excavation, shown in the heavy line in Figure 8a would be needed. About half of this excavation would be adjacent to approach track "I" which itself would ramp downward in the original CBT plan. This added track increases total linear feet of tunneling requirements for the LIC and Manhattan connections to the 63rd St. lower level tunnel by about 8%. The incremental cost of this work should not exceed $60 million bringing the total cost of LIRR Grand Central access to $799 million. This is still a bargain compared to STV's $2.177 billion.

STV Concern

3. Using a single track loop track, even at speeds as high as 15mph, severely constrains capacity.

CBT Response

This is clearly not the case. STV has confused running time with capacity. While it is true that operating around the loop increases running time by as much as 100 seconds this in itself does not affect capacity. Operating at 15 mph, a 12-car train takes approximately 50 seconds to pass a given point. With two minute headways that leaves 70 seconds before the arrival of the following train -- more than adequate time to throw a switch and clear a signal. With the option of adding a second departure track, described above, the terminal might have an even greater capacity. There are other issues that affect capacity both for the CBT plan and the STV plan, including the type of signaling system used, the track geometry at the north end of the platforms at Grand Central, and the nature of the merge at LIC. STV has the analytic tools to conduct a comprehensive capacity analysis of all these elements as part of this project.

The 100 seconds of extra running time for trains traversing the loop is an important consideration. One way to minimize this impact would be to reverse operations between the morning and evening peak. Then only a relatively small percentage of LIRR commuters would travel around the loop. With the nine track upper level terminal option, described earlier, operation around the loop could be kept to a minimum. However, another consideration is operating efficiency. Current railroad operating practice is to conduct a brake test when trains reverse direction. A through operation, with trains arriving and continuing in the same direction around the loop, avoids the need for a brake test, improves crew utilization and reduces operating cost. A full range of options should be explored by STV as part of this major investment study.

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STV Concern

4. Narrow platforms hamper boarding and constrain capacity.

CBT Response

The 14 foot wide platforms at Grand Central are indeed a constraint. But this will be a shortcoming for any LIRR access plan. With the completion of Metro-North's North End Access project, adequate vertical capacity will be available to load and unload trains, and to quickly clear platforms. Additional opportunities exist to add direct platform to street stairways, particularly from platforms "T" and "U" where a full block office redevelopment project at 383 Madison Avenue, immediately above these platforms, is planned.

STV Concern

5. Metro-North must give up trackage at Grand Central to allow LIRR access.

CBT Response

This is true of any plan. The original CBT plan takes only five of 29 existing Metro-North platform tracks on the upper level, while leaving the 17 lower level platform tracks largely intact. Even with the option of using four more upper level tracks for LIRR trains Metro-North would be left with a 37 platform tracks at Grand Central, fed by only four mainline tracks in Park Avenue. In addition to platform tracks, several other Metro-North track segments are affected, as STV correctly notes. Metro-North upper level storage tracks 52-65 must be taken out of service in the CBT plan since LIRR trains using the upper level loop, block access to these tracks. But these little used tracks are located directly beneath the Waldorf Astoria Hotel and might well be profitably leased to the hotel for exhibition space or some other productive purpose. CBT's plan may also require the removal of lower level storage tracks 100-102. The STV plan removes much more trackage, all on the lower level.

Metro-North has a great deal to gain from LIRR and airport access to Grand Central. With many LIRR passengers diverted from Penn Station to Grand Central, capacity becomes available for Metro-North Hudson Line and New Haven Line trains to serve Penn Station. Revenue from retail space at Grand Central should rise dramatically, as more high income travelers use the station. Some of this retail space may become very attractive for airline ticket use. Metro-North passenger revenues would also be enhanced as many air travelers from Westchester and Connecticut discover the convenience of high speed connecting trains from Grand Central to Kennedy. Even through train service becomes a future possibility.

Metro-North has been operating its four track Park Avenue viaduct and tunnel as a three track system ("two and one" in the peak direction) for nearly 15 years as its repair work on these aging structures proceeds apace. Once fully restored, the line could be operated as a "two and two" system, allowing more frequent contra-flow trains to better recycle equipment and to improve service levels for reverse commuters. This could lead to major decreases in Metro-North storage

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track requirements at Grand Central. Much of this track space could be converted to more productive retail use. Plans to transform Grand Central to a through terminal and extend Metro-North trains south to Penn Station or Wall Street also could greatly reduce platform and yard requirements.

A regional rail systems planning effort is needed to deal with these issues.

STV Concern

6. The CBT plan may require a grade steeper than three percent, the maximum grade specified by the LIRR, to reach the upper level tracks at Grand Central.

CBT Response

A grade exceeding three percent would only be required if Metro-North's lower level Ladder U was needed for future use. Unless additional platform tracks are developed in the lower level, the loss of this ladder will not significantly affect current Metro-North revenue train operations. As STV pointed out in its 1993 study, current LIRR design standards call for a maximum grade of only two percent grade in a tunnel. With this arbitrary standard there would be no practical way to use the 63rd St. lower level tunnel for LIRR service. The three percent grade was chosen as a reasonable maximum for the East Side Access project. But since a considerable portion of this grade is on a relatively sharp curve, the grade planned by STV is effectively higher than 3%. If more detailed analysis demonstrated a need for a grade of 3.2% or 3.3%, LIRR's current fleet of high performance M1/M3 electric commuter cars could easily sustain this grade. The issue is "qualitative" not "quantitative". STV's train performance models could be used to analyze the impact of various grades on capacity and speed.

STV Concern

7. CBT's plan at Sunnyside precludes 3 and 1 operation on the LIRR mainline East to Jamaica.

CBT Response

The present LIRR operation calls for a number of Long Island City-bound peak hour trains to operate on the mainline, the primary reason for 3 and 1 operation on this four track line. With the completion of the East Side access project the CBT plan proposes that the LIRR Mainline be used only by Manhattan-bound trains – dual mode locomotives hauling bi-level commuter cars to Penn Station, and trains of electric M1/M3 cars to Grand Central or Penn Station. With more than half of LIRR peak hour riders wanting to use Grand Central, according to the Project's latest ridership projections, the 63rd St. tunnels become the capacity constraint. 3 and 1 operation on the mainline is not warranted under these conditions.

(HAIKALIS)

STV Concern

8. The CBT plan makes no provision for midday storage of equipment.

CBT Response

In order to streamline the LIRR Grand Central project, CBT omitted the construction of a new midday storage yard and its costly connecting ramps at Long Island City. CBT believes that providing two storage yards for each piece of equipment may not be cost effective. In addition to the capital cost of constructing the yard the second facility must be operated and maintained. The operating cost savings resulting from the reduced dead head crew time, lower energy cost and diminished wear and tear on low mileage equipment must be substantial to overcome these up-front costs. This is a classic value engineering problem. STV could easily make this calculation, perhaps using the LIRR West Side storage yard as a case study.

STV Concern

9. The CBT plan calls for an at grade junction with the Atlantic Branch at Woodhaven.

CBT Response

Grade separated junctions are certainly to be preferred over at grade junctions. The LIRR operates at least a half dozen such junctions, including very busy ones at Valley Stream, Mineola and Hicksville. CBT's flat junction at Woodhaven would be the mirror image of the junction operated by the LIRR at Woodhaven for many years. As plans for extending the Flatbush Line to Manhattan advance a grade separation can be constructed. At current train volumes, the separation would not be cost effective.

STV Concern

10. Other Issues - Mixed Service and Aluminum Cars

CBT Response

STV questioned the cost and practicality of CBT's proposal for "mixed service". This is clearly indicated in the plan as a second phase. CBT made no cost estimate for its second phase, which includes elements beyond STV's scope of work in any event. STV noted the complexity of labor negotiations and institutional constraints and that is precisely why CBT chose not to advance through running or mixed service at this time. But CBT believes that the attractiveness of routing regional express trains through distributor subways in Manhattan, permitting riders to reach many destinations without changing trains, is great enough to merit a full analysis as part of a second phase of this planning effort. This is clearly an MTA responsibility and should be part of a "Master Links" concept plan.

(HAIKALIS)

The CBT plan also depicted an advanced rapid transit train configuration, tested by the BMT in 1933, that might be suitable for airport service. STV noted that this particular train was constructed of aluminum, a material that the LIRR used without success in the 1930s. STV engineers should note that a similar BMT articulated train, also constructed in 1933, used stainless steel material. Today, the LIRR regularly operates on tracks also used by NJ Transit trains, many of which have consists of Comet cars, built largely of aluminum.

Neither issue is significant in dealing with the merits of the key element of the CBT plan -- saving taxpayers $1.4 billion. This is a significant sum and streamlining the Grand Central Access project may the only way to build support for its completion.

I hope that you will share this critique with all the members of the Citizen Advisory Committee who received the STV comments.

We also wish you a speedy recovery from your accident. As always, we would be happy to meet with you and STV at a mutually convenient time and location to discuss these issues.

Sincerely,

—ga—

George Haikalis
Transportation Consultant

cc Dr. Stephen Dobrow

(HAIKALIS)

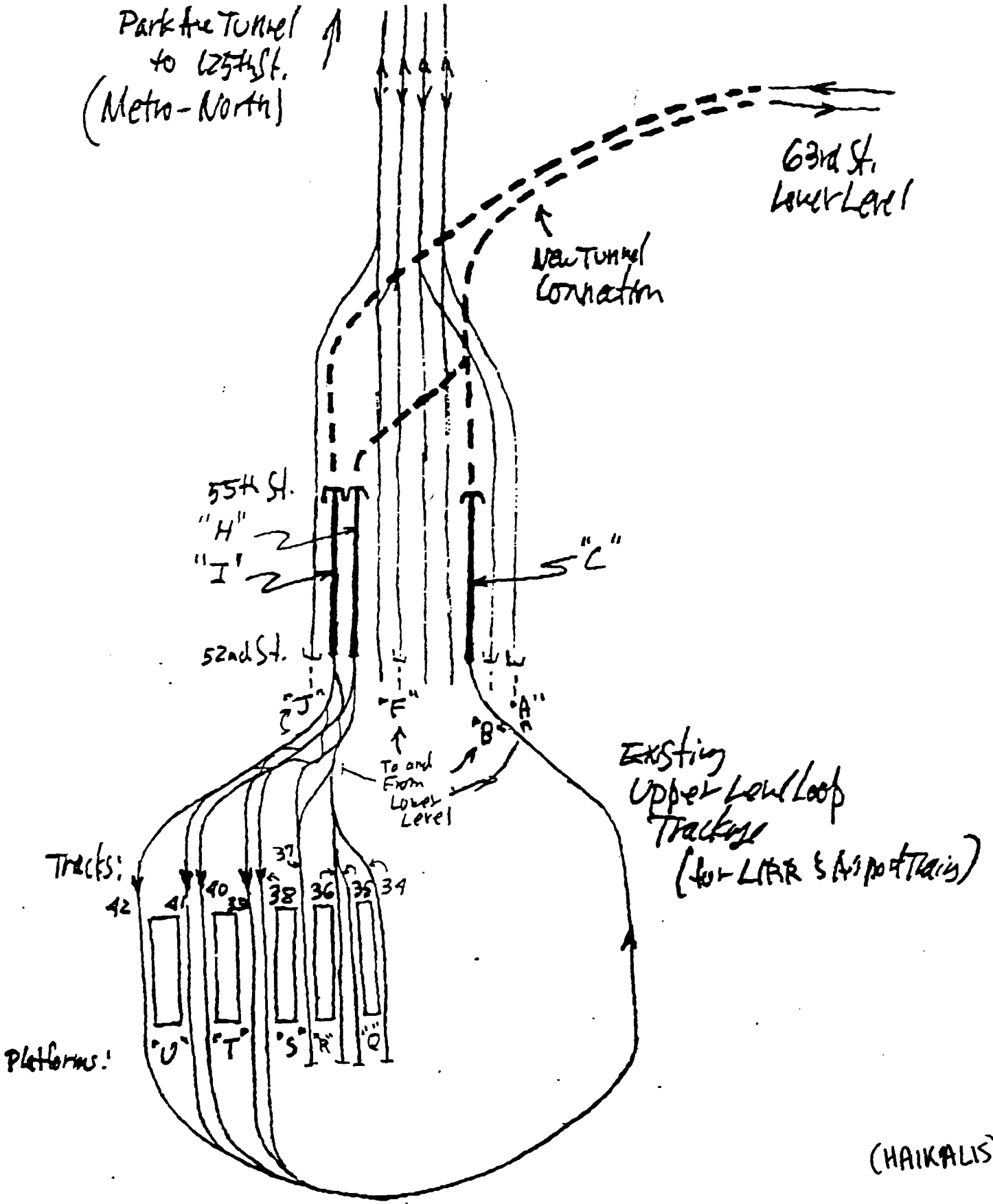

Figure 8a - GCT Track Diagram
Option for Second Departure Track and

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Lola Finkelstein, *Chair* Timothy J. Buzzee, *District Manager*

November 19, 1997

Thomas Prendergast
President
MTA Long Island Railroad
Jamaica Station Building
Jamaica, New York 11435

RE: LIRR East Side Access Project (LIRR Access To Grand Central Terminal)

Dear Mr. Prendergast:

At the regularly scheduled monthly meeting of Community Board #5 on Thursday, November 13, 1997, the Board passed the following resolution by a vote of 28 in favor, 0 opposed, 1 abstention, 1 present but not able to vote.

Whereas, the Long Island Rail Road (LIRR) Access to Manhattan's East Side Major Investment Study (MIS), one of five such studies currently underway by the Metropolitan Transportation Authority and its operating agencies, each costing an average of $5 Million, has produced a single Build Alternative proposal to provide LIRR access to Grand Central Terminal (GCT), which is estimated to cost $3 Billion and take a minimum of 13 years to design and build, and

Whereas, at this price, the project at best would take a very long time to build, while at the same time depriving many other meritorious projects needed funding, and at worst would be only partially built, and

Whereas, the MIS process has not thoroughly and objectively evaluated any less expensive alternative because they failed to meet absolutely 100% of each and every established project goal, such as the Committee for Better Transit Apple Corridor proposal, thereby providing no more affordable alternative to be compared with the Build Alternative in terms of costs and benefits, and

Whereas, completion of this project would provide many important benefits to Midtown Manhattan, including additional train and passenger capacity, significant travel time savings, reduced auto commuting and "one-seat" airport access service from JFK into both GCT and Penn Station, one of the key objectives of the Manhattan Interboard Task Force On Airport Access, on which Manhattan Community Board Five is one of four member boards, therefore, be it

RESOLVED, Manhattan Community Board Five strongly urges the MTA and the Long Island Rail Road (LIRR) to amend the LIRR Access to Manhattan's East Side Major Investment Study process from the single, expensive Build Alternate that provides access to Grand Central Terminal to now include a thorough and objective evaluation of the cost and benefits alternatives that are

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(HAIKALIS)

less expensive and faster to build than the proposed MIS Build Alternative, but fail to meet 100% of all project goals, including, but not limited to the Committee for Better Transit Apple Corridor.

Thank you for your consideration of this matter.

Sincerely,

Lola Finkelstein
Chair

Joseph M Cliff
Co-chair, Transportation Committee

Joseph McCluskey
Co-chair, Transportation Committee

cc: Hon. Daniel P. Moynihan
Hon. Alfonse D'Amato
Hon. Jerrold L. Nadler
Hon Carolyn B Maloney
Hon. Rudolph Giuliani
Hon. Ruth W Messinger
Hon. Thomas Duane
Hon. Andrew Eristoff
Hon. Catherine Abate
Hon. Roy M. Goodman
Hon. Richard Gottfried
Hon. John Ravitz

(HAIKALIS)

STV Incorporated

MEMORANDUM

DATE: July 8, 1996

TO: Pamela Burford
Director Special Projects
Long Island Rail Road

FROM: STV

SUBJECT: **Comments-Apple Corridor Concept for JFK Airport Access with LIRR East Side Access**

The paper entitled "Apple Corridor", which was prepared by George Haikalis for the Committee for Better Transit (CBT), addresses the subject of a proposed high-speed rail link between Kennedy International Airport (JFK) and Grand Central Terminal (GCT). The paper also discusses a number of ancillary issues covering fare strategies, rail transit service to southeast Queens and potential rail transit interconnections to provide through running rail service.

The purpose of this memo is merely to comment on some of the assumptions made with regard to rail operations and on the overall feasibility of proposed changes to the LIRR's GCT East Side Access Plan developed for the "Operational and Physical Feasibility Study of LIRR Access to Manhattan's East Side" April 1993. No comment is offered regarding the ancillary issues or the rail access plan proposed by the Port Authority.

OPERATIONAL ISSUES

The Apple Corridor concept proposes alterations to the planned facilities which are to be constructed for LIRR access to GCT. The alterations are made to reduce the cost of constructing these facilities, but in so doing result in facilities which no longer provide the necessary infrastructure to meet the scheduling and train routing needs of LIRR.

Terminal Station at GCT: The Apple Corridor concept proposes that four tracks and two island platforms (Tracks 39 thru 42 and Platforms T and U) be designated for commuter and suburban rail service and that one track and one platform (Track 38 & Platform S) be provided for JFK trains. These facilities are proposed for the upper level of GCT using the existing platforms and tracks which formerly served as incoming arrival tracks for intercity trains.

The operation of trains through the proposed terminal is via GCT throat Track I to the platforms and thence via the Loop Tracks. This creates a run through operation whereby trains dwell only long enough to discharge and board passengers and then continue back out to Long Island. It is proposed that 30 trains per hour can be operated during the peak hour.

The key assumptions in this scenario are: that four tracks are sufficient to handle LIRR passengers boarding trains in the evening peak period for nine destination branches; that the Loop track speed, which is currently 6mph, can be raised to 15mph; and that Metro-North Railroad

(HAIKALIS)

(MNR) can sustain its operation in GCT without the use of 5 tracks which are currently used by them extensively.

The most critical of the three assumptions, that the single Loop track is capable of 15mph speed, requires further investigation to determine its feasibility. At a minimum an improved signal layout and some degree of superelevation will be required. (The cost estimate contained in Table 2 of the paper includes neither in its scope.) Even if a speed of 15mph can be achieved, however, the single loop track will constrain the terminal capacity by virtue of the fact that the distance travelled by a departing train at 15mph would be approximately 2200ft further than an arriving train.

It should be noted that the maximum authorized speed (MAS) in the throat area of GCT at the present time is 10mph for non diverging routes and 8mph for diverging routes. These speeds are dictated by the civil restrictions imposed by the placement of structural columns. The Apple Corridor concept routes LIRR trains via throat Track I but does not address the issue of operating speed except on the Loop track. It is doubtful that 30 trains per hour can be operated with the speed limitations in the terminal and around the Loop.

The width of Platforms S,T and U are 14ft in each case. While this width is sufficient for the original purpose of intercity train arrivals, it is not sufficient for peak period commuter trains operating on three minute headways and which are being estimated to carry an average of 1200 passengers. This limitation would be most onerous during the evening peak when trains with different routes and stopping patterns are being loaded. The present operation by MNR does not involve the number of train movements conceived by LIRR for east side access and airport access.

Discussions with Metro-North during the development of the East Side Access Feasibility Study concluded with the understanding that expected passenger growth by MNR will require all of the available platform space for peak period operations. In fact, MNR was skeptical that the Madison Yard storage tracks could be made available on the lower level to accommodate LIRR service. It is doubtful that their position will change on this issue.

HAROLD Interlocking: The Apple Corridor proposal shows a simplified layout of HAROLD Interlocking. Specifically, it shows two tunnel connections and a much simplified track layout. While the intent of reducing the tunnel connections from six to two is quite clear (to reduce costs), it is not clear if the track simplification is meant to be taken literally or is merely a device to avoid unnecessary clutter to the sketch. In either case, the lack of crossover switches does not provide the necessary routing to sustain the "3 and 1" Main Line operation between HAROLD and Jamaica. This operating technique is a vital adjunct to today's operation and will become more valuable in the future when LIRR service to GCT is inaugurated. Needless to say, the elimination of the Port Washington Branch from access to GCT must be considered in view of the position of Queens and Nassau County customers regarding access to the East Side of Manhattan.

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Main Line: The previously noted 3 and 1 operation of the main line tracks between Harold and Jamaica provides limited capacity for reverse peak revenue trains and non revenue equipment trains. The introduction of revenue service to JFK will further limit the single track capacity that is available for reverse peak trains.

Train Storage: There is no mention in the Apple Corridor proposal of the disposition of trainsets for off peak storage. (The reference to Hillside Maintenance Facility considers only maintenance and repair activities; the issue of storage is not addressed.) The Feasibility study determined that there is insufficient track capacity to route all trains, either as revenue or non revenue movements, east of HAROLD at the end of the morning peak. As previously noted, three of the Main Line tracks are assigned to the prevailing direction of traffic, leaving only one track available for reverse peak movements. This results in a significant capacity imbalance. Lacking sufficient space within GCT, the study identified Yard A in LIC as the only viable space for storing as many as 22 trainsets.

Atlantic Branch Connection at Woodhaven: The Apple Corridor proposes that a future connection to the Atlantic Branch at Woodhaven could be placed in the southeast corner of the intersection that is similar to the abandoned connection in the southwest corner. The purpose of the new junction would be to serve LIRR passengers via Jamaica and also riders from Jamaica Center. The proposed connection is a flat junction, with westward trains to JFK crossing over the eastward track from Brooklyn at grade. This would impose a potential for conflict with regular trains, especially during the evening peak period. A connection that plans as many as six trains per hour should be grade separated.

Mixed Service: Service options for the Apple Corridor consider the future possibility of mixing trains from Amtrak and New York City Transit with that of LIRR. Operations of a right of way which involve more than one carrier require compatibility of the traction power, signal/train control and communications systems. It also requires concurrence of the several labor union jurisdictions. While all of these issues are capable of resolution, the cost will be high and should be included in any estimate accompanying a proposal.

Rolling Stock: Access to the unit terminal buildings at JFK will require rolling stock that can accommodate the short radius curves. The use of aluminum as a carbody material, however, is not universally accepted. LIRR has had extensive experience with aluminum dating back to 1932. The material was rejected more recently because of structural damage caused by electrolysis and because of the potential for severe damage from fire.

CIVIL ISSUES

The Apple Corridor concept proposes alterations to the planned facilities developed for the "Operational and Physical Feasibility Study of LIRR Access to Manhattan's East Side" April 1993, which would be constructed for LIRR access from Harold Interlocking (within the Sunnyside Area) to Grand Central Terminal (GCT). Some of these alterations have been

(HAIKALIS)

examined to determine their feasibility and ramification to the overall design concept and adherence to track standards and codes.

Terminal Station at GCT: The Apple Corridor station proposes using tracks and platforms, formally used by AMTRAK, which are currently in revenue service for Metro-North Railroad. Reallocation of this area will require MNR to either consolidate its current and future operations to exclude this area or to relocate the displaced service into the Madison Yard portion of the terminal. Madison Yard, located on the lower level in the west side of the terminal is currently not accessible to the public and is used for non revenue functions such as car - cleaning.

The Apple Corridor concept is centered on the extensive use of the upper level loop track. LIRR use of this track will preclude MNR from using storage tracks 52-65. Access to these storage tracks would require crossing movements in front of frequent outbound LIRR and Apple Corridor service severely reducing capacity.

If the current or future MNR service cannot be supported by the decreased revenue infrastructure, which is currently viewed as very likely, revenue service expansion into the Madison Yard area of the terminal will require infrastructure rehabilitation, including providing platforms and crosspassages for pedestrian access, signage and ADA compliance. These station changes are comparable to those required to support an LIRR East Side Access into the lower level and will be necessary and costly and should then be included within the cost estimate.

The use of the upper level loop track is also constrained by the fact that this track cannot begin descending from the upper level to join with the 63rd Street Tunnel alignment due to the lower level storage tracks (TKS 100-102) which terminate at 52nd Street. The loop track therefore must transition downward one track level within approximately 800 ft. (i.e., between 52nd and 55th Street) to maintain operational flexibility of the lower level lead tracks A & B. These restrictions will both effect the 3% maximum grade and create possible conflicts with the IRT Lexington Avenue Express track subway line structure.

ADA Issues: A legal determination as to the applicability of the ADA requirement will have to be made. If it is determined that ADA applies, due to the size of this major terminal renovation and the reallocation of the function of the existing upper level platforms, existing access to the platforms will have to be reconstructed to achieve compliance and costed within the project estimate (i.e. existing ramps maintain a 8.65% grade for over 80 feet); a major segment of these platforms are not in passenger use, (i.e., the platforms extend beyond the ramps accessing GCT) and these areas may be in need of refurbishment.

GCT Approach: The Apple Corridor alignment is predicated on developing an alignment using a 3% maximum grade that would be able to access the upper level along the existing Track I Right-of-Way. An initial review of the alignment and the terminal has revealed some design issues which reflect negatively on the viability of the scheme.

(HAIKALIS)

STV Incorporated

Memorandum to Pamela Burford July 8, 1996
Subj: Comments-Apple Corridor Concept for JFK Airport Access with LIRR East Side Access

The IRT subway line, which is located within the Lexington Avenue Right-of-Way, prevents the Apple Corridor alignment from being raised further above the East Side Access Feasibility Study elevation. If the alignment proceeds from this critical point at a 3% grade, the alignment will meet (point of vertical intersection) approximately 90 ft. south of the 52nd Street centerline. Although a reconstruction of the upper level Ladder X track is possible, the impacts to the lower level Ladder U (and its access to tracks 116 to 126) may produce a significant reduction to the terminal capacity.

Queens Approach: The Apple Corridor proposal discusses a line station on the LIRR's 63rd Street Tunnel alignment in the vicinity of Northern Boulevard. The inclusion of this station on the alignment would not only have negative impacts on the tunnel capacity but could not be implemented without significantly reconstructing the existing tunnel with concurrent impact to adjacent property owners.

As part of the NYCT's 63rd Street Connector Project the tunnel bellmouth is currently being constructed approximately to the limits of Northern Boulevard. East of this point the alignment must rise at a rate of 3% in order to connect with the existing trackage west of 43rd Street. Station design standards indicate that placing a station on a 3% grade is unacceptable. Any reduction in the grade would elongate the tunnel section eastward, negatively impacting AMTRAKS & NJT's access to Sunnyside Yard via the Loop Tracks which is unacceptable.

Therefore, the only location available for a station would be west of Northern Boulevard requiring a major reconstruction of the existing structure with possible ramifications to the adjacent NYC Transit structure and facilities.

STV/ob

(HAIKALIS)

APPLE CORRIDOR

An Affordable High Speed Rail Link
between
Grand Central Terminal and Kennedy International Airport
incorporating:
LIRR Access to Manhattan's East Side
Kennedy to Jamaica LIRR Link
Convenient Regional Connections
Express Midtown-Rockaways Link

Prepared for

The Committee for Better Transit
PO Box 3106
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718-728-0091

by

George Haikalis
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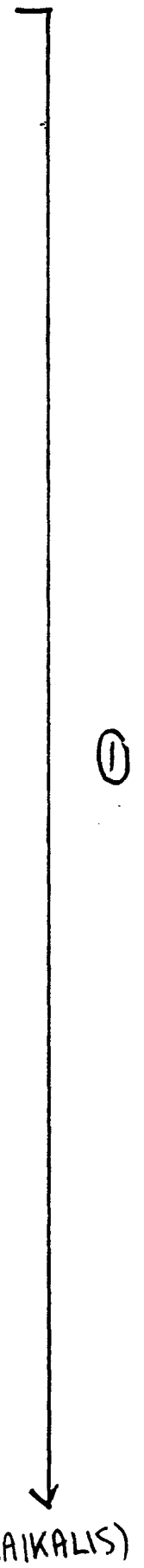
June 4, 1996



I. The APPLE CORRIDOR

Imagine boarding a fast, comfortable airport train at Grand Central Terminal in Manhattan. Twenty-one minutes later the APPLE CORRIDOR train would make the first of six stops in the central terminal area at Kennedy International Airport. A few steps away would be your airline check-in counter. Compare this with the current uncertainty of a forty-five minute to one hour and forty-five minute rush hour taxi trip from Manhattan to the airport, on New York City's legendary, overcrowded highways.

Or imagine walking across the platform at the LIRR Jamaica train station (a familiar routine for LIRR commuters) and boarding an airport train that will take you to your terminal or workplace at Kennedy Airport.

Or imagine reaching Kennedy Airport from any subway or commuter rail station in the New York-New Jersey-Connecticut metropolitan region, with only one or two transfers, and using a single, reasonably-priced regionwide ticket.

Or imagine boarding a Long Island-bound regional express train at Grand Central Terminal only a short walk from the many offices on Manhattan's East Side. Contrast this with the inconvenient and time consuming walk or subway ride to Penn Station or Long Island City to reach LIRR trains.

Or imagine taking a train from the Aqueduct/Ozone Park/South Ozone Park area, or making a cross platform transfer from a Rockaway train, and reaching Midtown Manhattan in fifteen minutes, instead of forty-five minutes on the subway.

Unaffordable dreams? Not at all, with a "value engineering", consensus building and private sector involvement approach to capital investment. This report, prepared for the Committee for Better Transit (CBT), describes a plan for making these dreams a reality. CBT believes that trains could be operating by the turn of the century if the Mayor and the Governor would give their blessings to this plan and if a private firm were engaged to design and build, and perhaps operate and maintain, the APPLE CORRIDOR.

(HAIKALIS)

Some Guidelines:

o To complete the plan as quickly as possible, and at an affordable cost, only simple, basic plan elements would be constructed initially. Additional incremental features would come later if their costs are justified by the added benefits they provide. This is the essence of "value engineering".

o Creative financing would allow the plan to proceed without new revenue sources, other than the existing Passenger Facility Charge -- the three dollar tax levied against each enplaning airline passenger. No additional City or State funds would be required, at the outset, for the basic plan.

o A sense of urgency would be needed to bring about cooperation among key affected public agencies, and business, labor and community interests. The overall goal of the APPLE CORRIDOR -- to link Manhattan's East Side with Kennedy International Airport -- needs to be recognized as crucial to the survival of the City and the Region as the epicenter of global commerce and international cooperation.

The overall plan, shown in Figure 1, would contain the following elements:

o In Manhattan, the lower deck of the 63rd St. tunnel, completed over twenty years ago, would be connected to existing trackage in Grand Central terminal.

o In Long Island City, the lower deck would be connected to existing LIRR trackage heading east to Woodside and Jamaica.

o The disused Rockaway Beach Branch of the LIRR from Rego Park to Aqueduct would be restored for service.

o The on-airport rail line from Aqueduct to Kennedy Airport's Central Terminal Area would be constructed to compatible "regional rail" standards.

o A new track connection would be built at Woodhaven Junction to allow direct Airport to Jamaica trains.

II. Reaching Consensus on a "Preferred Alternative"

CBT proposes the APPLE CORRIDOR as a first phase solution to the intractable airport access problem. With two airports in New York City, and over a thousand miles of standard gage railroad and subway track in place there are countless possible plans for airport access. CBT suggests that a good starting point for an "affordable" access plan would be to keep the plan as simple as possible and to make the maximum use of existing resources. The plan should incorporate state-of-the-art, industry-accepted transit operating practices, rather than current regional transit agency norms. Each affected community and constituency should be invited to participate in the access plan decision-making process early on, before final commitments are made.

Several key issues are discussed in more detail in this report. However, three important general concerns should be addressed at the outset, as part of a consensus building effort:

(1) Why invest substantial sums of money in rail links to the airports?

New York City's two airports are almost totally motor vehicle dependent. Over the past fifty years highway agencies located the region's express highways to serve the airports. The airport operator -- the Port Authority of NY & NJ -- constructed large parking facilities and complex access roads at the airports to facilitate auto access for passengers and employees.

But with the continuing growth of commercial aviation and the increase in auto use throughout the region, this complete dependence on motor vehicular access has resulted in serious traffic congestion problems. Expansion of roadways leading to the airports is virtually impossible, making further addition of on-airport roadways pointless.

Furthermore, this excessive motor vehicle dependence causes many other problems for the region -- unacceptable levels of air and noise pollution, large numbers of injuries and deaths from traffic accidents and enormous amounts of space consumed by the motor vehicle. With less than half of the City's households having cars, and given the transit dependent nature of the extraordinarily dense Manhattan business district, a rail transit alternative to the motor vehicle is clearly needed for access to the airports.

(2) Why focus on Kennedy first?

Kennedy International Airport is far larger in land area than LaGuardia Airport. Kennedy has four runways compared to LGA's two. Kennedy's runways can accommodate the largest aircraft, used on long international and trans-continental flights. LGA's limited footprint contributes to its widely recognized safety problems. Little room is available for maneuvering from runways to gates. In severe winter weather de-icing must be done at the gates, instead of immediately before take-off near the runways. Proposed runway extensions into LI Sound cause difficult environmental problems. Landing patterns in bad weather impose severe noise burdens on neighboring communities.

LGA's limited space also restricts its ability to handle air cargo or provide for aircraft maintenance. These activities can be better located at Kennedy. Not surprisingly, Kennedy is by far the larger workplace location, with 37,400 employees compared to LGA's 9,200.

It is the busier airport as well, with 28.8 million annual passengers compared to 20.7 million for LGA. During the evening peak hour (5pm-6pm) 58 flights, with 9,200 seats are scheduled to depart Kennedy. During this same period LGA handles only 33 flights with 3,700 seats.

LGA's primary advantage is its closeness to Manhattan. Business travelers from cities in the Midwest and south find this attractive. Distances from East Midtown to LGA are 7.5 miles compared 15.5 miles to Kennedy. The trip to Kennedy is over more congested roads as well, leading to far greater travel times.

But Kennedy is NYC's link to the rest of the world. For NYC to remain competitive, it must offer its international visitors a first class link to the center of the city. An important benefit of a high quality rail link to Kennedy is that it will facilitate "hubbing" of flights. Transfer between international and domestic carriers will be enhanced if more domestic flights were offered from Kennedy. Airlines would find it to their economic advantage to shift a significant portion of LGA's flights to Kennedy if CBT's APPLE CORRIDOR plan, with its superior access to Manhattan, were put into operation. In the longer term an LGA access solution will be needed.

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(3) Why is a direct connection to Manhattan so important?

In contrast to most American cities, in NYC office buildings, hotels, theaters and cultural institutions are much more concentrated in the core -- the Manhattan business district. New York maintains its global dominance in the arts, communications and finance because of the compact nature of its central business district. Not surprisingly, a large fraction of air passengers arriving at Kennedy and LGA are traveling to Manhattan.

It is important for NYC to treat its visitors well. Asking travelers to make multiple transfers en route from the airport to their destinations in the city center is not in NYC's long term economic interest. Airport links that require transfers, like Paris' Orly, have not been successful. While direct rail service to multiple destinations throughout the region would be desirable, it would not be affordable. The region's rail system is focused on the region's core, and by linking the airports to major terminals in Manhattan a comprehensive regional airport access system emerges.

III. Key features and future options

A variety of detailed concerns about the APPLE CORRIDOR's key features are identified and addressed in the pages that follow.

(1) Queens routing

CBT's APPLE CORRIDOR routing through Queens is shown in Figure 2. Instead of the Port Authority's elevated guideway over the Van Wyck Expressway from Jamaica to Kennedy, CBT proposes to restore service on the unused Rockaway Beach Branch, from its junction with the LIRR Mainline at Rego Park to Aqueduct Race Track. This line is a precious city-owned asset, complete with structures and embankments, that is almost on a straight line from Grand Central to Kennedy . New track and signaling would be installed. Structures would be rehabilitated where needed and a new bridge, with adequate vertical clearance for intermodal freight trains, would be built over the LIRR Montauk Branch. Parking for the Forest Park Crescent apartments, now temporarily occupying a portion of the right of way, would be relocated nearby.

Restoring service on this line, not used since 1962, will increase noise levels for an estimated 2,000 nearby dwelling units. Residents are justifiably

concerned. Mitigation measures are essential and would include construction of sound barriers and use of new, quieter rolling stock on airport trains. Property owners could also be compensated for the installation of double pane windows and central air conditioning. Careful attention to detail in the community consultation process could result in carving out a host of neighborhood parks from the wide right of way.

At Woodhaven, Junction the APPLE CORRIDOR crosses the Brooklyn Branch of the LIRR which is in a tunnel under Atlantic Avenue. A double track connection would be built in the southeast quadrant of this junction permitting direct trains from Kennedy to the Jamaica LIRR Station and the Jamaica Center business district. This connection would be similar to the existing, but unused, connection in the southwest quadrant. The new connection would require some property acquisition, including relocation of two or three small industrial operations. Provision for eventual restoration of the southwest connection would be made, when plans are completed for extending LIRR service to Lower Manhattan. At the Jamaica LIRR Station airport trains could use the same trackage as LIRR trains permitting a convenient cross-platform transfer. The subway would be only two levels down. Airport trains could be serviced at the recently completed LIRR Hillside Maintenance Shops only a short distance east of the station.

South of Woodhaven Junction the Rockaway Beach Branch widens to four tracks. At Liberty Avenue the subway enters the right of way. The APPLE CORRIDOR plan calls for shifting the subway to the two westernmost track beds, leaving room for the two airport tracks. North of Conduit Blvd., near the Aqueduct Racetrack, a new cross-platform transfer station with the "A" train subway would be constructed, as shown in Figure 3. Brooklyn and Lower Manhattan-bound APPLE CORRIDOR airport passengers would make a convenient transfer to the subway at this location. And Midtown-bound passengers from the Rockaway Beach peninsula could also transfer from the subway to high speed APPLE CORRIDOR trains to Grand Central.

A number of local buses could also be routed past the Aqueduct transfer station. One example of a routing pattern is shown in Figure 4. Airport employees and Manhattan-bound commuters from Ozone Park and South Ozone Park would find this an attractive station. If the Aqueduct Racetrack were redeveloped into a residential community with neighborhood retail space, the station could become the focal point for this development. If designed with careful attention to community concerns, some airport-related

commercial development could be incorporated, adjacent to the Aqueduct Station.

South of the existing four track rail viaduct across the Belt Parkway the two airport tracks would head east into Kennedy Airport. The two subway tracks would continue south to Howard Beach and the Rockaways.

Advantages of CBT's Plan Over the PA Plan

The Port Authority's plan, to construct an elevated rail line in the narrow median of a very busy expressway is costly and disruptive. In order to clear overpasses crossing the mostly below-grade highway the guideway would have to be forty-five feet in the air. The PA proposes constructing the substantial footings needed in the median at late night hours. Failure to clear construction equipment before the morning rush hour could lead to substantial traffic delays, especially inconveniencing airport bound travelers and workers. The aerial guideway, designed for light rail or rapid transit loads, would be visually disruptive to the surrounding community. At Jamaica the PA plan calls for a station two levels above the LIRR tracks. To transfer to the subway at that location five levels must be traversed.

The PA plan could be modified to permit direct service to Manhattan by providing a connecting link just west of the station. This viaduct would permit Kennedy-Manhattan trains to bypass the Jamaica Station and operate directly west onto the LIRR Mainline to Penn Station and Grand Central. This route would be only a half mile longer than the Rockaway Beach Line. For Kennedy to Jamaica shuttle trains the elevated line would be about two miles shorter.

CBT favors the Rockaway alignment for several reasons -- it is far less costly to construct, it offers a fast cutoff to Midtown Manhattan for Rockway and Ozone Park residents as well as airport travelers, and it avoids the potentially disruptive construction required in the highway. These benefits override the obvious negatives -- increased noise for residents living along the disused right of way and some land taking for the Woodhaven Junction connection.

(2) On airport alignment

The on-airport portion of the APPLE CORRIDOR would generally follow existing Port Authority plans, with two key changes. The airport line would

leave the Rockaway Beach right of way just south of Aqueduct Station, bypassing the Howard Beach Station. And only one en route stop, at Federal Circle, would be provided to serve airport employee concentrations and car rental locations. The station planned for employee parking would not be needed with improved public transit access to the airport.

The airport line would continue under the taxiway and circle the Central Terminal Area, stopping at six stations to serve clusters of terminals. The Port Authority plan calls for a double track loop with island platforms. Enough space is available to extend platforms to handle full length, 600 foot subway trains (or equivalent length intercity rail trains). A minimum curve radius of 350 feet could be achieved with some minor alteration of PA plans. Climbing from under the taxiway to over the airport's internal roadways necessitates a short stretch (approximately 700 feet) of six percent grade. While subway cars, and even Amtrak's Empire Corridor TurboLiners, could negotiate this grade the PA should look at less severe gradients in its final design.

As the PA's design is refined it would be important to reconsider the need for a double track loop. A single track could easily handle the projected peak hour loads. Side platform stations would be simpler and allow ramps directly into terminal buildings. A short stretch of double track could be constructed for operational flexibility, particularly if intercity trains are added at a later stage. But the extra reliability from a full double track loop, given the current performance of modern rail transit cars, may not be worth the substantial added cost. One possible layout is shown in Figure 5. This plan incorporates the PA's two track, island platform to be built into the new International Terminal Building, but otherwise uses side platforms, located 200 to 300 feet closer to the other terminal buildings than in the PA plan.

The Port Authority's original airport access plan, challenging conventional wisdom, called for a unique combination of an on-airport circulator and a high speed trunk line carrier merged into a single system. This important feature avoids a transfer at the airport and is retained in CBT's APPLE CORRIDOR plan. This type of train operation is not without precedent. Figure 6 shows Chicago's one hundred year old elevated "Loop", at the same scale, which functions as a distributor for trunk line rapid transit services. For nearly a century Loop trains made ten intermediate stops as they circled the two mile perimeter taking about ten minutes. Intercity trains from Milwaukee used the Loop as well. Recently the Chicago Transit Authority

began operation of direct trains to Midway Airport from the Loop. The six station loop at Kennedy would be less of a challenge, but the key is to keep station dwell times to acceptable levels.

(3) Manhattan routing

The APPLE CORRIDOR serves one station directly in Manhattan -- Grand Central Terminal. This is the largest single destination area for airport passengers and is a convenient transfer point to Metro-North trains for service to Westchester and Connecticut. The terminal is a grand entrance for visitors to NYC. Plans for refurbishing this magnificent terminal are well underway. APPLE CORRIDOR trains will provide more potential customers for the extensive new retail space under construction at the terminal. Three of the city's largest hotels connect directly to the terminal concourse.

But Manhattan is a carpet of destinations and many airport travelers will have to transfer to another mode to reach these locations. Passengers with luggage will probably want to take cabs for short trips. With its many exits, and well organized cab lines, the terminal can comfortably handle the added load of airport travelers. Passengers for Penn Station and points in New Jersey could make a same-platform transfer to other LIRR trains at Woodside, arriving in Penn Station only a few minutes later than at Grand Central. Passengers for Lower Manhattan would transfer, across the platform, to the A train at Aqueduct Station. If sufficient demand develops direct Kennedy-Penn Station and Kennedy-Lower Manhattan trains could be operated.

Another proposal for rail access, made by NYC officials, calls for connecting the "N" Train line which runs through the BMT subway in Manhattan directly to LaGuardia Airport and operating special airporter trains starting at City Hall. CBT supports this proposal, in concept, but as a second phase of the airport access plan. If a direct track connection from the 60th St. tunnel under the East River to LIRR and Amtrak trackage at Sunnyside, called for in the City plan, were constructed APPLE CORRIDOR trains from Kennedy could also use this route.

Direct LIRR rail access to Lower Manhattan has been proposed for many years, and is receiving a new hearing. Proponents have suggested a track connection between the BMT subway at Atlantic Avenue and the LIRR Flatbush Terminal in Brooklyn. Trains to Kennedy could use this link, and a

restored Woodhaven Junction connection mentioned earlier, to reduce running times compared to the A train.

These Manhattan route options are shown in Figure 7 along with estimated evening rush hour running times from stations in Manhattan to the first stop on the loop at Kennedy Airport. APPLE CORRIDOR running time from Grand Central would be 21 minutes. A direct train from Penn Station would take 22 minutes. The "A" train running from Lower Manhattan, with a coordinated cross platform transfer at Aqueduct, would take 39 minutes, and from 42nd St. and 8th Avenue, 52 minutes. In later phases, with the BMT connections in place, Kennedy times would drop to 32 minutes from Lower Manhattan or from Times Square.

CBT believes its APPLE CORRIDOR plan linking Grand Central to Kennedy Airport with fast, frequent rail service is the best starting point for airport access. Additional connections and services can be operated in the future, as a truly coordinated regional rail plan evolves.

(4) Streamlining the LIRR access link to Grand Central

The key feature of the APPLE CORRIDOR is the completion of LIRR access to Grand Central Terminal. To keep costs down, and to maximize traveler convenience, the plan would use the existing upper level loop of Grand Central with its five platform tracks, as shown schematically in Figure 8. Typical operation would be for LIRR trains to use the four westernmost tracks (nos. 39-42) and their two island platforms (designated T and U). Airport trains would use the fifth track (38) and with its own separate platform (S). This would keep airport travelers out of the way of commuters.

The loop trackage in the terminal would be connected to the completed, but unused, lower level tunnels under 63rd St. that were designed and built for LIRR and airport service. This would require the construction of two 3,000 foot long tunnel segments, mined or bored deep in the rock of Manhattan, from 63rd St. and Second Ave. to 52nd St. and Park Ave. A three percent grade, the current design guideline, would allow the two 63rd St. tunnel tracks to connect to Grand Central upper level loop track leads "J" and "C". The five terminal tracks and three platforms would be used, without any significant modification. Underrunning third rail would be replaced with LIRR-style overruning third rail, or alternatively LIRR cars could be equipped

with double-acting third rail shoes. Additional passenger access to the platforms, from the north, is already under construction as part of a Metro-North project.

Currently the LIRR plan, now the subject of detailed planning, calls for a ten track terminal using the Lower Level of the terminal. A three track approach is planned with a "flyunder" just below Metro-North trackage, avoiding conflicts between inbound and outbound moves. The plan requires reframing dozens of columns, excavating the lower level by five feet and underpinning several buildings on Park Avenue including the Lever House. All of these features are extraordinarily costly, and provide little extra value for the dollars invested.

CBT's plan would provide a high capacity loop system that is operationally similar to PATH's World Trade Center terminal. The layouts are shown at the same scale in Figure 9. PATH operates trains at a rate of 40 trains per hour during the busiest peak periods. Curves are much tighter at the Trade Center. The Grand Central loop track has a generous 350 foot radius in comparison to PATH's 115 foot radius. There is no reason why LIRR trains could not operate at 15mph or faster around the loop. The new local-express connection to the Queens Blvd. Subway line now under construction in Long Island City has the same radius curve on its "mainline". A goal of 30 scheduled trains per hour for the loop is not unreasonable.

Connecting to the upper level loop tracks at Grand Central has several other advantages, besides drastically reducing cost. The upper level is closer to the surface, reducing the climb for commuters and airport passengers. At the south end of the terminal the upper level tracks have ramps that lead directly to the concourse and the street. This popular feature of the much heralded terminal will be especially convenient for airport travelers with luggage that is equipped with wheels. Using the upper level keeps open the option of using the lower level for future extension of Metro-North trains south to Penn Station or Wall Street.

(5) Long Island City Alignment

In Long Island City the APPLE CORRIDOR would require construction of two tracks from the end of the existing lower level of the 63rd St. tunnel at Long Island City to existing LIRR trackage at Harold Tower, as shown schematically in Figure 10. Two 3,000 foot long cut and cover tunnels would be

constructed, one for each track, crossing under Amtrak and LIRR freight trackage at Sunnyside Yard. The two tunnel tracks would connect directly into existing track beds of the LIRR Mainline local tracks. Track layout shown also permits connecting to the Mainline express tracks for flexible operation. Under normal operation most APPLE CORRIDOR trains from the 63rd St. lower level tracks would pass through this connection without changing tracks. Using the local tracks is advantageous because at Rego Park, the restored Rockaway Beach line connects directly with these tracks, keeping costs down.

LIRR bi-level cars and dual mode diesel electric/electric locomotives, now being built to serve non-electrified lines in eastern Long Island cannot use the 63rd St. tunnel, and would operate on the two mainline express tracks from Jamaica, continuing to Penn Station using the 32nd St. tunnels (Lines 1 and 2). Amtrak, and eventually Metro-North Hell Gate trains, would also use these tunnels. At Penn Station, in CBT's plan for early implementation of regional rail, most trains using the 32nd St. tunnels would be through-routed with trains using Amtrak's Hudson River tunnels to New Jersey. This would greatly enhance capacity of Penn Station, while opening up new regional travel possibilities.

Plans for a Long Island City/Sunnyside intermodal transfer station are being developed by MTA. One possible layout is shown in the schematic drawing. Amtrak is developing plans for a flyunder in the eastbound direction, and an upgraded bypass track in the westbound direction, eliminating conflicting moves through this location. These Amtrak tracks are shown in the schematic, though in a simpler, less costly layout. The transfer station shown in the drawing anticipates CBT's Penn Station through-routing plan and simplifies the layout. No significant new trackage is needed, other than a few turnouts. Platforms would be constructed adjacent to the eight existing mainline tracks passing under the Queens Blvd. overpass. An interim access system to these platforms from the overpass could be built at relatively modest cost, with a "grand" station constructed later as part of a redevelopment plan. Many of these features are shown approximately to scale in Figure 11.

The two LIRR Port Washington Branch tracks would connect directly to the 33rd St. tunnels (Lines 3 and 4) to Penn Station. This discrete line, with its own tunnels to Penn Station, would be operated more like a rapid transit line, with frequent service and an integrated fare structure. Port

Washington Line passengers bound for Grand Central, or for Kennedy Airport, would change to APPLE CORRIDOR trains at Woodside.

In the longer term the Port Washington line could be routed through the 60th St. tunnel, as part of a comprehensive restructuring of rail and subway lines. This restructuring would include consideration of the City's proposal for rail access to LaGuardia Airport and local developer aspirations to relocate elevated railroad lines out of Queens Plaza. It would also anticipate operation of Rockaway Beach rapid transit trains on the APPLE CORRIDOR, making several additional stops in Queens and connecting to the 60th St. tunnel. The 60th St. tunnel connection could be made just west of the intermodal transfer station, as shown in Figure 11, to facilitate connections and focus development. This effort could include reconfiguring Woodside into a cross platform transfer station. Another option is to make provision for a future "on-line" station on the 63rd St. lower level line from Grand Central, near Northern Blvd., before it begins its climb to the LIRR Mainline at Sunnyside. These possibilities are worth considering, but they need not be put in the critical path of implementing the initial phase of the APPLE CORRIDOR quickly.

The streamlined APPLE CORRIDOR plan at Long Island City contrasts with the costly and elaborate plan currently being considered by the LIRR in its East Side access plan. The LIRR would build six ramps at LIC instead of two. The other four would lead to the Port Washington Line and to storage tracks at Sunnyside Yard. Though desirable, these feature may not be worth the substantial incremental cost.

(6) Schedules

APPLE CORRIDOR trains would operate every ten minutes from Grand Central Terminal to Kennedy Airport for 20 hours per day. Running times are shown in Table 1. Airport trains would take 21 minutes to make the 15.2 mile trip from Grand Central to the first of six stops on the airport loop, with intermediate stops at Woodside, Aqueduct and Federal Circle. This is well within the capability of modern regional rail technology. The entire round trip would take 51 minutes. With a nine minute layover at Grand Central, only six train sets would be needed to maintain the basic service. With one person train operation on-board labor costs are quite modest.

Jamaica-Kennedy trains would also operate on ten minute headways. The 7.7 mile run to the first terminal would take 13 minutes. A complete round trip from Jamaica to the airport and back would take 35 minutes. To assure a convenient cross-platform transfer at Jamaica, in each direction, airport trains would use one of the turnback tracks east of the station. Five train sets would be required.

The on-airport loop service would operate every five minutes, requiring only two sets of equipment. A system total of thirteen train sets plus three spares would be required.

As a future option, Amtrak intercity passenger service could also operate from Penn Station to the airport. Frequent high speed TurboLiner-type trains from Albany, Scranton, Allentown, Harrisburg and Atlantic City would be able to serve both Manhattan and the airport increasing their ridership potential. Rather than construct a separate terminal for intercity trains, at least at the outset, these trains could use the airport loop. Typically an arriving intercity train would circle the loop, making up to six stops, and then proceed to a ground level lay up yard located somewhere between Aqueduct and Federal Circle. A departing train would leave the yard, circle the loop stopping to receive passengers and head for Penn Station. This service only makes sense if Amtrak takes steps to minimize dwell time and improve equipment utilization. This is the key to making these services affordable in any event.

(7) Fares

As a starting point for discussion, fares could be assumed comparable to the LIRR. The airport would fit into Zone 3, the same as Jamaica and Eastern Queens. Manhattan to Airport APPLE CORRIDOR fares would be $3.75 off peak and $5.50 peak. A $117 monthly ticket used at a typical 37 trips per month basis would be $3.16 per one-way ride. The LIRR presently offers a bus/rail combination ticket for weekly or monthly commuters. This adds $0.74 per trip for regular monthly users. This combination might be offered to subway/APPLE CORRIDOR transferring passengers at Aqueduct.

But LIRR fares are far too high to attract many NYC riders given the $1.50 base fare. They will be even less competitive when the MTA eliminates double fares in July 1997. CBT has proposed that affordable unlimited ride passes be offered for time periods of a month, a week, one day or two hours..

These passes would be good for travel on any mode in the city -- rail, subway, bus or ferry. For example, a monthly pass priced at forty times the current $1.50 base fare -- $60 per month -- would be a tremendous boon to ridership, citywide. If honored on LIRR trains as CBT proposes, the LIRR would become a true regional rail service.

MTA has been reluctant to offer passes because of its high estimates of revenue loss from its already frequent users. CBT has challenged these estimates. But some revenue loss can be expected. Operating costs would rise for commuter rail service to meet the much larger demand. The APPLE CORRIDOR opens up new East River capacity by the turn of the century with its streamlined 63rd St. tunnel connection to Grand Central permitting the LIRR the opportunity to serve eastern and southern Queens patrons as well as suburban commuters. At the same time, CBT has called for road pricing strategies that would produce revenues for an affordable, vastly improved transit service. The APPLE CORRIDOR is an integral part of this plan. Road pricing, a innovative parking pricing on the airport, could go a long way toward encouraging airport passengers, visitors and employees "to do the right thing" -- use the APPLE CORRIDOR, instead of driving.

(8) Ridership

Ridership estimates are difficult to make. For this overview a few key assumptions and goals are suggested. Assuming CBT's proposed service and fare levels, one goal would be to attract about three-quarters of the Manhattan-Kennedy market, a large part of which now uses taxis or buses, and about one quarter of the non-Manhattan market, which is primarily auto-based. If the APPLE CORRIDOR is effective in shifting half of current LaGuardia air traffic to Kennedy, because of its vastly improved Manhattan access, a substantial core of ridership can be expected. Using 1993 PA air passenger counts these assumptions produce an APPLE CORRIDOR estimate of 10,200 daily trips from Manhattan and 5,500 daily trips from other origins in the region to Kennedy. In addition, the APPLE CORRIDOR might succeed in attracting about a quarter of the employee trips or about 6,400 trips to the airport. Another 3,000 persons might be attracted to the system as meeters and greeters, accompanying travelers to or from the airport. Not estimated are other airport visitors who might be attracted to the extensive commercial developments planned in new terminal buildings at Kennedy.

The APPLE CORRIDOR provides a fast shortcut for Midtown commuters from the Rockaways, and from the Ozone Park area. If half of the current subway riders from these areas shifted to the new line, about 10,000 more riders to Manhattan could be expected. Even more ridership from these areas could be attracted in the future as travel patterns change, and as development on the Rockaway Peninsula is encouraged by the faster service.

Not including on-airport users, the APPLE CORRIDOR might attract as many as 35,000 passengers each way, or 70,000 total weekday ridership. In addition there would be a shift of as many as half of the LIRR riders from Penn Station to Grand Central with the completion of the 63rd St. lower level tunnel link. Some 50,000 LIRR riders to Penn Station would be attracted to Grand Central. With the new East River capacity, and CBT's proposed regional fare structure riders from Eastern and Southeastern Queens would find the LIRR more attractive than a bus-subway combination. Perhaps another 30,000 of these riders would shift to the LIRR, half of them to Grand Central. Overall, the APPLE CORRIDOR might attract a total of ridership of over 200,000, of which 25% would be airport travelers, making it one of the busiest transit corridors in the U.S..

One concern about attracting large numbers of air passengers to a rail line is the difficulty in handling luggage. With an attractive price, and very frequent service, the APPLE CORRIDOR would be appealing, even to Manhattan travelers who now use taxis or other for hire vehicles. But the possibility of through checked baggage from Grand Central remains difficult because of heightened security due to worries about terrorism. Until this can be overcome, perhaps the best approach is to have extra personnel on hand to help travelers with luggage, with Red Caps at Grand Central and Sky Caps at each of the six on-airport stations. Family and friends would be encouraged to accompany travelers, given the appealing ride and modest fare. For higher income travelers the APPLE CORRIDOR could offer Premium Fare luxury service that would include attendants helping with luggage.

The APPLE CORRIDOR connects directly to the nation's rail network. Amtrak supports a limited mail and express capability at present, and might consider the opportunity to enhance its market share with new links to Kennedy Airport. Intermodal rail freight could also reach the airport on this trackage. No U.S. or overseas railroads exploit rail connections to the airport for freight, at present, although some experimentation is beginning in Germany.

(9) Equipment -- Back to the Future

Acquiring new trains for the APPLE CORRIDOR airport service provides an opportunity to introduce a new concept in train technology. Or more correctly an old one. Arguably the most advanced train equipment ever acquired by the NYC transit system occurred at the depth of the depression, in 1933. Eager to win back new riders from the automobile, rail car manufacturers and railroad and transit operators began to consider new options. The Presidents Conference Committee (PCC), made up of key executives of the then privately-owned transit companies, developed an advanced streetcar design, which eventually became an enormous success. At about the same time rail car builders, like Pullman and the Budd Company, began to produce advanced lightweight "streamliners" for high speed train service. A unique combination of the best of these two technologies was developed by Pullman for the Brooklyn-Manhattan Transit Corp. (BMT).

BMT's new lightweight aluminum train consisted of two identical end units and three intermediate units permanently connected together as an articulated train. Passengers could walk through the train without stepping between cars. As many as nineteen units could be connected to form a single continuous train. Figure 12 shows this train configured in a way that would be useful for APPLE CORRIDOR service. Nine units would form a 298 foot long train, equivalent to a five 60 foot subway cars, or four 85 foot commuter rail cars.

While the BMT cars could serve as a prototype, rail technology has advanced in the last 63 years. Paris, Hong Kong and Copenhagen have new articulated rapid transit trains of advanced design. The MTA's new technology train has many of the propulsion and control features that would be desirable in a new train. The United Aircraft TurboTrain and the PATH car demonstrate that aluminum trains can be both lightweight and strong enough to meet Federal railroad safety standards, which would be specified for the APPLE CORRIDOR. The initial fleet of sixteen prototype trains, capable of eventually running either on the subway or the LIRR, would be a large enough procurement to advance the state of the art, while small enough to allow necessary refinements to take place as the cars are placed in service. They could serve as the precursor to the Transit Authority's plan to purchase 100 new subway cars for the Queens Blvd. Connection.

The interior layout of the original BMT cars is very close to what would be desirable for the APPLE CORRIDOR airport service. The 32 inch wide bi-parting doors lead to a generous holding space which would be convenient for passengers with luggage. Framing this space are three rows of two by two seating at each end. All together a nine-unit train set could seat 320 passengers, while still leaving adequate space for luggage on the floor or in overhead racks.

These trains would be designed to couple together in groups of two to four sets. The APPLE CORRIDOR platforms at Grand Central, originally used by long intercity trains, could handle a four-set, 1,200 foot long train if that were ever needed. In-service coupling of trains en route to form longer units is a way to make more productive use of limited track capacity. While once common in the U.S., few transit properties now use this practice. But it is quite common overseas. Once the initial APPLE CORRIDOR service is established, some experimentation with train coupling could be considered. An obvious candidate would be train service to the Rockaway Pennisula, where the two branches converge and connect with the APPLE CORRIDOR at Aqueduct Station.

IV. Creative Financial and Institutional Arrangements

The entire APPLE CORRIDOR project including the streamlined connection to Grand Central Terminal, the restoration of the Rockaway Beach line, the connection to Jamaica at Woodhaven Junction, the on-airport loop at Kennedy and airporter trains will cost an estimated $1.585 billion if construction could begin in two years. Of this amount, $739 million is for the LIRR East Side Access. This cost estimate is based on the 1993 MTA plan for the LIRR East Side Terminal, factored downward to reflect the vastly simpler, and therefore less costly, project as described in this paper. The basis for this estimate is described in Table 2. Other costs are estimated in a comparable way and summarized in Table 3. These estimates are for full implementation including planning, engineering, construction management etc.

The Port Authority's plan for rail links to Jamaica and Howard Beach is estimated to cost $1.1 billion. The PA will advance this capital funding for the project, and repay it from two sources -- the Passenger Facility Charge (PFC) of $3 collected by the PANYNJ from each enplaning passenger and its

regular capital budget for on-airport improvements. The PFC revenue stream can support about $700 million in capital improvements.

CBT proposes that the APPLE CORRIDOR be constructed, instead of the current PA plan. This plan will cost $485 million more than the PA plan, but will include the LIRR Grand Central access project as well. CBT assumes the PA will continue to contribute its $1.1 billion to this vastly superior plan. The MTA Capital Program, as recently amended, allocates $50 million for the LIRR East Side project. The remaining $435 million could come a variety of resources. Federal "new start" transit funds could be sought. Funds now allocated to highway expansion could be reprogrammed. Alternatively, the PA could advance the money, build the entire project and then be reimbursed by the MTA on a trackage rights basis, once service begins early in the next century. The PA could "buy" a twenty percent share in the completed segment of the 63rd St. lower level tunnel which was built for railroad and airport use. This is about the proportion of peak hour capacity that would be used for airport trains in the APPLE CORRIDOR plan. At current prices, this completed tunnel shell may have a replacement value of close to a billion dollars. The MTA could use this $200 million to reduce its trackage rights fees to an amount that would support the remaining $235 million to complete the project. This sum could easily be funded from expected increased annual revenues to the LIRR once service begins to the East Side.

The APPLE CORRIDOR would be undertaken as a single cooperative, joint use project. The PA and the MTA would reach an agreement and contract with a third part -- a private vendor -- to design and build the various components of the project. It would organized as an "airport" project, with a projected revenue stream from trackage rights agreements, for its no-airport users. In this way the PA could use its resources, and the PFC funding, to finance the construction cost.

Operating costs are another matter. High fares reduce subsidy requirements but also curtail use. One person train operation requires the cooperation of organized labor. Maintenance agreements with the LIRR or the Transit Authority could avoid the capital and operating costs of a new, separate facility just for airport trains. Mentioned earlier in this report was the basic issue of increasing use of LIRR lines in NYC by including them in an integrated, unlimited ride pass fare structure. A coherent citywide strategy of charging motorists for the costs they impose on the city, and using some

of these revenues to make transit more affordable and attractive, is a sensible strategy. Kennedy access is a good case in point. The PA should consider charging motorists who pay nothing for the use of its elaborate and costly roadways, when passengers are dropped off and cars are not parked, and charging employees for parking space.

The Mayor and the Governor have much to gain by endorsing CBT's APPLE CORRIDOR. The Mayor gains an extraordinary airport rail link at no cost to the city, even as most of its investment in construction activity takes place in the city. The Queens Borough President gains a major boost to its largest industry -- aviation -- restoring Kennedy's competitive edge over Newark Airport. And the Governor can accomplish a great deal -- LIRR East Side access and a direct Manhattan-Kennedy and Jamaica-Kennedy rail links -- with no new outlay of state dollars. Doing more with less is always a good idea, but especially in the current political climate.

We invite the Mayor, the Governor and the Borough President to join us on the inaugural run of the APPLE CORRIDOR, on January 1, 2000.

Table 1 - Distance and Estimated Travel Time

Grand Central - Kennedy International Airport

	Miles	Minutes
Grand Central Terminal	0.0	0
Woodside Station	5.0	7
Aqueduct Station	11.8	15
Federal Circle Station	13.3	18
Terminal One Station	15.2	21
Delta Station	15.4	23
International Station	15.7	25
TWA Station	16.1	27
British/United Station	16.2	28
American Station	16.6	30
Federal Circle Station	18.6	33
Aqueduct Station	20.1	36
Woodside Station	26.9	44
Grand Central Terminal	31.7	51

Jamaica (LIRR) Station - Kennedy International Airport

Jamaica (LIRR) Station	0.0	0
Aqueduct Station	4.3	7
Federal Circle Station	5.8	10
Terminal One Station	7.7	13
Delta Station	7.9	15
International Station	8.2	17
TWA Station	8.6	19
British/United Station	8.7	20
American Station	9.1	22
Federal Circle Station	11.1	25
Aqueduct Station	12.6	28
Jamaica (LIRR) Station	16.9	35

(HAIKALIS)

Table 2 - "Affordable" GCT cost estimate
Based on costs published in STV's 1993 Report

Item	original cost millions	estimated %	new cost millions
contracts: (in July 92 $)			
at Grand Central			
C-1	199	0%	0
C-2	96	10%	10
C-3	116	95%	111
line equip./track/signals	102	20%	20
station finish	49	5%	3
GCT Total	563		144
at Long Island City			
C-4	77	95%	73
C-5	319	34%	108
line equip./track/signals	131	34%	45
LIC Total	527		226
Total Contract Cost	1,090		370
Contingencies (20%)	218		74
Total with contingencies	1,308		444
Other Costs*	324		110
Total Cost in July 1992	1,632		554
inflation**	545		185
Grand Total	2,177		739

*includes design 8%, construction management 12%
LIRR supervision & review 4.75% , total "other" 24.75%
** 4.25% compounded annually, assume July 1999 (33.4%)

Note: Contract C-1 is for work south of 52nd St., C-2 is from 52nd to 55th Sts., and C-3 is north and east of 55th St., C-4 if from Northern Blvd. Through Yard A and C-5 is east of Yard A.

(HAIKALIS)

Table 3 - Estimated Capital Costs for APPLE CORRIDOR
(In 1999 $ - including allowance for design, adm., inflation etc.)

Grand Central Terminal Access (See Table 1) 739

Restore Abandoned Rockaway Beach Branch (Rego Park to Aqueduct)
- restore 4.2 miles of double track railroad @ $8 million per mile = $34 million
- replace bridge over Montauk Line = $10 million
- relocate parking spaces at Forest Park Crescent = $2 million
- install sound barrier along 2 miles of route = $2 million
- provide resources for property owners to install double pane windows and central air conditioning to reduce noise - 2,000 housing units @ $5,000 per housing unit = $10 million
- relocate Aqueduct Station and provide for cross platform transfer to subway = $20 million
- subtotal $78 million

Woodhaven Junction
- construct new track connection in southeast quadrant for Kennedy to Jamaica service, including purchase of right of way $100 million

Total off-airport cost $907

Rolling stock - special airporter cars
- 16 9-unit 298 foot long articulated trains sets @ $8 million = $128

Total cost including equipment $1,035

Total cost of PA access plan $1.1 billion, less the following items:
station at Jamaica LIRR, 3 miles of elevated guideway in median of Van Wyck Expressway, Howard Beach and Employee park ride stations, rolling stock, maintenance facility. Savings = $550 million

Net PA cost = $550 million

Total GCT access and airport cost = $1,585 billion

(HAIKALIS)

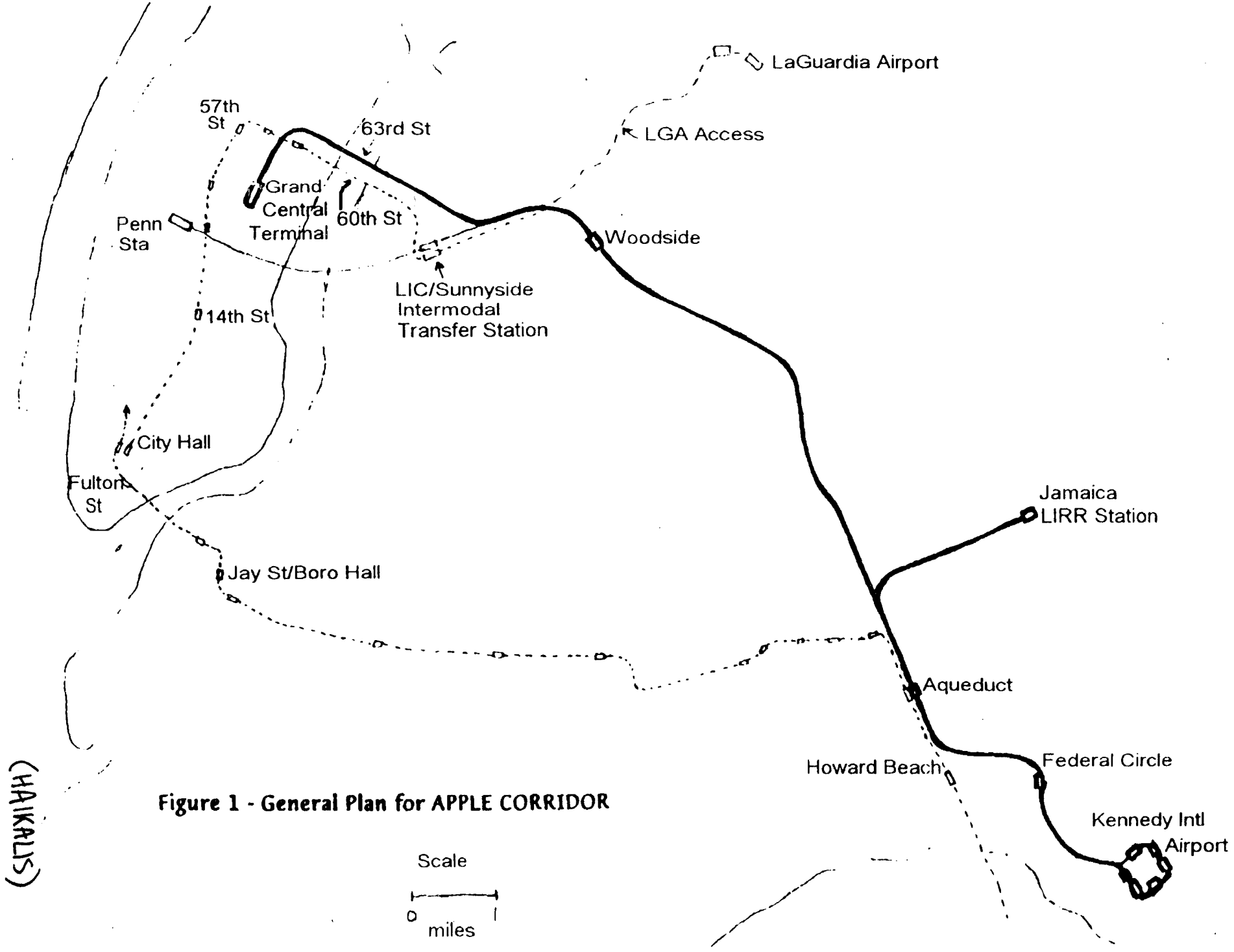


Figure 1 - General Plan for APPLE CORRIDOR

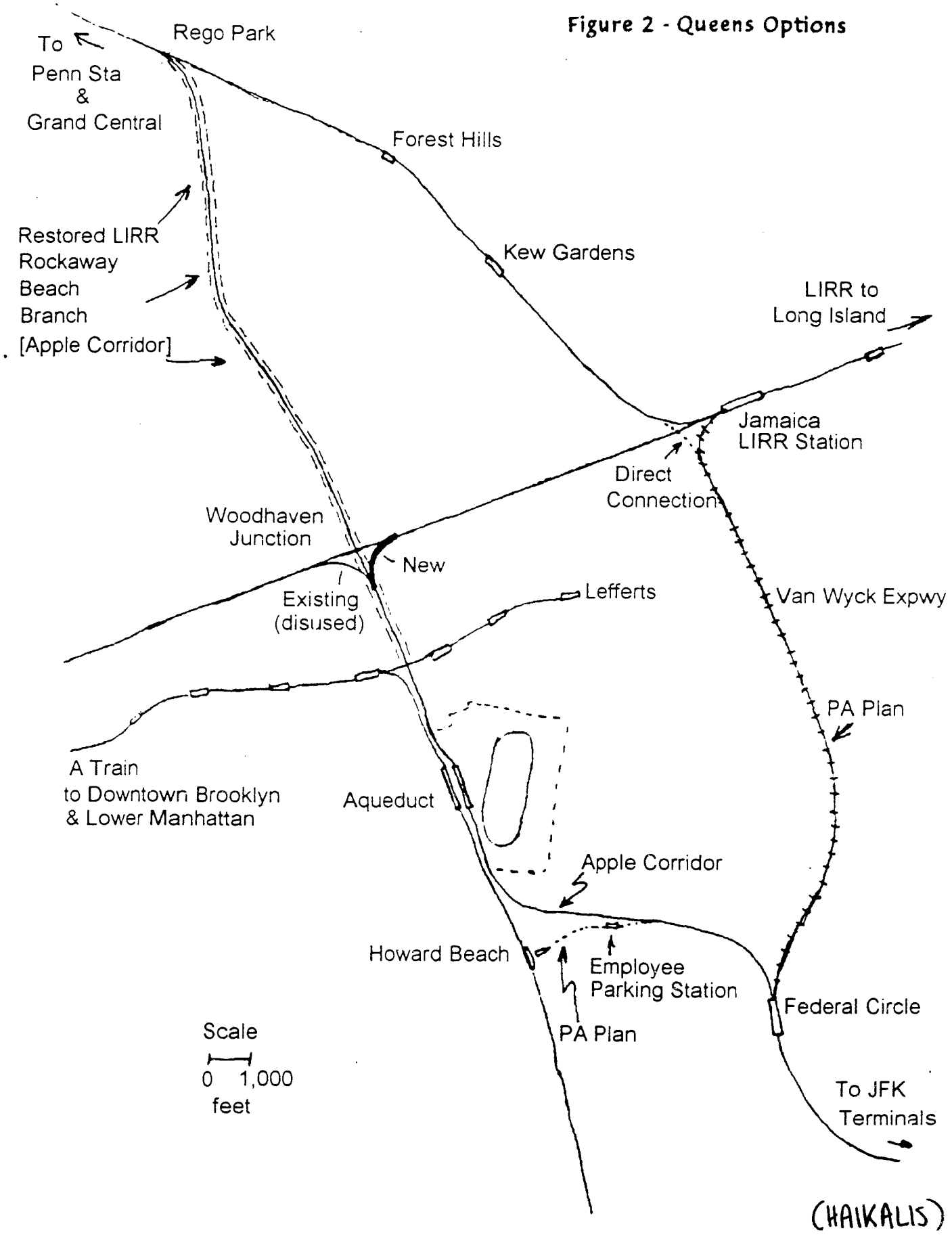


Figure 2 - Queens Options
To
Penn Sta
&
Grand Central
Rego Park
Forest Hills
Restored LIRR
Rockaway
Beach
Branch
[Apple Corridor]
Kew Gardens
LIRR to
Long Island
Jamaica
LIRR Station
Direct
Connection
Woodhaven
Junction
New
Existing
(disused)
Lefferts
Van Wyck Expwy
PA Plan
A Train
to Downtown Brooklyn
& Lower Manhattan
Aqueduct
Apple Corridor
Howard Beach
Employee
Parking Station
PA Plan
Federal Circle
Scale
0 1,000
feet
To JFK
Terminals
(HAIKALIS)

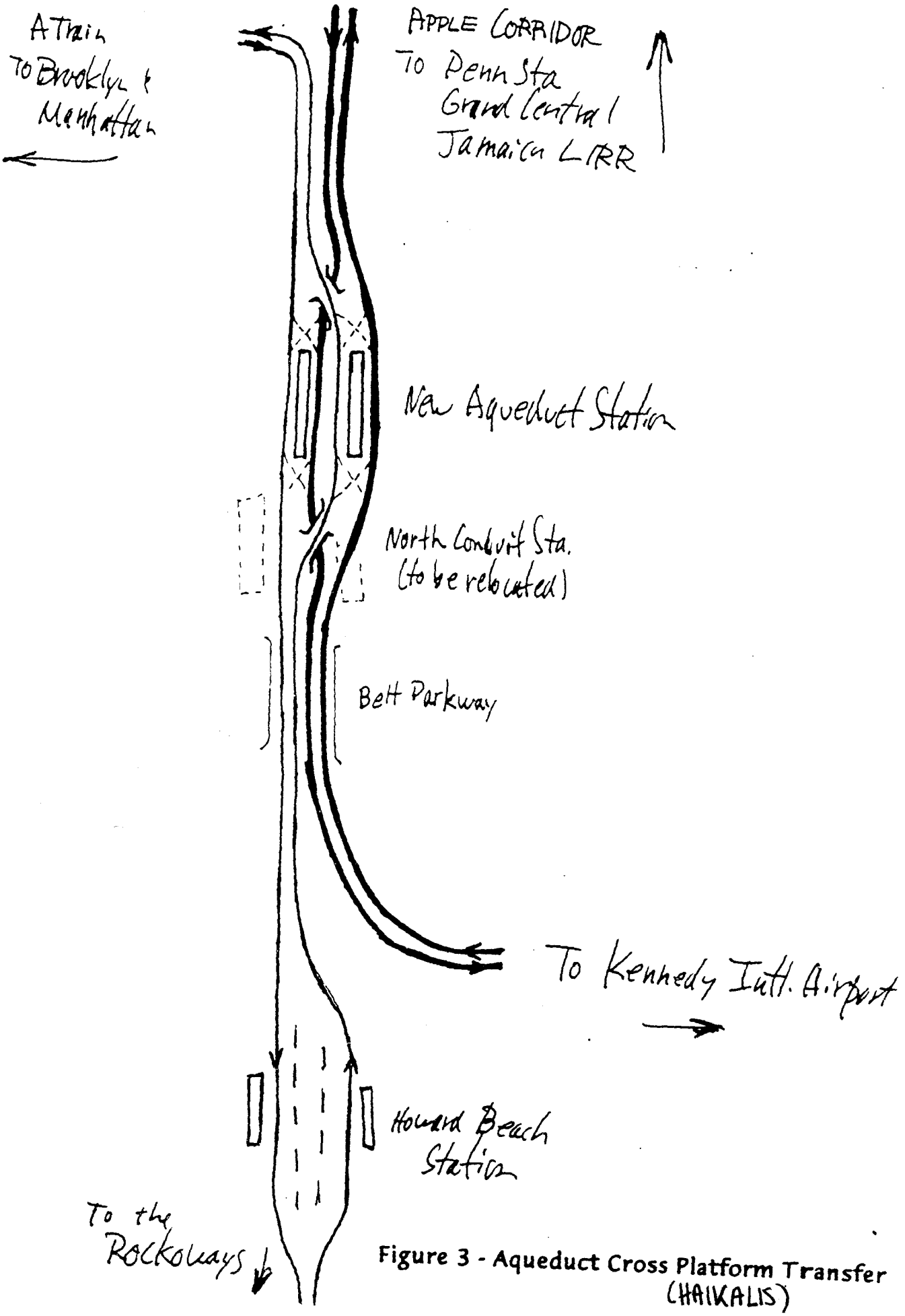
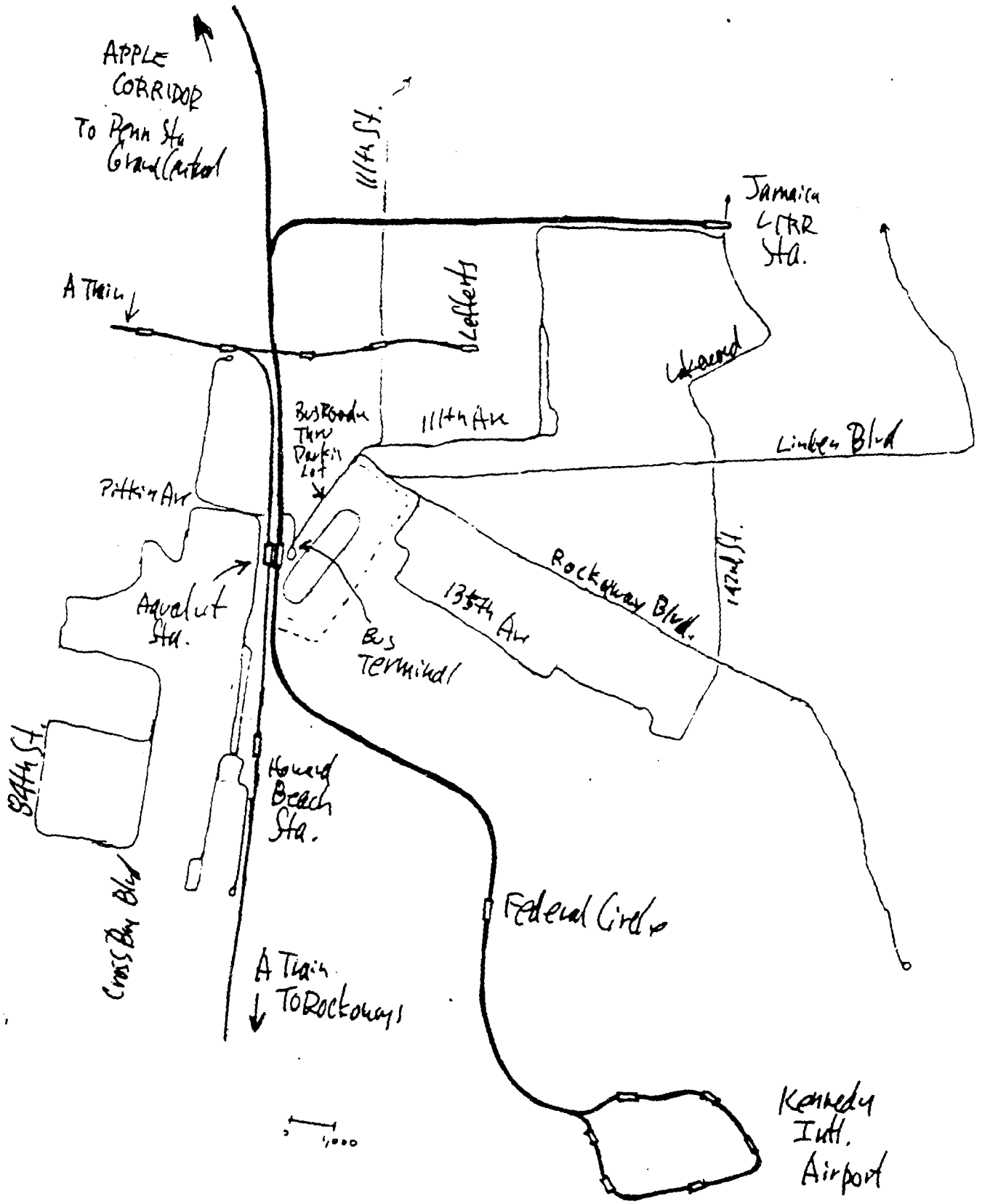


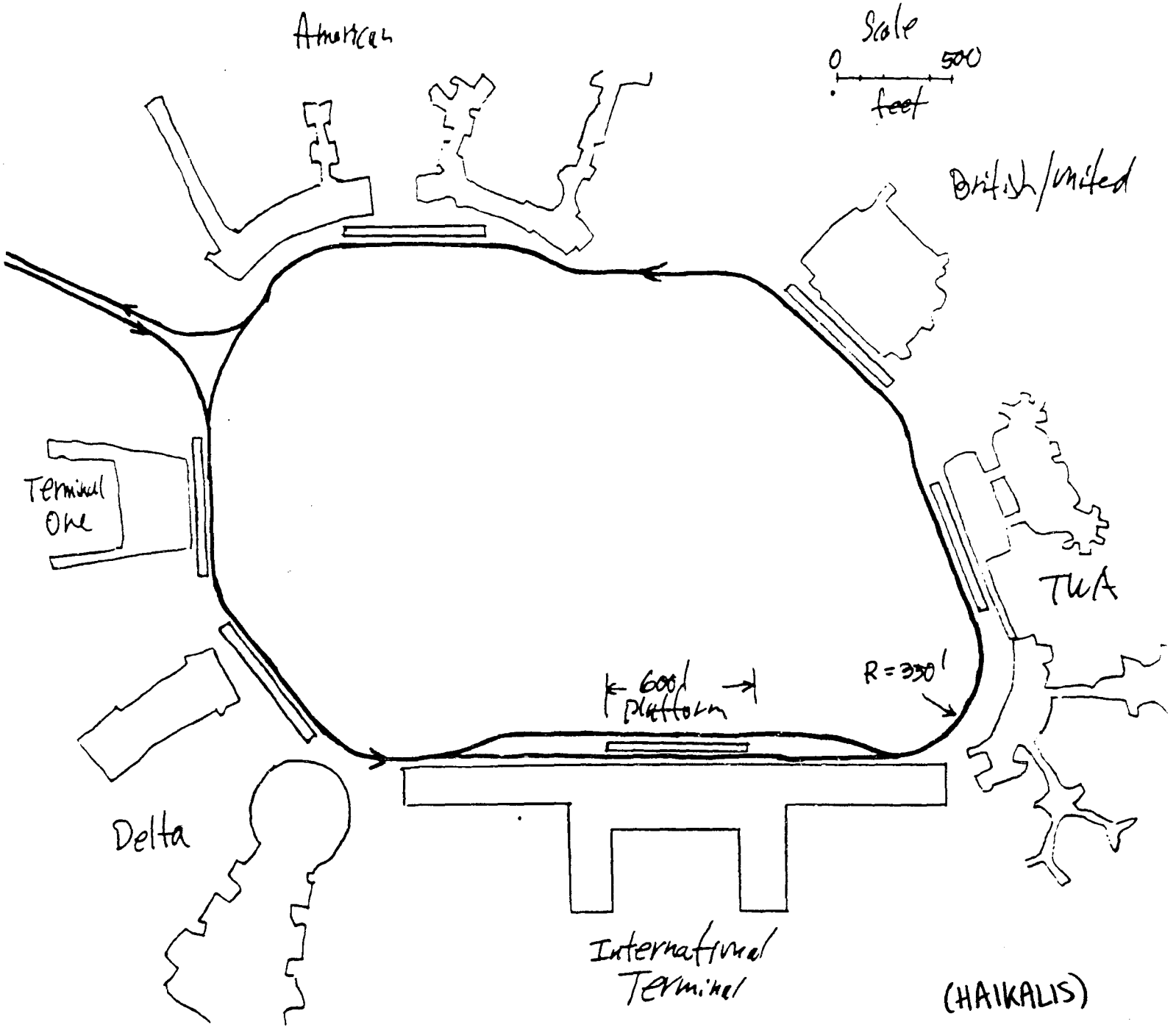
Figure 3 - Aqueduct Cross Platform Transfer
(HAIKALIS)

Figure 4 - Feeder Bus Lines to Aqueduct Station



(CHAIKALIS)

Figure 5 - Layout at Central Terminal Area
Kennedy International Airport



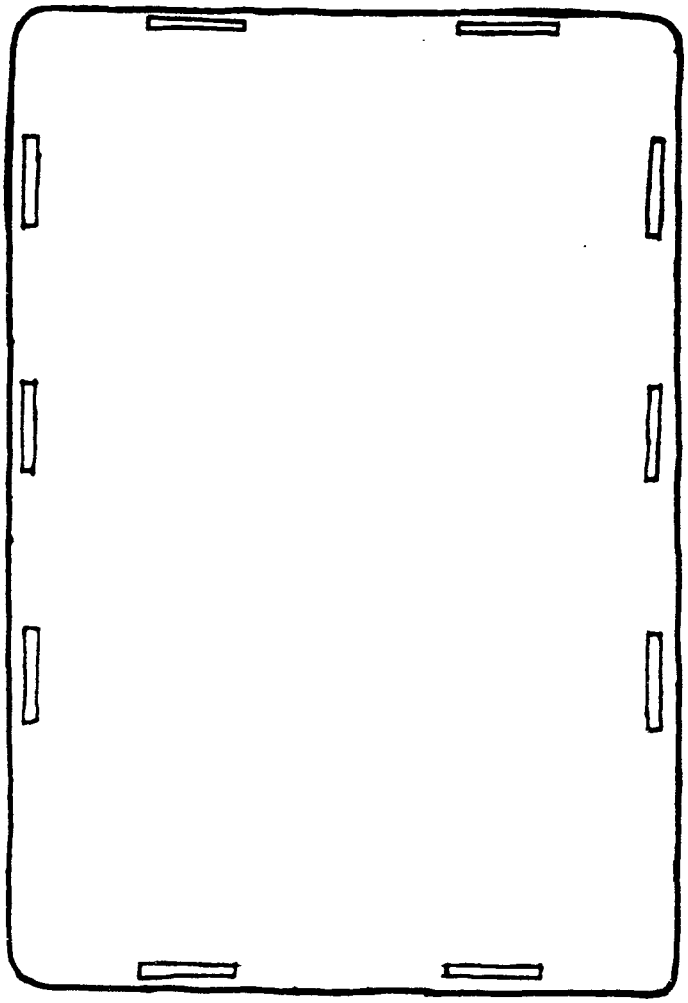


Figure 6 - Chicago Elevated Loop (HAIKALIS)

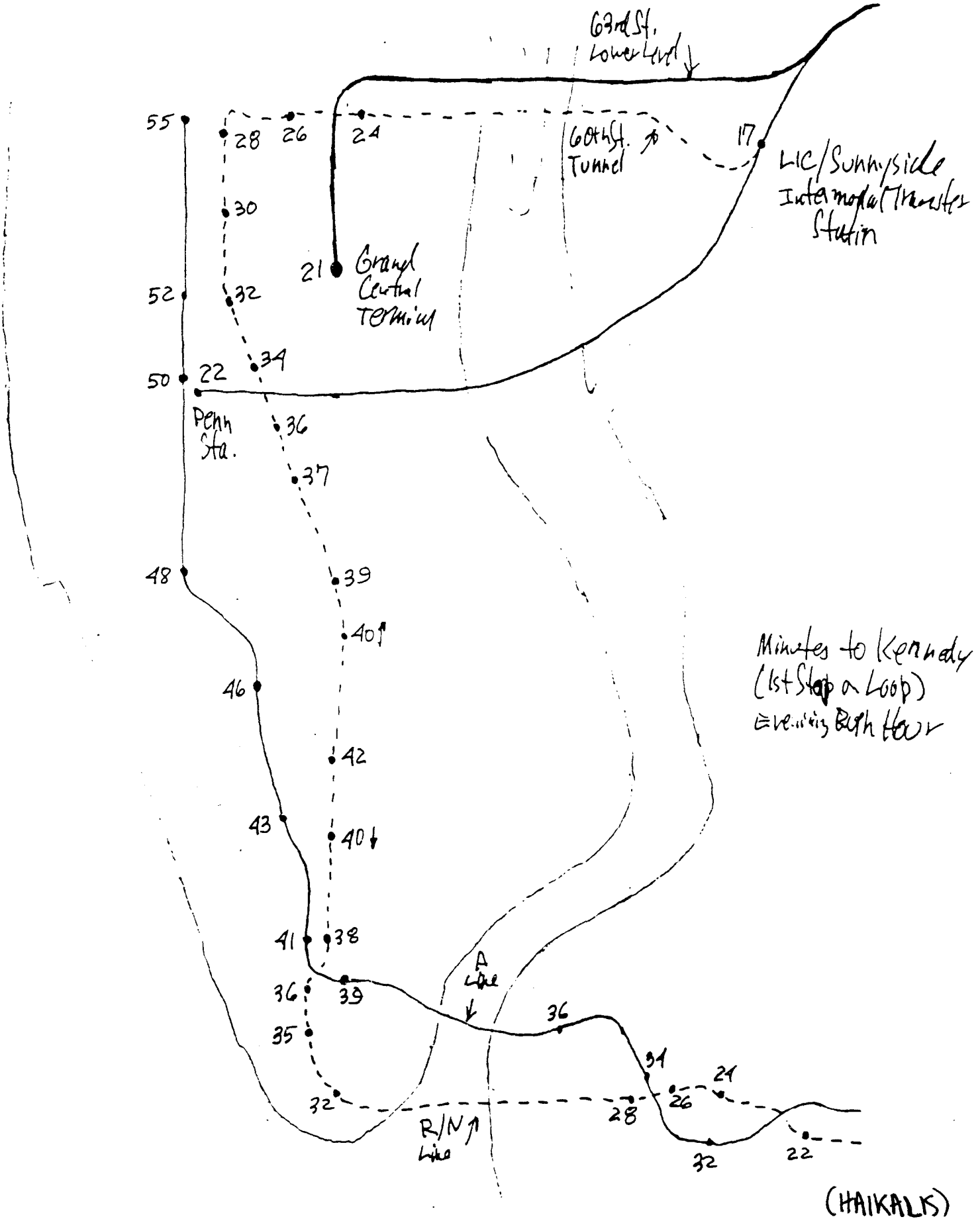


Figure 7 - Manhattan Distribution Options

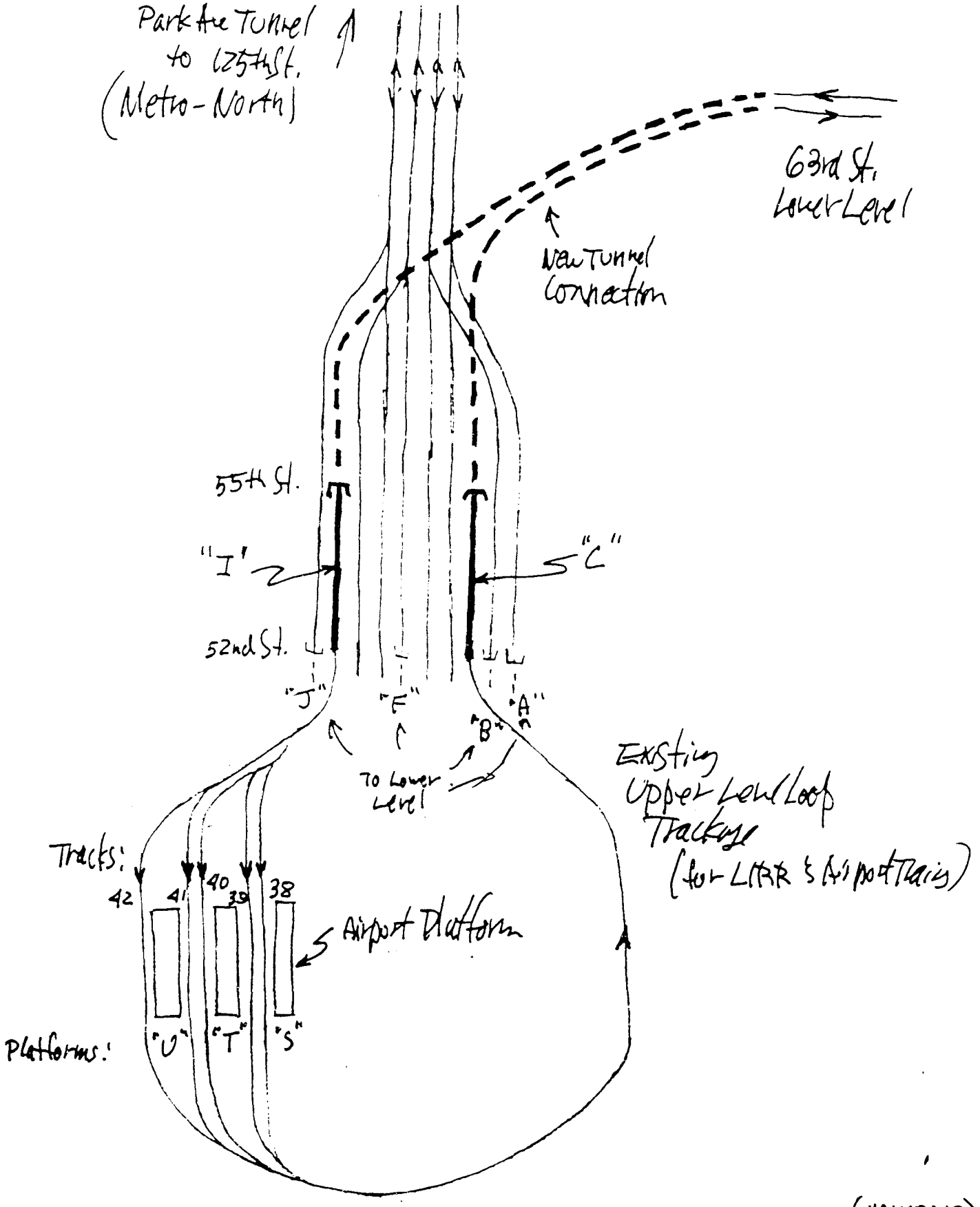
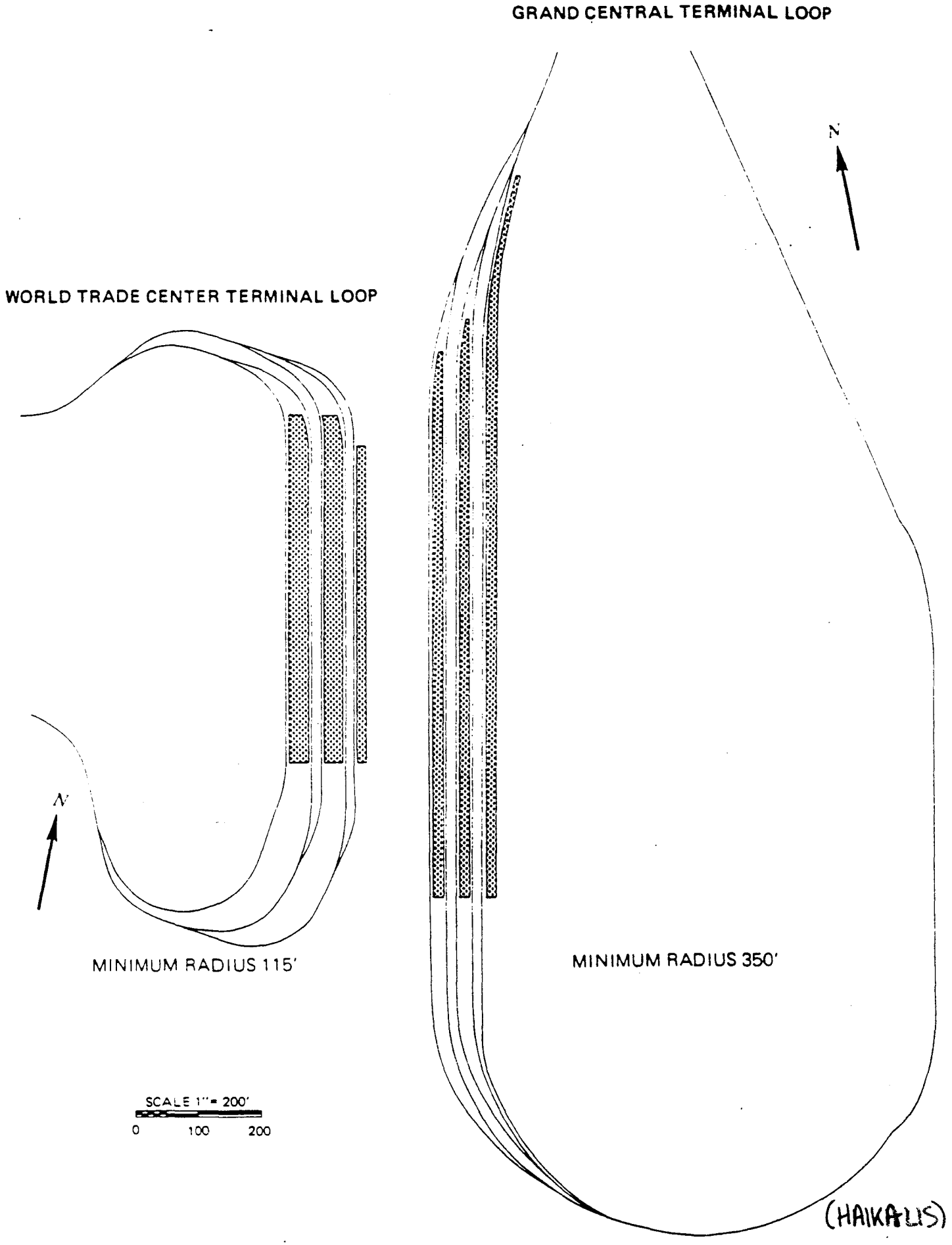


Figure 8 - GCT Track Diagram

Figure 9 - Comparison of GCT and WTC Terminal Loops



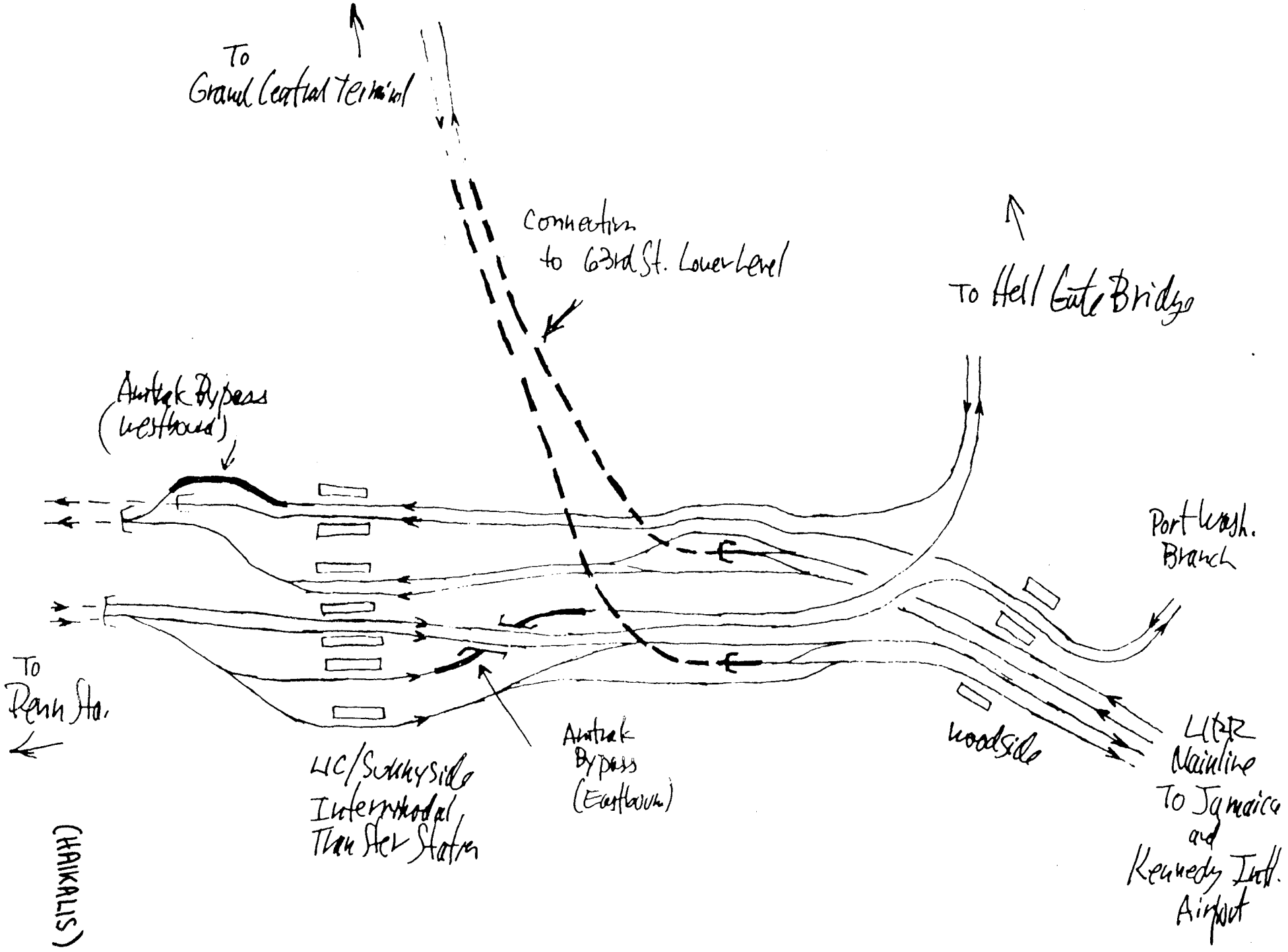
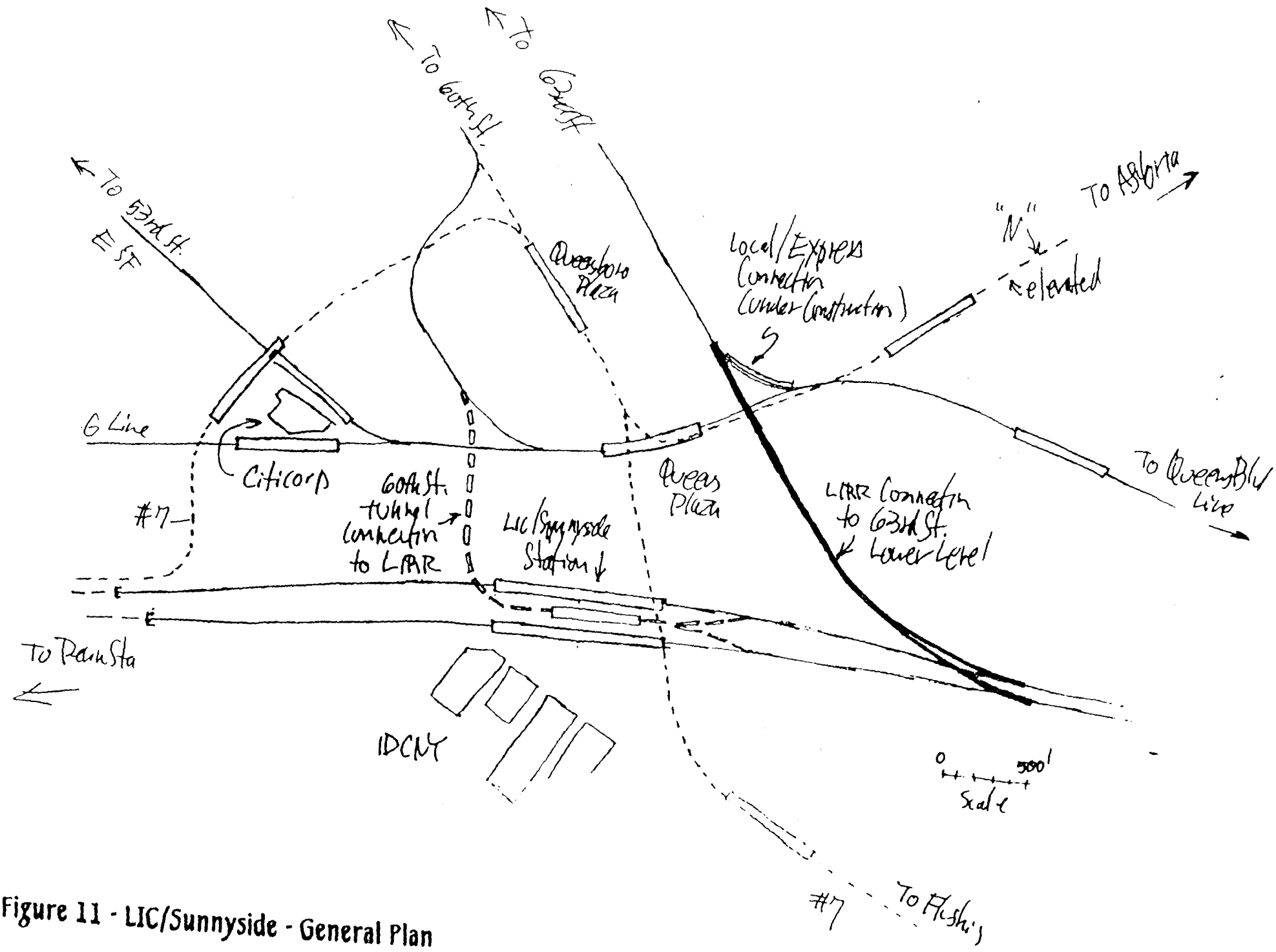


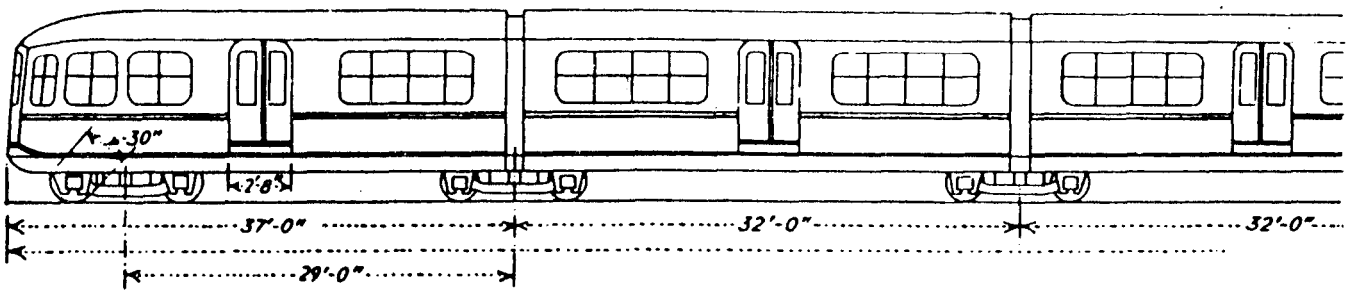
Figure 10 - LIC/Sunnyside Track Diagram

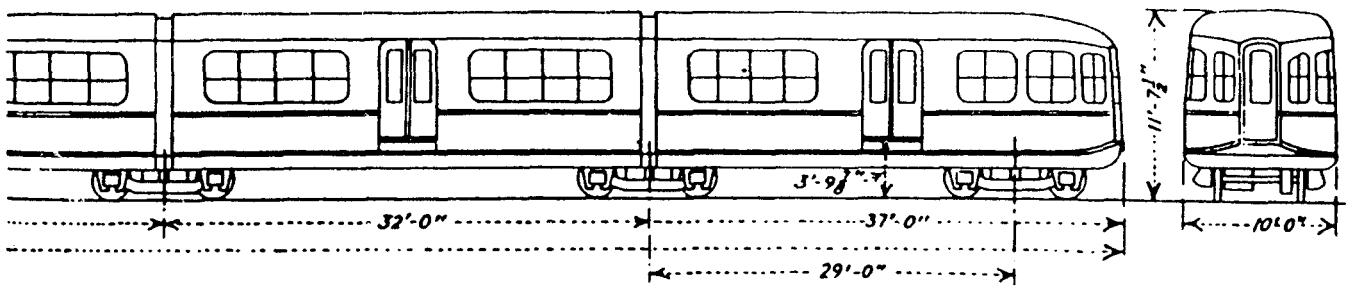


(HAIKALIS)

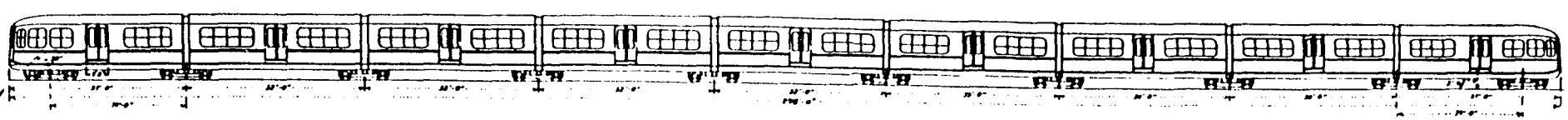
Figure 11 - LIC/Sunnyside - General Plan

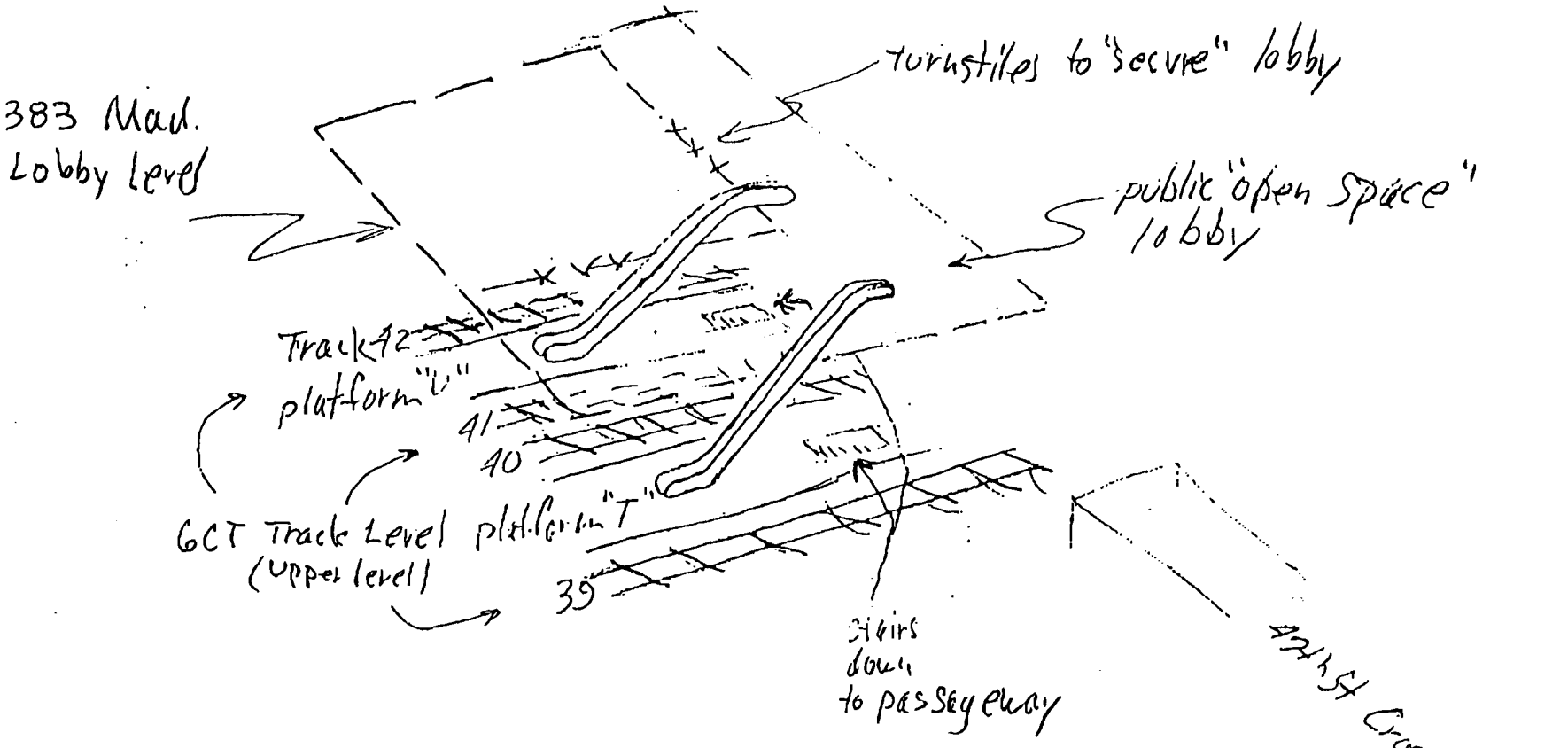
Figure 12 - Nine-Unit Articulated Airporter Trains





(HAIKALIS)





Proposal for New Escalators (or Stairs)
from platforms "U" & "T"
to 383 Mad.

George Haikalis
10/5/98

(HAIKALIS)

LESTER A. EPSTEIN & ASSOCIATES
Real Estate - Investments

11 EAST 47TH STREET
NEW YORK, N.Y. 10017

TELEPHONE
(212)371-7810
FAX
(212)371-7813

June 15, 2000

Anthony Japha, Chief Program Executive
MTA/LIRR East Side Access Project
469 Seventh Avenue
New York, N.Y. 10018

RE: 47 East 44th St.; MTA/LIRR East Side Access Project DEIS

Dear Mr. Japha,

This is in response to the Draft Environmental Impact Statement for the MTA/LIRR East Side Access Project with respect to our property at 47 East 44th St., Manhattan.

We disagree with the Preferred Alternative Options 1 &2 contained in the DEIS as it proposes to demolish our property and replace same under Option 1with a ventilation structure and under Option 2 with a ventilation and HVAC climate control structure for the LIRR facility at Grand Central Terminal which demolition we believe is unnecessary and will adversely affect us, our tenants, the MTA and the general public. To wit:

1. The MTA is the adjoining property owner to our said property owning 341 Madison Ave., 345 Madison Ave. and 347 Madison Ave. The MTA bldg. at 347 Madison Ave. has a one story extension in the rear and a three story extension with an entrance on 45th St. contiguous to said one story extension as evidenced by the attached copy of the survey for their property. The said ventilation and/or HVAC housing can be placed in either or both locations which the MTA already owns eliminating the need to acquire our property and to turn 44th St. into a construction site for up to 2 years (p. S-16, p. 17-9). The sites referred to in the DEIS (p. 5-26 & 5-27) refer to the main building of 347 Madison Ave. and not to the extensions. (1)
2. The analysis of the real estate market contained in the DEIS is incorrect insofar as it states outdated 1999 information from Garrick Aug (see p.5-36), real estate brokers. which includes a claim that there is a 25% retail vacancy rate in Midtown Manhattan and from Cushman & Wakefield, real estate brokers, which includes a claim that there is significant availability in the office market and that existing tenants can be easily relocated (see p.5-36). The situation has dramatically changed since those reports were issued with less space now available. We believe that relocating our retail and office tenants will be extremely difficult and will likely result in hardship and disruption of our tenants businesses which may not be covered adequately by the Federal Uniform Relocation Assistance and Real Property Act of 1970 (p. 5-32 to 34, 17-8 & 9). (2)
3. Specifics regarding the proposed Ventilation and or HVAC housing are inadequate except to state that the MTA and its subsidiaries are not subject to NYC zoning requirements which leaves in doubt the actual intentions of the MTA in connection with the proposed condemnation of our building (p. 6-22 and 6-23) (3)

Additionally, we have noted during inspections of our property by persons authorized by the MTA in connection with this project that the proposed ventilation facility would not need entirely occupy our 25 x 100 plot and would appear to vent the new LIRR GCT facility into the existing louver vents at the rear of 345 Madison Ave. adversely affecting the MTA itself. The need for less space is certainly evident under Option 1 while it is not stated that alternative sites for the HVAC/ventilation housing were even considered in evaluation of either Option 1 or 2 (see P. S-13). ④ ⑤ ④

Additional points which we believe that should be considered in connection with the East Side Access and this DEIS are:

1. Increase in Midtown Manhattan air pollution levels (see p. S-37) ⑥
2. Congestion in the overcrowded Madison & Lexington Ave. areas near GCT as both streets are already notorious for their narrow sidewalks which force pedestrians to walk in the heavily trafficked street during peak periods (p. 9C-14 &15, 9C-52 to 57); The DEIS seems only concerned with reducing congestion at Penn Sta. (p. 2 –31) ⑦
3. Congestion in the overcrowded IRT Lexington Ave. subway at GCT.(Ch. 9C) ⑧
4. Inadequate comparison and evaluation shown for the possibility of bringing both the LIRR Port Washington & Main Lines through the 63rd St. Tunnel to the now or formerly proposed 3rd Ave. Terminal ; (p. 2-32 to 2-35) ⑨
5. Economic feasibility of the Preferred Alternative is open to debate and subject to political process and future economic conditions which cannot be determined. ⑩

We believe that the use by the MTA of its existing property in connection with this project or its consideration of a different plan altogether will result in substantial savings of public money and less disruption to business and in the already congested area near Grand Central Station. ①

Very truly yours,

LESTER A. EPSTEIN

CAROLYN B. MALONEY
14TH DISTRICT, NEW YORK

2430 RAYBURN BUILDING
WASHINGTON, DC 20515-3214
(202) 225-7944

COMMITTEES:
BANKING AND FINANCIAL SERVICES

GOVERNMENT REFORM

JOINT ECONOMIC COMMITTEE

DISTRICT OFFICES:

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SUITE 311
NEW YORK, NY 10128
(212) 860-0606

☐ 28-11 ASTORIA BOULEVARD
ASTORIA, NY 11102
(718) 932-1804

Congress of the United States

House of Representatives

Washington, DC 20515-3214

Testimony of Congresswoman Carolyn B. Maloney
Before the Metropolitan Transportation Authority June 15, 2000

Thank you for the opportunity to address you today. I am pleased to submit testimony to the MTA on East Side Access, a project that will have a positive affect on my district, both in Manhattan and Queens. I also want to commend the board on its decision to build a full-length Second Avenue Subway. Although we are here to comment on the Draft Environmental Impact Statement for East Side Access, I think the message that many of us want to convey is that East Side Access needs the Second Avenue Subway if it is going to work. They are part of the same transportation solution and they must be considered together. The DEIS is stunningly silent about the Second Avenue Subway. (1) (2)

When the LIRR connection is completed in 2009, it will dump thousands of additional riders onto the East Side. The DEIS indicates that the Preferred Alternative studied is expected to bring about 62,000 LIRR riders into Grand Central Station during the 4-hour weekday AM peak period in the year 2010. The DEIS evaluates the impacts that East Side Access will have on bus and subway lines around Manhattan and Queens. For instance, the DEIS notes that the additional LIRR passengers will result in significant impacts to the Nos. 4 and 5 express lines southbound in the AM peak hour. (3)

I believe that the discussion of the impact of adding more passengers to the already overcapacity 4 and 5 trains is inadequate. There is no room on these lines for existing passengers. To talk about adding more people without a Second Avenue Subway to alleviate congestion is an absurdity. The Lexington Avenue Line is 40% to 60% over-capacity during the peak hours. The DEIS does not discuss how a full-length Second Avenue Subway would help to reverse the negative impacts on the Lexington Avenue Subway Line. Without a full-length (4)

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Second Avenue Subway, over-crowding will create dangerous conditions for riders. The already over-crowded cars will not be able to handle even the six passengers per car that the DEIS calculates will be added. And signal adjustments to the line will not be enough to mitigate the negative impacts to the Lex Line. A supplemental DEIS should discuss the importance of a full Second Avenue Subway to provide an outlet for these new passengers when the LIRR project is completed.

The DEIS is incomplete without a discussion of the way the Second Avenue Subway will alleviate some of the environmental problems created by East Side Access. Since these projects should be built in tandem, the DEIS for East Side Access should include greater detail about the effects of the Second Avenue Subway.

MEMORANDUM
DEPARTMENT OF TRANSPORTATION

TO: **Mr. Anthony F. Japha**
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, NY 10018

FROM: **Chung-Kuo Chiang, Ph.D., PE** C. Chiang
New York State Department of Transportation
Hunters Point Plaza
47-40 21 st Street
Long Island City, NY 11101

SUBJ: **Review Comments on East Side Access**
Draft Environmental Impact Statement (DEIS)
May 2000

DATE: **May 24, 2000**

Comments:

1. **On title sheet "BRONX" County should be "BROOKLYN" instead?** (1)

2. **Table of Contents, on page xix add a line "Appendices" after Index.** (2)

3. **Chapter 1, page 1-5 table 1-1 it added up 101% not 100%.** (3)

4. **Chapter 3, page 3-18 Table 3-2 Total Acres added up 283,800 not 183,700? and the percent of total was over 154% not 100%? Please check numbers.** (4)

5. **Chapter 4, page 4-3 5.1%, 6.6%,39.6%, 6.9%, 9.0% 90.3% the % symbol can be eliminated. (Typical comments for all DEIS tables, please make them consistency and check for accuracy).** (5)

6. **Overall this is a very Comprehensive, Thorough and Sound report.**

THOMAS S. GULOTTA
COUNTY EXECUTIVE

OFFICE OF THE EXECUTIVE
ONE WEST STREET
MINEOLA, N.Y. 11501-4895

REC'D
JUN 6 2000

May 31, 2000

Anthony F. Japha, Chief Program Executive, ESA
MTA LIRR East Side Access
469 7th Avenue
New York, New York 10018

Dear Anthony,

Thank you for your letter of May 17, 2000 and the Draft Environmental Impact Statement (DEIS) for the East Side Access Project.

I am forwarding the Executive Summary of the DEIS to Paul Ponessa, Director of the Planning Commission, for his information and review.

Thank you for bringing this matter to my attention. If I may be of assistance to you in any way, please feel free to contact me.

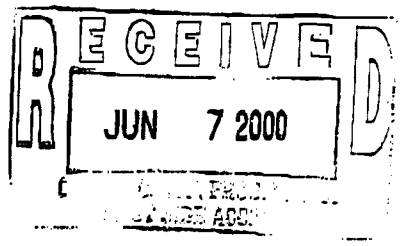
Warmest regards,

Tom Gulotta

THOMAS S. GULOTTA
County Executive

TSG:pan
CCS #20029603

STEVEN AUSNIT
124 EAST 61 STREET
NEW YORK CITY, NY 10021
(212) 838-8913
(212) 832-8410 (FAX)



June 6.
~~May~~ 30, 2000

Anthony F. Japha
LIRR East Side Access
469 Seventh Avenue
New York City, NY 10018-7625

Dear Mr. Japha,

Thank you for sending me the DEIS on the LIRR East Side Access, which I have read with interest.

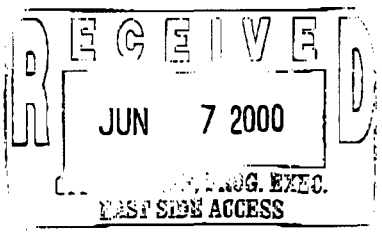
As the owner of several properties on 61st Street, under some of which the proposed tracks of both option 1 and option 2 would run, I am writing you to strongly urge the choice of option 2. (1)

Option 2 is not only so much less expensive, less disruptive, and less subject to conflict and litigation, that it is hard to understand how option 1 even remains under consideration.

With the reasons for the choice of option 2 so overwhelming, I trust that in this instance, the decision as to which option will indeed be chosen will be based on the indicated advantages and on common sense, and not on any yet unknown political considerations or pressures that could arise in the future.

Sincerely yours,

Steven Ausnit



222-33 Kenilworth Drive
Oakland Gardens NY 11364-1427
718-279-5850

RE: DEIS: ESA

Anthony F. Japha
Chief Program Executive
East Side Access
Metropolitan Transportation Authority
347 Madison Avenue
New York NY 10017

Dear Mr. Japha,

This letter will constitute my response to your Draft Environmental Impact Statement regarding The East Side Access Plan for the Long Island Railroad.

I support construction of the East Side Access' proposed LIRR access to Grand Central Terminal. Specifically, I support the Preferred Alternative due to its lower construction impact on communities along the new alignment and because it is least likely to adversely affect Metro-North Railroad operations. I oppose the other alternatives presented.

However, my support is not unconditional. I favor construction of the new LIRR line envisioned by MTA's plan, but only if it is supported by appropriate improvements to subway infrastructure and to Grand Central Terminal itself. Further, I believe MTA to have underestimated the impact of this project on the Lexington Avenue subway lines; a reliance on the published impact estimate could be detrimental both to LIRR riders and subway patrons. MTA was also not specific concerning ADA-compatibility of all aspects of the new Grand Central Terminal facility. Lastly, signage is already inadequate and confusing in Grand Central Terminal, and should be revised and improved as this project progresses. (1) (2) (3) (4)

Lexington Ave Subway Impacts: Any mitigation efforts not including a subway along the full length of Second Avenue, from Harlem (if not the Bronx) to Whitehall Street, will be utterly ineffective in preventing the paralytic effects of overcrowding on the Lexington Avenue subway. New signal equipment, better tracks and turnstile management will indeed benefit Lexington Avenue subway patrons, and should be pursued as part of a "State of Good Repair" plan, but it is unrealistic to believe that these will noticeably affect service during an additional deluge of arriving LIRR passengers. (1)

Construction of East Side Access must be paired with a firm commitment and adequate identified funding for a full-length Second Avenue subway line.

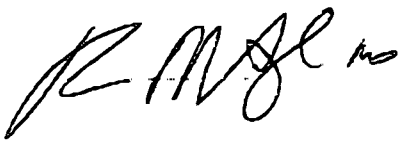
ADA Access: The new LIRR station within Grand Central Terminal (GCT) represents an opportunity to improve ADA access to GCT. Not only should the new LIRR station be generously equipped with appropriate elevators and ramps, but ADA access between the LIRR, Metro-North Railroad, Lexington Avenue, Shuttle and Flushing IRT lines should be improved.

There is currently no ADA access to the IRT #7 platform at Grand Central station; further, access to the various subway lines is fragmented. This can be remedied as part of the new construction plan, especially since the MTA should be closely coordinating East Side Access with any subway improvements within the GCT area. Among desirable improvements, I believe the MTA should install elevators and ramps to improve pedestrians' ability to both use and bypass the LIRR facility efficiently, depending on their travel plans. For example, elevator or ADA ramp access should allow direct transfer from LIRR or Metro-North Railroad to the Lexington Avenue lines (or to their level), direct access to the #7 subway, or direct access to the Main Concourse. (2)

Signage: Signs in GCT are few in number and confusing. As part of this project, signs with good contrast and large letters should replace existing signage in the main concourse, as well as being part of the new LIRR facility. Currently, patrons frequently have trouble finding the subway when alighting from commuter trains. Patrons with poor eyesight cannot use existing GCT signage. New signage can remedy this. (3)

The East Side Access project, specifically the Preferred Option with LIRR tunnels underneath existing Metro-North tracks, can be of great benefit to the region, but only if it supported by appropriate Terminal and subway infrastructure, as indicated above. I oppose the No Build alternative, and believe alternatives involving substantial "cut and cover" construction may adversely impact too wide an area and cost the MTA much good will and support among the public.

Sincerely,



Ron M. Aryel, MD, MBA

005734

BOARD OF EDUCATION OF THE CITY OF NEW YORK
Harold O. Levy, Chancellor
OFFICE OF THE CHANCELLOR
110 LIVINGSTON STREET · BROOKLYN NY 11201

RECEIVED
JUN 12 2000
OFFICE CHIEF, PROG. EXEC.
EAST SIDE ACCESS

Reference No: 2000-292

June 12, 2000

Mr. Anthony F. Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, New York 10018

Dear Mr. Japha:

As the Chief Executive of the Division of School Facilities of the New York City Board of Education, I am responsible for ensuring that an environment conducive to the education of our students is maintained at each of our facilities. A review of the Draft Environmental Impact Statement for the East Side Access Program leaves me greatly concerned about the impact this project may have on the Newcomers Academy which is a public high school immediately adjacent to the proposed work area in Long Island City.

The Newcomers Academy is located at 28-01 41st Avenue and currently has almost 1,500 students. This school building is immediately adjacent to the proposed work site proposed for this Project. This school is currently operating at 123% over capacity. All Queens High Schools are currently overcrowded and operating at 124% of capacity. I am mentioning these figures to impress upon you the necessity of keeping the Newcomers Academy functioning during all phases of the East Side Access project. Relocation, for any reason, is simply not an option. (1)

We are concerned about the dust and noise that will be generated at the construction site that may adversely effect the health and safety of the students and staff at this facility. (2) We are also concerned about the maintenance of the structural integrity of the school building itself, as the tunneling to be done will occur almost directly under the building. (3) An ongoing Transit Authority project that occupies the same site as is contemplated for the East Side Access Project has caused tremors in the building even though the project is not nearly as large.

The Transit Authority construction project created several incidents in which excess dust penetrated the building and, during the project's early stages, created a great deal of noise that, on several occasions, disrupted the learning environment in the school. (2) In addition, for quite some time after construction began, the Transit Authority did not properly block off its construction site from (4)

005734

the streets commonly used by students to gain access to the school and this posed a clear danger to the students. Despite the obvious nature of this danger, it took several weeks for the Transit Authority to correct this situation. The school's overall experience with the current Transit Authority project does not provide us with the confidence that during the East Side Access Project the necessary efforts will be made to ensure the health and safety of the students and staff at this school. (4)

While the Draft Environmental Impact Statement admits that the project may have "significant adverse noise impacts"(p. 17-49) on the Newcomers School, we do not believe the proposed mitigation measures will meet the requirements of existing New York State statutes or the needs of the school (2)

The Draft Environmental Impact Statement states that "to avoid disrupting activities at Newcomers School, LIRR would consult with school officials during final design to ...consider the need for sound insulating construction fencing". We do not believe the installation of sound insulating fencing will be a satisfactory solution to the problems of noise and dust that may well occur at this school.

The school is a four-story structure immediately adjacent to the proposed construction site. It is a building that is not supplied with air conditioning. This means that during warm weather the school depends on open windows for relief from the heat. As sound generally travels upwards and the school towers above the site, we do not see how the proposed remediation will prevent this project from violating the requirements of the State Education Law, Section 155.5, Uniform Safety Standards for School Construction and Maintenance Projects. This section of the State Education law mandates that "construction and maintenance operations shall not produce noise in excess of 60 dba in the occupied spaces of school buildings".

In addition, to our concerns about the noise impact of this project and the impact statement's inadequate coverage of this issue, we are also very concerned about air quality and dust. The impact statement treats the possibility of dust from the project as if it were not a substantial problem. However, the location and the need to keep windows open during warm weather leads me to believe that both dust and air quality will be significant problems at the Newcomers Academy. (5)

Therefore, we believe that this project should not move forward without a firm commitment on the part of the MTA to do whatever is necessary to prevent a negative impact on the learning environment at this school. A careful reading of the Draft Environmental Impact statement does not give us this assurance. (6)

We are more than willing to meet with representatives of the MTA to determine what must be done to ensure that the 1,500 students at the Newcomers School will not be adversely effected by this project and that the project itself meets all of the requirements laid down in section 155.5 of the State Education Law.

(6)

We have been contacted by representatives of the MTA who have given us verbal assurances that they intend to do everything possible to work with us to ensure that there is no negative impact to the Newcomers Academy. However, I must repeat that the Draft Environmental Impact Statement, as currently written, gives us no such assurance.

Sincerely,

Patricia Zedalis

Patricia Zedalis
Chief Executive
For School Facilities

PZ:RM:pnc

CLAIRE SHULMAN
PRESIDENT

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CITY OF NEW YORK
OFFICE OF THE
PRESIDENT OF THE BOROUGH OF QUEENS
120-55 QUEENS BOULEVARD
KEW GARDENS, NEW YORK 11424-1015

June 13, 2000

Mr. Anthony F. Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, NY 10018

RE: East Side Access
Draft Environmental
Impact Statement

Dear Mr. Japha:

In response to your request for comments on the East Side Access Draft Environmental Impact Statement, I am especially concerned about the alternatives or options under consideration regarding the removal and disposal of excavated tunnel material (spoils). As I have expressed on a number of occasions, the Long Island Railroad's option of transporting 94,000 truck loads of excavated tunnel material through the streets of Queens is not a viable alternative.

I am aware that your preferred option for the removal and disposal of tunnel spoils is by rail transport. As I have indicated previously, New York City's Department of Environmental Protection is successfully using rail transport to remove and dispose of tunnel spoils for the Third Water Tunnel currently under construction in Queens. The Long Island Railroad should view this approach as the only acceptable approach to remove and dispose of the nearly three-quarters of a million cubic yards of excavated spoils from the Queens side of the project.

(1)

Reading from page 17-17 of the Draft Environmental Impact Statement dealing with construction impacts;

> "A less desirable option would be to remove the spoil from Yard A (and also from the Manhattan access shaft) via truck. This would result in the generation of approximately 124 truck trips per day during peak periods of tunneling work. Due to the potential for a large number of both daily truck trips and total truck trips (since nearly 750,000 BCY of material could potentially require transport from Yard A, a total of 94,000 truck trips over the approximately 10-year construction period might be required), rail transport is the preferred option for removing spoil from Yard A."

It makes no sense to even consider this option as a back-up plan to be utilized for spoils disposal in the event the preferred rail option is not adopted. This alternative is simply not acceptable. (1)

Further, I still have concerns on how passenger safety will be addressed when the Long Island Rail Road discharges its riders joining the #7 Flushing line riders at Grand Central Station for connections to the Lexington Avenue line. Although various estimates of the number of railroad passengers transferring at 42nd Street to the Lexington Avenue line have been used over the past few years, even the lowest ridership estimate will result in a significant crowd control situation on the already crowded platforms of the 42nd Street subway station. (2)

Sincerely,

Claire Shulman

CLAIRE SHULMAN
President
Borough of Queens

CS:em
Japha.060

C. Assembly Member Catherine Nolan
Dolores Rizzotto, District Manager CB#2
George Delis, District Manager CB#1

Long Island Association, Inc.
80 Hauppauge Road
Commack, Long Island, NY
11725-4495

'00 JUN 14 AM 8:05

OFFICE OF THE CHAIRMAN

June 13, 2000

Mr. Virgil Conway
Chairman
Metropolitan Transportation Authority
347 Madison Avenue
New York, NY 10017

RE: East Side Access Project

Dear Chairman Conway:

While I cannot attend tomorrow's hearing, the Long Island Association would very much like to submit this letter for the public record in strong support of the East Side Access Project of the Long Island Rail Road. The LIA believes that this project is the most important project now being planned for the Long Island transportation system and will benefit all of our residents. (1)

Providing service to the East Side has been one of the dreams of transportation planners from Long Island for many years. The current inability of the Long Island Rail Road to go directly to the East Side requires tens of thousands of commuters to use service to Penn Station and then go backwards to the East Side through Grand Central Terminal. Not only is this inefficient, it also reduces the incentive for many thousands of commuters to use mass transit to go to the East Side, thus significantly increasing the number of automobiles entering Manhattan each day. Given a choice between taking their automobile directly to the East Side or taking mass transit to the West Side and then going backwards after transferring to a subway or bus, many commuters choose the automobile to the detriment of congestion and air pollution.

The East Side Access Project through which Long Island Rail Road commuters will be able to go directly to the East Side will provide a meaningful incentive for thousands of automobile drivers to change to mass transit for the direct ride to Grand Central. In addition, it will also provide a new choice for thousands of commuters who now do not go to Manhattan because it is not convenient for them to get to the East Side without taking their automobile. Thus, this project will not only bring more commuters to mass transit, it will also reduce the number of automobiles entering Manhattan, thus reducing traffic congestion for thousands of other motorists who must take their automobile. (2)

The East Side Access Project will increase transportation efficiency, reduce air pollution, increase economic activity throughout the region and allow the Long Island Rail Road to expand their service through the acquisition of new cars and the development of new service yards. It will provide much needed flexibility to our transportation system, just as we enter a new era of competition with other cities and regions that are expanding their transportation system. The Long Island Association urges the Metropolitan Transportation Authority to move forward on this project as soon as possible. All of the residents of the region will benefit from its development.

Sincerely,

Mitchell H. Pally
Vice President for Government Affairs

Remarks of
Senator Dean G. Skelos
Deputy Majority Leader
New York State Senate
East Side Access Project EIS Hearing
June 15, 2000

Chairman Conway, Regional Administrator Thompson, while I am unable to join you this evening, I nevertheless wanted to make sure that my full and unequivocal support for the MTA's Long Island Rail Road East Side Access Project is made part of tonight's official hearing record. (1)

First, let me say that the district that I represent in southeast Nassau County will benefit tremendously from this project. Clearly one would expect support from someone in my position. But my case today on behalf of the East Side Access Project is much broader in scope and carries with it my perspective as NYS Senate Deputy Majority Leader and the Senate designee to the MTA Capital Program Review Board.

From a State and regional perspective, this project is critical to the future of our economy and mobility. It is a project that provides benefits not only for people who live in, work in and commute between Manhattan, Queens, Nassau and Suffolk counties, but for those around the entire metropolitan region. (2)

Of course it will allow the LIRR to achieve its projected 20% growth over the next ten to twenty years. But it will do so much more.

It will link the East Side of Manhattan with the new rail line that is being built to service JFK Airport.

It will reduce the pollution and congestion associated with 12,000 cars that now traverse the East River bridges.

It will provide for economic stimulus to the Long Island City business district through the project's proposed station in Sunnyside, Queens.

It will free up platform space at Penn Station, allowing for Metro-North trains to be diverted there for customers who want to reach west side destinations, such as the World Financial Center and the World Trade Center. Those riders will no longer have to compete with crowds on the Lexington Ave subway, providing a better trip for them as well as the tens of thousands of Manhattan commuters on the Lex line.

(2)

East Side Access will bring with it many thousands of construction jobs to the entire metropolitan area over the life of the project as well as many thousands of additional supporting jobs throughout New York City's five boroughs and the surrounding counties.

But beyond the regional arguments for this project are even more compelling ones from a national perspective. In that sense, East Side Access is literally one of the best "New Start" investments in the country today. Few others can guarantee the type of return on investment it will provide from the first day of its opening.

Some 50,000 riders will use it on day one, and each and every taxpaying commuter who uses it will save an average of nearly 40 minutes a day roundtrip. That's three hours a week and about 18 days of productive work and or family time a year! Clearly this is an efficiency that is good for not only for the national, regional and local economies, but for our families and their quality of life as well.

Ultimately, the project will serve about 179,000 commuters daily, saving all of them similar amounts of time.

(2)

As many of you know, the State of New York stands squarely behind this and a number of other MTA expansion projects. The State Legislature and the Governor recently approved the MTA's 2000-2004 five-year Capital Program, the largest and most comprehensive in the transit agency's history. As such, we, as a State and a region, have stepped up to the plate in terms of funding the local portion of the East Side Access Project and many other worthy transit needs throughout the MTA system.

As far as a federal commitment to the project is concerned, over the past three years the project has received some $46 million in federal "New Start" earmarks. This year's $10 million appropriation secured in the House will help move the project forward toward initial construction elements late this fall.

(3)

But obviously more needs to be done at the federal level in terms of support.

Let me then take this opportunity to ask that the Federal Transit Administration (FTA) and Federal DoT do everything possible to move forward expeditiously to finalize this EIS and grant this project the Full-Funding-Grant-Agreement it so rightly deserves.

Secondly, let me suggest that the Administration provide more than a token amount of funding for this project in its FFY 2002 budget proposal, which I would imagine FTA and DoT will be working on over the next few months.

The project, which is authorized in TEA-21 at $353 million, will require many multiples of the $10 million the Administration recommended for it this past fiscal year. Given the State's firm commitment, it is now clearly up to the federal government to help make this and the MTA's other proposed expansion projects possible.

(4)

I thank you for the opportunity to comment on this terrific project and I look forward to working with the MTA and the FTA to bring this worthy project to completion as quickly as possible so that tens of thousands of riders can benefit.

# # #

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NYSCoasts

DEPARTMENT OF STATE

George E. Pataki
Governor
Alexander F. Treadwell
Secretary of State

RECEIVED
JUN 26 2000
OFFICE CHIEF, PROG. EXEC.
EAST SIDE ACCESS

Division of
Coastal Resources
41 State Street
Albany, NY 12231-0001

June 15, 2000

Anthony F. Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, NY 10018

Re: F-00-520
FTA - Metropolitan Transportation Authority - East Side Access, NY/NYC
Acknowledgement of Project Information

Dear Mr. Japha:

The Department of State has received the information describing the above proposed project on May 22, 2000 and has determined that the submitted documentation is adequate to commence our review of your proposed project. We will contact you if additional information may be necessary for consistency review purposes.

Kindly ensure that the forwarding letter and the complete document in two volumes (the basic document and the appendices) are mailed to the New York City Department of City Planning, Local Waterfront Revitalization Program, Waterfront and Open Space Division, 22 Reade Street, Room 6W, New York, NY 10007-1216. By copy of this letter, it is requested that the New York City Local Waterfront Revitalization Program provide us with their comments on this proposed project within 30 days of their receipt of the documents from you.

(1)

You and the Federal Transit Administration will be notified of our decision when we have completed our review of this project for its consistency with the New York State Coastal Management Program.

Please call me at (518) 473-7969 if you have any questions.

Sincerely,

David E. Buerle
Coastal Resources Specialist

DEB:dlb
cc: FTA - Anthony G. Carr
DEC/Region 2 - Charles deQuillfeldt
NYC LWRP - Wilbur Woods

Permanent Citizens Advisory Committee to the MTA

347 Madison Avenue, New York, NY 10017 • 212/878-7087 • Fax 212/878-7461
E-mail: mail@pcac.org • World Wide Web: http://www.pcac.org

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Beverly Dolinsky - *Executive Director*
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Mary Whaley - *Administrative Assistant*

MEMORANDUM

TO: Pam Burford, LIRR

FROM: Joshua I. Schank, PCAC Transportation Planner

RE: Comments on East Side Access Draft Environmental Impact Statement

DATE: June 20, 2000

The PCAC is on record supporting the LIRR East Side Access Project. Based on what is presented in the draft environmental impact statement (DEIS), the project should proceed, using Option 2 as the method for getting LIRR trains into Grand Central Terminal. Option 1 would probably be very difficult to complete. In the past, building owners on Park Avenue have objected to Metro-North cut and cover construction, and they are likely to be able to stop this project. (15)

We do, however, have the following concerns about the DEIS:

Effects on the Lexington Avenue Subway

Our primary concern is with the effect of this project on the subway trains under Lexington Avenue, which will have to accommodate new riders once East Side Access is complete. According to the DEIS, the impacts on the subway would only be partially mitigated (page 1-21), and this is not satisfactory. (1) Moreover, some of the mitigating measures will not accomplish very much at all. For example, the "Step Aside" program does not actually work without enforcement personnel, since passengers tend to ignore etched tiles on the floor or use them to help position themselves in front of an opening subway door. (2)

Moreover, the DEIS downplays the impact of new riders on the Lexington Line. Although "six new riders per car" on the 4 and 5 trains does not sound like very many in the abstract, in reality it would make a big difference. First of all, these are trains that are already operating at greater than 100% capacity. Secondly, the new riders would not be evenly distributed throughout a given train. Riders tend to board a train based on their station entrance and exit points, not necessarily in a uniform manner. Some cars on a train could get only one or two extra riders, while others could get ten or twenty, if any space is available at all. This would greatly exacerbate already unacceptable conditions on the city's most crowded subway line. (3)

Given these problems, the PCAC supports the completion of the Second Avenue subway in concert with East Side Access. East Side Access should not be completed without a full length Second Avenue subway. (4)

Funding Concerns

Since we are eager to see this project completed, we are also concerned about its long-term funding. The DEIS assumes that 50% of the funding for this project will be from the federal government, but so far this money has not been appropriated. Funding for the project should be nailed down in advance to the extent politically possible so as to ensure project completion. (5)

The Biltmore Room

Proposed changes to the landmarked Biltmore Room in Grand Central Terminal would significantly alter the visual character of the terminal, despite DEIS claims to the contrary (page S-27). Although the removal of the temporary newsstand in the middle of the room will help restore the room's character, it would not compensate for the major visual changes produced by new escalators to be installed at the northern end of the room. The newsstand should be removed, and this historically significant room should be preserved, without the intrusion of escalators. (6)

Parking Mitigation Measures at LIRR Stations

The DEIS does not thoroughly detail a workable strategy for dealing with the parking shortages at LIRR stations that will result from this project. Attempting to switch riders from one station to another with fare incentives may work if it is coordinated with schedules, as is the case at Metro-North. A specific plan for doing this should be outlined in the final EIS. Also, given the track record for feeder bus service on Long Island, why is it assumed that feeder bus service will work at this time? Since the vast majority of LIRR riders drive to their local station, and one of this project's main goals is to increase LIRR ridership, parking mitigation is vital to the success of this project. The final EIS must consider other measures to substitute for the ones above. (7)

Reductions in VMT and Automobile Congestion

The DEIS projects that East Side Access will help to reduce VMT (page 1-13) and highway congestion (page 1-14). Does this projection take into account the pent-up demand for automobile transportation currently suppressed by congestion and high auto travel times? Will space freed up on the highways soon disappear as other commuters find the highways more attractive? Will some of these commuters be former public transportation users? The ability of mass transit projects to reduce VMT and auto congestion has been strongly questioned, and no postwar transit project in this country has accomplished these goals. What is the MTA's responsibility in addressing increases in VMT which may occur as a result of the initial project-led decrease? (8)

Air Quality

The DEIS projects an improvement in air quality in the New York region due to new LIRR customers who formerly drove (page S-37). Is this based on the assumption (9)

that East Side Access will reduce VMT for the region (see above)? Moreover, would the number of vehicle "cold starts" increase or decrease with East Side Access? Cold starts are a more serious contributor to poor air quality than VMT. Since most LIRR commuters drive to their boarding station, and there will be more LIRR riders after East Side Access is complete, does this mean that "cold starts" will increase? (10)

Land Use and Zoning

The DEIS argues that intensive commercial development around Penn Station is not practical because of current zoning law (page 3-15). However, if the law could be changed, might this be part of an adequate alternative to this major infrastructure investment? Although this is not the purview of the MTA, were strategies for coordination with the city considered? City Zoning changes in the 1980's were intended to decongest East midtown and encourage development further West. Yet the East Side Access project will strengthen East Midtown as the center of commercial growth for the region. How was the decision made to do this? How is this part of a long-term plan for the growth and development of the New York region? (11)

Miscellaneous

- The DEIS should explain why the Sunnyside Station must be tied to East Side Access. It is not clear from reading the DEIS exactly why the Sunnyside Station could not be built independently or as part of the TSM alternative. (12)
- It would be helpful to know more about the future of reverse-peak service; this is not explained thoroughly (page 1-14). A full description of expected LIRR service to Penn Station and Grand Central Terminal after the completion of East Side Access should be in the body of the final EIS. (13)
- What will be the impact on transit revenue when LIRR riders walk rather than use transit once they arrive in Manhattan? (14)

CATHERINE NOLAN
37th Assembly District
Queens County

THE ASSEMBLY
STATE OF NEW YORK
ALBANY

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JUN 30 2000

CHAIRWOMAN
LABOR COMMITTEE

COMMITTEES
Rules
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Veterans
Ways & Means
Corporations, Authorities & Commissions
MTA Capital Program Review Board

June 28, 2000

Anthony Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, N.Y. 10018

Dear Mr. Japha:

I write regarding the East Side Access Draft Environmental Impact Statement. I am concerned about the alternatives under consideration for the removal of excavated tunnel material (spoils). As the excavation area is in a train yard adjacent to the main line it should be convenient to use rail at the site to move the spoils. Removal by truck, as suggested as an alternative, would be unacceptable as Long Island City is very congested with truck traffic. The impact on the surrounding community if trucks are used would be severe and long term. (1)

Also, I remain concerned about the impact upon the crowding of the Lexington Avenue subway as more passengers will be boarding at Grand Central. I do not believe that any mitigating actions to increase capacity on the Lexington Avenue line are planned as part of this project. Short of a new East Side subway something more must be done to increase capacity. Efforts to improve passenger movements in and off trains have been unsuccessful in the past and I am therefore skeptical they will work in the future. (2) Current plans call for the Second Avenue subway to be opened some time after after East Side Access is completed. I do not think that the plans are sufficient to absorb the new riders as predicted. (3) Other efforts should be looked at including speeding up the 2nd Avenue subway

Finally, I concur that a new Long Island City LIRR station would help maintain and further Long Island City as a business center and reduce congestion in Manhattan and Queens, however I think that a better connection between the proposed "Sunnyside station" and other transit and Queens Plaza is necessary. (4)

Sincerely,

Catherine Nolan

ig

Room 522, Legislative Office Building, Albany, New York 12248, (518) 455-4851, FAX (518) 455-3847
District Office — 45-25 47th Street, Woodside, New York 11377, (718) 784-3194
District Office — 61-08 Linden Street, Ridgewood, New York 11385, (718) 456-9492, FAX (718) 417-4982
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The City of New York

DEPARTMENT OF BUILDINGS

EXECUTIVE OFFICES
60 HUDSON STREET, NEW YORK, N.Y. 10013-3394

website: nyclink.org/buildings

(212) 312-8000
TTY (212) 312-8188

RECEIVED
JUL 10 2000
EAST SIDE ACCESS

Richard C. Visconti, R.A.
Acting Commissioner
(212) 312-8100
FAX: (212) 312-8088
E-mail address:
richardv@doblan.ci.nyc.ny.us

June 29, 2000

Mr. Anthony F. Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, NY 10018-7605

Dear Mr. Japha:

My staff has reviewed the draft environment impact statement for the East Side Access Project that you forwarded to the Department along with a cover letter dated May 17, 2000. Please be advised that the Department has a number of concerns.

If the MTA chooses the option which requires underpinning of private buildings that work must be filed with and approved by the Buildings Department along with any other modifications to these buildings. The Department also has a procedure for monitoring vibrations that may effect landmark buildings (copy enclosed). It is requested that this procedure be followed if work adjacent to Lever House or any other landmark or historic structure is necessary. (1) (2)

The Department of Buildings has a memorandum of understanding (MOU) with Metro-North regarding the operation of cranes and derricks (copy enclosed). The Department would request that a similar MOU be executed with the Long Island Railroad prior to any work being performed. (3)

Thank you for the opportunity to express our concerns.

Very truly yours,

Richard C. Visconti

Richard C. Visconti, R. A.
Acting Commissioner

Enclosures

c: Satish Babbar
Stanley Shor

OFFICE OF PARKS · RECREATION · HISTORIC PRESERVATION
NEW YORK STATE
Bernadette Castro
Commissioner

New York State Office of Parks, Recreation and Historic Preservation
Historic Preservation Field Services Bureau
Peebles Island, PO Box 189, Waterford, New York 12188-0189 518-237-8643

RECEIVE
JUL 13 2000

July 7, 2000

Anthony F. Japha
Chief Program Executive, ESA
Metropolitan Transportation Authority
LIRR East Side Access
469 7th Avenue
New York, NY 10018-7605

Dear Mr. Japha:

Re: FTA/MTA
East Side Access
New York City
95PR1757

The State Historic Preservation Office (SHPO) has reviewed the submitted Draft Environmental Impact Statement (DEIS) prepared for the MTA/LIRR East Side Access Project (including the Draft Programmatic Agreement). We have done so under the provisions of Section 106 of the National Historic Preservation Act of 1966.

We also had the opportunity today to discuss the materials with Donald Burns of the Federal Transit Authority's Region 2. During that conversation, we communicated that our office is comfortable with both the DEIS and the Draft Programmatic Agreement. We have no substantive comments at this time.

We look forward to reviewing the Final EIS, as well as the Programmatic Agreement. If anyone has any questions, please call me at (518) 237-8643, ext. 3271.

Sincerely,

Julian W. Adams
Sr. Historic Sites Restoration Coordinator

0

CITY PLANNING COMMISSION
CITY OF NEW YORK

OFFICE OF THE CHAIRMAN

July 7, 2000

E. Virgil Conway
Chairman and Chief Executive Officer
Metropolitan Transportation Authority
347 Madison Avenue
New York, New York 10017

Dear Chairman Conway:

We are submitting our written testimony on the East Side Terminal Draft Environmental Impact Statement for your consideration. We support this important project but ask that the MTA study the opportunity to provide a one-seat rail trip from the East Side Terminal to John F. Kennedy Airport.]0

Thank you for giving this suggestion serious consideration..

Sincerely,

Joseph B. Rose

Enclosure

c: Susan L. Kupferman, Special Assistant to the Executive Director

Joseph B. Rose, *Chairman* (212)720-3200
22 Reade Street, New York, N.Y. 10007-1216
FAX (212)720-3219
http://www.ci.nyc.ny.us/planning

July 7, 2000

NEW YORK CITY DEPARTMENT OF CITY PLANNING
TESTIMONY ON EAST SIDE TERMINAL
DRAFT ENVIRONMENTAL IMPACT STATEMENT

The proposed East Side Terminal for the Long Island Rail Road (LIRR) at Grand Central Station will be a significant improvement to the City's transportation system. For decades many thousands of commuters have taken the LIRR from Queens and Nassau-Suffolk to Penn Station and then headed back to the East Side of Manhattan where they work. The East Side Terminal will dramatically shorten their commute by providing LIRR service directly to Grand Central. By 2010, with the East Side Terminal in place, 62,000 additional people will travel directly to Grand Central during the weekday morning period. (2)

The East Side Terminal also is the best starting point for another important link in the City's transit system -- a one-seat rail trip from Manhattan to John F. Kennedy International Airport (JFK). Studies by the Port Authority, the City Planning Department and the MTA have shown that most of the potential riders for rail service to JFK would start their trip within walking distance of Grand Central Station. Approximately 70 percent of all jobs in Midtown are within walking distance of Grand Central. By comparison, only 36 percent of these jobs are within walking distance of Penn Station. Although consideration is being given to providing airport access to JFK from Penn Station (using the LIRR and a connection at Jamaica to the Airtrain), we believe the more promising approach is to provide airport access from the East Side Terminal, and this alternative should be studied in the environmental impact statement. (3)

Needless to say, providing the most efficient and attractive possible train service to JFK would produce considerable environmental and economic benefits to the City. Airport access would relieve congestion on some of the City's most heavily trafficked arteries, including the Van Wyck

Expressway, and would address recurrent complaints from the business community, tourists and others about how difficult it is to get from JFK to Manhattan.

Providing airport access from Grand Central would, however, involve making difficult decisions about how to use limited rail capacity. The draft environmental impact statement (DEIS) indicates that the capacity of the 63rd Street Tunnel is limited to 24 trains per hour to Grand Central. The proposed action would devote all the available peak-hour capacity in the 63rd Street Tunnel to LIRR commuters. If some of these trains were used to provide the one-seat rail trip to JFK, commuter service would have to be scaled back. More analysis is needed of how best to use the available infrastructure.

The MTA should analyze the feasibility of providing a one-seat ride to JFK as part of the Eastside Terminal project and the East Side Terminal should be built in a way that, at the very least, would accommodate a one-seat ride to JFK in the future. It is essential that the opportunity to achieve a one-seat ride to JFK from Grand Central not be lost. Unless the DEIS is revised to include a consideration of a one seat ride to JFK, the public and the decision-makers will be denied an opportunity to fully evaluate and comment on the potential effects of the proposal.

Specifically, the DEIS should be modified as follows:

1. The DEIS should evaluate an alternative scenario that includes a one-seat ride to JFK from the East Side Terminal.
2. The DEIS should evaluate how the proposed action would affect the potential to provide a one-seat ride to JFK in the future. In the DEIS, peak-hour forecasts indicate that all 24 LIRR trains using the 63rd Street tunnel and servicing Grand Central would be devoted to increased LIRR commuter service under the proposed action. This would preclude the possibility of providing a one-seat ride to JFK from Grand Central.
3. The DEIS should evaluate the consistency of the proposed action with current public policies,

including consistency with the goals and objectives of the MTA's ongoing study of airport access to JFK.

(5)

Another issue that deserves more attention are the planning and zoning proposals in Long Island City. New York City is committed to developing the commercial core of Long Island City to create a new, 24-hour, mixed-use neighborhood. To that end, the Department of City Planning has filed applications for zoning map and text changes that would create the zoning capacity for new office and residential development within a five-minute walk of the LIRR's proposed Sunnyside Yard station. The new station will play an important role in the success of this new neighborhood. The DEIS should describe more fully the City's planning and economic development strategy for Long Island City, and focus in particular on how the pedestrians will get from the new LIRR station to the new commercial center contemplated in the proposed zoning. Improvements will be required along the Queens Boulevard bridge, which is the pedestrian connection between the new station, the Queens Plaza and Queensboro Plaza subway stations and the area to be rezoned.

(6)

The City of New York

FIRE DEPARTMENT
9 METROTECH CENTER BROOKLYN, N.Y. 11201-3857

DANIEL A. NIGRO
Chief of Operations
Bureau of Operations Room 7W-1

RECEIVED
JUL 18 2000
OFFICE CHIEF, PROG. MGT.
EAST SIDE ACCESS
cc: Audrey Heffernan 7/18/00

July 7, 2000

Mr. Anthony F. Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, N.Y. 10018

RE: East Side Access Proposal

Dear Mr. Japha:

The Fire Department has evaluated the Draft Environmental Impact Statement for the above referenced project. We will have no problem supporting the project with the manpower and equipment currently available to us. (1)

Because of the size and nature of this project, it is imperative that this Department be kept aware of proposed construction details so that we may comment on their impact on our operations. We are particularly interested in maintaining emergency vehicle and manpower access to all construction sites, tunnels and emergency exits. In addition, fire hydrants must be available in proximity to work sites and tunnel entrances.

Before and during construction, we would require access to tunnels and work sites in order to conduct familiarization drills for local fire units. This will enable our personnel to conduct site safety inspections and to become familiar with tunnel entrances and firefighting equipment. (2)

In order to determine if any Fire Department utilities are in the affected streets, you may call Mr. Dilip Badami of our Bureau of Fire Communications at (718) 999-2941.

Captain Robert Weinman of our Public Transportation Safety Unit (718) 999-2961) is our contact person for this project. He currently sits on one of your advisory boards and he will be concerned with issues such as exits, frefighting equipment below ground, communications, ventilation, lighting, fire detetection and power shut-off.

If you have any questions, please call Captain Gerald F. Wren at (718) 855-8571.

Very truly yours,

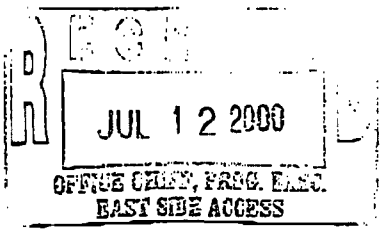
Daniel A. Nigro
Chief of Operations

DAN:GFW:ep
Japha

Cc: Mike Vecchi
Chief of Staff

Capt. Bob Weinman, PTSU

National Railroad Passenger Corporation, 400 W. 31st Street, New York, NY 10001



July 11, 2000

Mr. Anthony F. Japha
Chief Program Executive
LIRR East Side Access
469 7th Avenue
New York, NY 10018-7605

Dear Mr. Japha:

Included herewith are Amtrak's comments on the LIRR East Side Access Draft Environmental Impact Statement dated May 2000, and received by this office on May 18, 2000. Should you have any questions regarding the attached please contact Mr. Joseph DeVito of my staff to assist you. He can be reached at (212) 630-7779.

As rail transportation providers, we view the East Side Access project as a favorable enhancement of existing LIRR service and an opportunity to provide improvements to the entire region's rail service. We also believe, however, that this important service should and can be provided with minimum disruption to other regional rail transportation providers. Our comments reflect those areas where we are concerned that the draft EIS does not fully identify potential impacts and necessary mitigation measures applicable to Amtrak or Amtrak service, particularly during the lengthy construction period. We would be happy to discuss these further. 39

Thank you for the opportunity to respond to the draft EIS.

Sincerely,

W. R. Ernst

Walter R. Ernst
General Manager
Metropolitan Division, Amtrak

Cc: Letitia Johnson, Regional Administrator, FTA
Anthony G. Carr, Deputy Regional Administrator, FTA

National Railroad Passenger Corporation (Amtrak)

Comments to MTA/LIRR East Side Access
Draft Environmental Impact Statement of May 2000 (DEIS)

July 12, 2000

The East Side Access Project ("ESA" or the "Project"), while an important project for the region, has the potential to significantly disrupt Amtrak's Northeast Corridor operations (that is, its service from Washington, D.C. to Boston). Amtrak is in the final stages of implementing its new, congressionally-mandated high-speed rail service for the Corridor. This high-speed service is critical to bringing transportation services in the northeast into the 21st century, as well as to fulfilling Amtrak's concurrent mandate to operate subsidy-free by 2001. The success of Amtrak's high speed rail program requires the delivery of high-quality, reliable and on-time train service. Amtrak storage, service, inspection and maintenance operations at Sunnyside Yard in Queens are a crucial component in delivering this service. If the impacts of the ESA at Sunnyside Yard both during and after construction are not properly evaluated and mitigated, Amtrak's ability to provide its train service will be seriously compromised, and Congress' multi-million dollar investment in high speed rail service will be frustrated.

The level of detail provided in the DEIS makes it impossible for Amtrak to comment on all of the potential impacts of the ESA. Note that, in general, Amtrak supports the ESA and understands that the complexity of the ESA Project makes it difficult to outline fully each and every impact. However, the lack of specifics provided in the DEIS, combined with the very real potential for serious impacts to Amtrak train service, means additional work is necessary to understand Project impacts and appropriate mitigation. In addition, we are concerned whether sufficient Project resources have been committed for this mitigation. We have outlined herein our major concerns with the DEIS as it is written. (1A)

General

1. **Throughout the DEIS, assumptions regarding Amtrak's payment of East Side Access Project-generated expenses are in error. These costs should be added to the ESA Project costs noted in the DEIS section on Commitment of Resources and elsewhere; otherwise, it cannot be assumed that the underlying improvements will be built, and the resultant impacts must be disclosed.** (1B)

In the description of Project Alternatives at p. 2-30 and Tables 2-3 and 22-7, the cost estimates for the preferred alternative include a statement that certain improvements benefit Amtrak operations and declares that improvements "would be funded by the agencies that most directly benefit from the improvements, and not as part of the total ESA capital costs." We note that the items listed in the Tables provide little or no benefit

to Amtrak: the fourth loop track is for use by LIRR to Yard A, and the westbound bypass provides no benefit to Amtrak, as explained at number 12 herein. Moreover, even if Amtrak stood to gain from the improvements, there are no plans or money in its budget (or expected to be available) to pay for them. (1B)

As another example, the discussion on p. 17-35 assumes that Amtrak will pay for the permanent relocation of Buildings 2, 3 and 4 in Sunnyside Yard. That discussion incorrectly states that Amtrak plans to demolish those buildings and construct a new facility for maintenance and yard personnel. While this redevelopment was identified as a long-term planning possibility in the context of a possible NYCTA land purchase, it is not currently in Amtrak's budget or plans, and it has never been Amtrak's expectation to pay for such relocation. Accordingly, if those buildings were to be demolished, the ESA project must address the permanent relocation of the functions in those buildings in new structures.[1] (24)

By assuming that Amtrak will pay for Project-related mitigation, the DEIS attempts to undertake capital project budget decisions for Amtrak. This is unacceptable. While Amtrak and MTA/LIRR may in the future come to a contractual understanding concerning the sharing of capital costs related to EAS and the use of Amtrak property, Amtrak has not yet, nor is it ever required to, financially participate in this Project. (1B)

2. Throughout the DEIS, the baseline drawings used for Sunnyside Yard are outdated and do not reflect current conditions at the Yard. (2)

For example, the access roadway from 42nd Place to the new High Speed Rail Service and Inspection Facility is not indicated, and the impact of the Fourth loop track on this roadway (and therefore to access the High Speed Rail Facility) is not discussed. Use of up-to-date and more complete drawings would allow a more complete determination whether the ESA Project will impact recent and existing construction, including buildings, track, catenaries, substations and utilities. Amtrak would be happy to provide such drawings.

3. Without elevation drawings of proposed construction at and about Sunnyside Yard, it is not possible to assess the potential for impacts from the ESA Project to the existing electric substations, utility tunnels, air compressor station, utilities, catenaries and other existing facilities at the Yard. (3)

We request that such drawings be made available so that the potential for those impacts can be assessed.

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[1] While the DEIS reflects that Buildings 2, 3 and 4 are planned for demolition, all other documents submitted to Amtrak reflect the desired demolition of Buildings 3, 4 and 5. Please clarify.

4. While Amtrak fully anticipates continuing active cooperation with MTA/LIRR on the ESA Project, it is not clear what is meant on by the statement on p. 5-30 that "negotiation ... in regard to construction and operation of the East Side Access project will take place within [an] already established leasing relationship."

(4)

Amtrak is under the impression that a new agreement specific to the Project is contemplated to address issues such as LIRR's need for additional easements on site, payment and timing for Amtrak facility relocation, future yard usage, and many other issues. While Amtrak supports the Project and anticipates continued cooperation, it cannot do so at the expense of its own operations.

Contaminated Materials – Impacts

5. The DEIS underestimates the potential impacts to groundwaters and soils at Sunnyside Yard from Project de-watering activities and omits a reasonable alternative which would avoid most of those impacts.

As noted in the DEIS (pp. 14-7 to 14-9), Sunnyside Yard is a NYS Class II Inactive Hazardous Waste Site with petroleum and PCB contamination, and a plume of PCB-contaminated oil floating on groundwater in the northeast portion of the Yard. The steps in the NYS Department of Environmental Conservation ("DEC") process for clean-up of such Sites are: (i) a Workplan for the Remedial Investigation (RI) for the site must be approved; (ii) the RI is then written and it must be approved; (iii) a Feasibility Study is submitted and must be approved; (iv) a Preliminary Remedial Action Workplan (PRAP) is written and must be approved; (v) a Public Meeting is held; (vi) a Record of Decision is written and issued; (vii) documents for remediation work are prepared; and (viii) contractors are chosen, and work is scheduled and carried out. Pursuant to an Order on Consent (the "1989 Order on Consent") for the site executed by Amtrak and New Jersey Transit in 1989, Amtrak's only obligation at this point is to perform a Remedial Investigation and Feasibility Study of the Yard.

(5)

Sunnyside Yard had been broken up by NYS DEC into manageable sections for purposes of the investigation and clean-up evaluations. The section of Sunnyside Yards where the plume is located is identified as Operable Unit 3 ("OU3"). As of July 5th, the scope of the RI Workplan for OU3 submitted to the NYS DEC by Amtrak and NJ Transit initially in 1997 is still not fully resolved. In the meantime, Roux Associates, consultant to Amtrak and NJ Transit, is operating a passive recovery system at the plume that consists of one trench and two passive oil skimmers. Because this is a passive system at one section of the plume, it ***cannot*** be expected to recover most of the oil. (The paragraph discussing Sunnyside Yard at p. 14-19 implies otherwise.) Thus, it cannot be assumed that the NYS DEC process will be complete, and the majority of the oil out of the ground, before work commences on the ESA Project in 2001.

Even with the safeguards indicated in the DEIS for construction of the TBM launch site, the real risk remains that the PCB-contaminated plume will be affected.[2] If there is movement of the plume from de-watering activities, the efficacy of the contingency plans involving reinjection are unknown. In any event, reinjection will require obtaining injection permits and performing the necessary construction for injection, all of which will take time, forcing construction to stop in the midst of activity.

Any movement of the plume, either vertically through a groundwater depression (drawdown) or horizontally through a drawing action, is not acceptable, either to the NYS DEC or to Amtrak. Movement of the plume would have some or all of the following adverse consequences:

- the volume of soil contaminated with oil and PCBs would increase
- spreading the oil over a larger area would make recovery and eventual cleanup more difficult
- any down gradient soils previously remediated to accommodate track work (including those on LIRR property) may be recontaminated
- lowering the groundwater would allow the plume to go beneath the sewer line which currently acts as a barrier to northern movement.

(5)

Movement of the plume would also require its recharacterization for NYS DEC as well as recharacterization of nearby soils, a new remedial action workplan and feasibility study, and considerably increased final remediation costs.

Note that a portion of the plume and an area of soil contamination is located under and around the proposed new track on LIRR property that will be used to access Yard A. Failure to remedy this area of contamination now to NYS DEC's satisfaction could require later action and interfere with later operations.

A reasonable alternative to the very possible and grave consequences of moving the plume is available to the Project sponsors: remediation of the free-floating product before the ESA Project begins. With such remediation, the adverse consequences of a drawdown would be significantly reduced. In addition, the ESA Project would benefit by saving on monitoring costs, testing costs, and possible design and construction costs for a "more" permeable wall. The risks of stopping construction in order to "reinject" water, and of interference with ongoing Project operations at a later point, are also significantly

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[2] Comparison to the 63rd Street connection cutoff wall is not dispositive of the issue of whether a slurry cutoff wall will be effective in this case. Although the 63rd Street connection is closer to the plume, other physical conditions - such as intervening buildings and the sewer line between the construction activity and the plume – were relevant to the de-watering effects in that instance.

reduced. The pluses for the Project outweigh the minuses, and the MTA/LIRR should consider, as an alternative, its remediation of the plume with Amtrak's assistance prior to commencing work on the Project. (5)

Please note that in addition to de-watering for the TBM launch site, the TBM will tunnel through areas where the groundwater is contaminated with chlorinated solvents. De-watering in connection with those activities, and the possibility of incurring and disposing of such contaminated groundwater, should also be addressed in the DEIS. (5B)

Another related concern is that Project de-watering activities could cause offsite groundwater, which is more heavily contaminated with chlorinated solvents, to flow on-site. This should also be discussed. (5C)

6. The DEIS does not discuss the need for appropriate handling of sewer lines relocation at Sunnyside Yard in order to avoid potential adverse impacts.

Some of the sewer lines at Sunnyside Yard have been identified as containing PCBs and have been identified as Operable Unit 5 for purposes of NYS DEC investigation and cleanup. Any relocation of lines must take into consideration the need for proper handling and disposal of such lines, approval and sign-off from the NYS DEC. Any sewer line relocation and proper disposal of contaminated materials must be coordinated with, and approved by, Amtrak. (6)

7. Please note a number of factual corrections in this Section important to the DEIS.

Under "Existing Conditions" for Sunnyside Yard (pp. 14-7 through 14-10), there are a few factual errors and omissions. On p. 14-7, we note that the plume of PCB-contaminated oil contains approximately 75,000 – not 200,000 – gallons of product. On that page we also note that there are no "transformer yard areas" at Sunnyside Yard: while there are transformers on site, these are dispersed and are not located within a single area. On page 14-8, second paragraph, we note that another NYS DEC Class II Inactive Hazardous Waste Site is located to the north of Sunnyside Yard and is a source of chlorinated solvent-contaminated groundwater. (7)

8. The DEIS should also make clear that all construction activities in the Yard, including those involving the construction of replacement buildings for Amtrak sites requiring demolition for the Project, must be addressed with NYS DEC pursuant to the 1989 Order on Consent. (8)

9. The DEIS should note that all soil disposal from Sunnyside Yards must be coordinated with Amtrak.

There are restrictions on where material generated from Amtrak property can be shipped. In addition, there are known areas of concern relating to soil contamination in the Yard. All soil from soil excavations or cut and cover operations must be sampled, properly classified (with the hot spots delineated), documented for submission to NYS (9)

DEC, and properly disposed of. This activity must be coordinated with Amtrak, which must concur on the final destination of such soils. (9)

10. It is not clear whether the abandoned substation 1A at Sunnyside Yard requires demolition; if so, significant environmental issues involving asbestos and pigeon waste will be implicated. (10)

The ESA costs for demolishing this Substation should include the costs of compliance with applicable law in removing and disposing of these materials.

Construction Impacts

The ten-year construction of the East Side Access, including tunneling under Sunnyside Yard, has the potential to create major disruptions of Amtrak operations and significantly impact its facilities unless additional mitigation measures are included as part of the Project. (Alternatively, there may already be an intent to include such measures, but these are not fully described in the DEIS.) New York City is the hub of Amtrak's Northeast Corridor Service, which runs from Boston to Washington, D.C., and is Amtrak's single busiest corridor nationwide. Sunnyside Yard, an already constrained location, is the railyard servicing this hub. Any activity that impacts Amtrak operations at Sunnyside Yard will have a ripple effect on service between Boston and Washington, D.C. The DEIS section on construction impacts to Amtrak (p. 17-35) rather summarily concludes that work will be performed so that it will not adversely affect Amtrak's operations. This would not be the case based on the information given in the DEIS and construction plans shared to date with Amtrak.

The Yard is also used by New Jersey Transit for turnaround service, and Yard activities threaten to disrupt service on several of its lines unless mitigation measures are added. (11)

It should be noted that a portion of the Yard where the High Speed Trainset Service and Inspection Building (the "S&I Building") is located is subject to a mortgage held by a private entity. There are also utility, access, and track easements in favor of that mortgagee. Any use of, or impact to, the property subject to those agreements is contingent upon obtaining the necessary third-party consents.

11. Even with the most advanced TBM methodology, given soil conditions at the Yard, some soil settlement should be expected from tunneling activities. In addition, excavation on the north side of the Yard appears to affect water table elevation and groundwater flow, which in turn can also cause soil settlement. Any soil settlement at the Yard, particularly beneath the body track, could cause serious and significant delays in train service. Additional mitigation measures are needed.

The new tunnels will run through the heart of the Yard, beneath numerous tracks. Soil settlement of any degree under the Sunnyside Yard body track would render the track unusable. Sunnyside Yard is near capacity, and any out-of-service tracks would cause significant delays to trains being dispatched from New York, and Northeast

Corridor train service. The tunnel construction needs additional review, testing and contingency plans. Some suggested mitigation measures include soil monitoring, providing a carrier (self-supporting) rail during all phases of construction affecting a yard lead or track, and underpinning tracks in the Yard. (11)

12. We understand that two out of four train lines will be taken out of service at Harold Interlocking, with only a single temporary western bypass route for both LIRR and Amtrak, will result in a single track operation for Amtrak service to and from Boston; this will cause delays in Amtrak's Acela Express and Acela Regional Service.

The temporary western route would be primarily for LIRR service, resulting in a single track operation for Amtrak service – reducing by half the number of tracks available to Amtrak. This in turn will seriously compromise Amtrak's new high-speed train service. As a result of this service, scheduled to commence later this year, the number of Amtrak trains between Boston and D.C. will at least double by 2010. On-time service will be critical to the success of this billion dollar federal project. The impact caused by the reduction in tracks can be addressed through the construction of a temporary eastern bypass as well as a western bypass. (12)

13. The loss of body tracks 1 and 2, representing 40% of the storage area for the S&I Building, for the duration of the ESA construction will make it impossible to provide High Speed service as currently scheduled.

Failure to deliver and move trains from the S&I Building as scheduled also relieves the entity servicing the trains from its schedule, exacerbating any delays. There is no indication in the DEIS whether body tracks 1 and 2 will be relocated or replaced prior to their removal from service. (13)

14. Loss of outbound motor and north runner tracks at Sunnyside Yard during Stage 1 construction will impact Amtrak's and NJ Transit's access to the engine service area and loop track, and make it impossible to route trains efficiently through Sunnyside Yard, which in turn will cause delays to New York dispatchments and degrade Northeast Corridor train service.

Similar to 2 above, it needs to be clarified that the temporary north runner and outbound motor tracks will be constructed prior to these tracks being removed from service. (14)

15. Reversing the operations of Lines 1 and 2 during Stage 3 construction and the use of unidirectional equipment will cause serious operational difficulties and congestion in the Yard and result in delays to Northeast Corridor train service. It will also impede train servicing and car washing for NJ Transit.

Congestion will result because eastward trains would operate Line 2 to Sunnyside to the Sub tracks. These tracks are not long enough to hold multiple trains, so throughput to the Yard will be affected, especially during the A.M. peak period. This may result in (15)

Line 1 being blocked and unusable, causing delays to both LIRR and Amtrak revenue trains. In the evening peak, westward trains would operate via the Loop to Line 1 which takes approximately 25 minutes, versus current operations which are 5 minutes to the Sub tracks and Line 2.

Currently, trains circulate in Sunnyside Yard via the loop track, where they are washed; the car wash on Loops 1 and 2 currently operates only in the eastward direction. (15)

If Lines 1 and 2 are reversed, the resulting impacts can only be avoided by reorienting Sunnyside Yard body track walkways, adding a 480V standby system, adding bi-directional capacity to the Sunnyside Yard car wash, and adding yard/relay crews for the increased train movements required.

16. The methods in the DEIS discussed for controlling vibration are insufficient for protecting structures at Sunnyside Yard, many of which are over 90 years old, and fragile. Without additional protection and monitoring, impacts from blasting and other activities is likely.

In particular, buildings near the TBM launching site are in fragile condition. Other concerns are the underground utility tunnel perpendicular to the track structures, the tracks themselves, and, if not yet reconstructed, the Honeywell Street Bridge. Vibration impacts to the tracks could result in train derailments and the related loss of service and potential injury. Amtrak also notes that the blasting specifications for acceptable vibration levels are less restrictive than those used by Amtrak for work on or adjacent to Amtrak's property. For these reasons, we believe that the special mitigation measures to be used for historic resources and discussed at pp. 17-53 to 17-54 should be used for all structures impacted by vibration from construction at the Yard, and that Amtrak specifications for blasting should control. (16)

17. Plans for the Yard do not appear to include a connection between Amtrak and the New York & Atlantic Railroad on subtrack 4; loss of this planned connection would impact Amtrak plans for mail and express business deliveries, and the crucial revenues expected from those services. (17)

The connection appears jeopardized by the construction of the westbound bypass as designed.

18. The roadway from 42nd Place to the new S&I Building appears to be cut off by the "open cut" operations on the north side of the Yard. If so, the result would be impeded access generally to the S&I Building, an impact on certain contractual obligations relating to the Highspeed Program, and, during NYC DOT construction of the Honeywell Street Bridge, possibly no vehicular access to that part of the Yard. (18)

Currently, vehicular access to that side of the Yard is via the ramp off of the Honeywell Street Bridge. This access will not work well for the S&I Building when it is in operation, since the route has tight turns and close clearances, limiting its use to

vehicles of pick-up truck size or smaller. But even this access will be unavailable for an extended period of time due to the Honeywell Street Bridge project. The roadway from 42nd Place will serve as the alternative for Yard access during the NYC DOT construction project, and is part of an access easement held by the mortgagee. (18)

19. **The use of a large area on the south side of Sunnyside Yard for a staging area would dislocate Amtrak's current Maintenance of Way base, where all track supplies and materials are stored for New York area truck infrastructure.**

The DEIS provides insufficient information on construction staging locations to determine impacts to operations at Sunnyside Yard. Amtrak is concerned that such areas not impede access via the south side of the Yard, which may become the primary access to the Yard once excavation at Northern Boulevard begins. Staging areas in the Yard have already been committed to the NYC DOT for its bridge reconstruction project, making space very tight. Moreover, the DEIS should clarify that any plan involving the use of Amtrak property is subject to Amtrak review and the Project sponsors reaching an agreement with Amtrak. (19)

20. **Although the need for coordination with NYC DOT is mentioned, the Project construction staging plans and schedule do not appear to fully appreciate the effects of the NYC DOT bridge project for reconstruction of the Honeywell Street and Queens Boulevard bridges transversing the Yard.** (20)

The DOT bridge project is a fully funded and scheduled project which Amtrak is committed to support with manpower and scheduling of Yard activities. Amtrak does not have the staff to be able to provide this support to the ESA Project at the same time. As explained above, the NYC DOT proposed will also affect site access and the availability of construction staging space and work areas.

21. **Information is needed on how and where the tunnel drilling machinery will vent to the surface, and what constituents will be released into the air as a result of TBM operations.** (21)

22. **No analysis has been made of the traffic impacts – trains, trucks or otherwise – within, around and to Sunnyside Yard due to construction delivery and soil and debris removal activities associated with this major construction project.** (22)

Rail simulation models and maintenance of traffic plans may be needed to determine impacts, and whether the traffic flow can be organized to eliminate such impacts.

23. **As noted in the DEIS, residential uses exist approximately 70 feet from the proposed construction of Harold Interlocking. Amtrak urges the MTA/LIRR to commit to installing a noise barrier along the construction alignment during the period of intrusive, noise-intensive activity, such as pile driving.** (23)

24. As noted in No. 1 above, Amtrak has no current plans to rebuild "Buildings 2, 3 and 4" in Sunnyside Yard; loss of those buildings must be replaced with other permanent facilities for Amtrak maintenance and Yard personnel.

(24)

Building new facilities and relocating Amtrak's workforce is not discussed or indicated anywhere on the construction schedule. Nor is there space at the Yard which can be allocated to house such a large group. Improper planning for work facilities for yard personnel has the potential to disrupt the operation of Sunnyside Yard in its entirety.

Utilities

25. In addition to the utilities discussed at p. 13-3 (including a 12-inch water line), a new water line will be installed as part of the NYC DOT Honeywell Street and Queens Boulevard Bridge replacement project. This new line will need to be maintained and protected during construction.

(25)

In addition, a temporary water line should be installed prior to any demolition of the existing line.

26. Since loss of the 42-inch sewer line at the south side of the Yard will cause the shutdown of Amtrak's vacuum sewer system for train maintenance (waste disposal), the new sewer line must be installed prior to tunneling operations in the Yard.

(26)

This work is not indicated on the construction scheduling for the Project at the Yard (e.g., Figure 17-1, p.17-14).

27. There are already a significant number of ConEd power outages in Sunnyside Yard, and any additional loss, which often accompanies major construction projects involving line relocation, would provide unacceptable shutdown in operations at the Yard, affecting train movements in and out of Penn Station and Northeast Corridor service.

(27)

While the ESA plan includes six additional substations, it is not clear whether any of these will provide dedicated back-up electrical services for Sunnyside Yard.

In addition, there are a number of existing Amtrak substations potentially impacted by the Project. These include Station No. 44 (not shown on any of the DEIS drawings), which is within the Harold Interlocking area, and the static frequency converter substation, close to the loop track.

28. A utility relocation plan for water, electrical and sewer services should be provided to Amtrak for review.

(28)

Without such a plan, it is not possible to determine at this time whether there will be any additional utility impacts from the Project.

Transportation Impacts – Permanent

29. Additional information is needed on the location of the Fourth loop track to assess if there will be impacts to Amtrak's frequency converter.

Current plans provided by LIRR do not locate Amtrak's new frequency converter in relation to the Fourth loop track. Without this information, it is not possible to assess whether Amtrak will be able to utilize this Fourth loop and/or its frequency converter. (Nor can Amtrak, MTA/LIRR or the FTA assess construction impacts of the loop.)

29

30. The Harold Interlocking at Sunnyside Yard should include both an eastward and a westward bypass; without both bypasses, Amtrak's service - and particularly its critically important High Speed Rail Service between Boston and Washington, D.C. - will be compromised.

We understand that, despite initial plans, only a permanent westward bypass is now planned for implementation by the ESA Project.

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31. Without the proposed location of the new General Motors Access Bridge, traffic impacts from the Bridge cannot be determined.

31

32. Control of dispatches for Plaza Interlocking needs to be with Penn Station Central Control to allow for proper functioning of connections through Harold Interlocking and Sunnyside. Otherwise, delays in Amtrak Northeast Corridor Service are inevitable.

32

33. The plans reflected in the DEIS are silent on the condition of the TBM launch site upon Project completion and return of the site to Amtrak. If the launch site is on Amtrak property, the site should be returned with the capacity to support future tracks. Otherwise, NJ Transit will be unable to use the area, as planned, for its future growth.

33

34. The existing software used at Penn Station for controlling train operations and movements at Penn Station and Harold Interlocking will need modification each time Harold Interlocking is changed and will need to accommodate AC and DC plate changes.

The ESA Project should make provisions to deal with these Project-created changes and the concurrent costs.

34

35. It is not clear whether the DEIS assumes at p. 9B-4 that new track capacity at Penn Station as a result of fewer LIRR trips into the Station will be utilized by Metro-North Railroad. If so, note that future use of these slots is up to Amtrak, and a determination of their use cannot be made at this point.

35

Economic

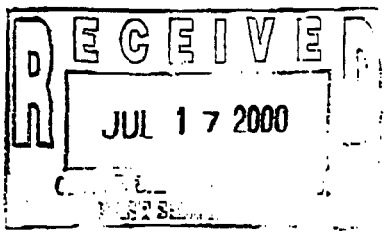
36. The DEIS should analyze further the impact on existing Amtrak retail revenues at Penn Station, and the development plans for that Station due to the significant decrease in LIRR commuters at the Station. (36)

Historical Resources

37. Amtrak has insufficient information to judge at this point whether it concurs in the determination that Signal Tower F and Switch Tower Q meet the eligibility criteria for inclusion in the National Register, but reserves the right to review this determination. (37)

Miscellaneous

38. Table S-3 should be modified to include the matters described above. For example, "Construction Impacts: Transportation" should take note of the potential impacts to Amtrak as described above or, preferably, the mitigation to be provided so that Amtrak service and operations will not be impacted. No mitigation should be included under the assumption that Amtrak will pay for it; Amtrak has made no such commitment. Under "Property Acquisitions," note should be made of the need to relocate numerous Amtrak facilities at Sunnyside Yard, and whether the plan is for permanent relocation or temporary relocation. Other changes should be made to conform the summary with the comments noted above. (38)



Richard H. Salmon, Jr.
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July 11, 2000

Mr. Anthony Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, NY 10018

Dear Mr. Japha:

I recently obtained a copy of the DEIS for the MTA Long Island Rail Road East Side Access Project and wanted to comment on the report. I noted that on page 1-20 of the DEIS, the joint planning effort called "Access to the Region's Core (ARC)" contemplates a through connection between Penn Station and Grand Central Terminal in order to "foster the concept of a one-seat ride from all commutersheds to both East and West Midtown".

It is clear to me that the Preferred Alternative - Option 2 is potentially consistent with the goal of the ARC while Option 1 is not. A deep tunnel could conceivably be continued south and west to connect to a similar deep station constructed in the future as part of the Penn Station complex and also tie into a new Hudson River crossing. This connection could be constructed as part of the original project or at a later date, if the project is designed to make this feasible. I think it is unfortunate that the DEIS does not mention this potentially significant benefit to Option 2, which I feel is important enough to eliminate Option 1 from further consideration. Similarly, I was chagrined to see that Section 1-D (Project Goals) did not place any value on building a project that is consistent with improving access from New Jersey and the west. I urge you modify the DEIS so as to have it consider the feasibility of integrating the East Side Access Project into an overall plan such as is contemplated in ARC.

(1)

(2)

Clearly, overall capacity of the project would ultimately be increased if the Option 2 terminal were to later become a through station. Platform throughput of a through station is significantly higher than in a stub-end terminal since all, or virtually all, conflicting reverse movements are eliminated, if properly designed. Further, once institutional barriers are overcome, through commuting would be possible from, say, Hicksville to Metropark were a service begun which operated with M-6/M-8 type equipment capable of operating from both DC third rail and AC catenary power sources. Certainly, there is no technical barrier to such an operation, even today.

(3)

I am advocating a long-term solution which could improve transportation throughout the entire tri-state region while also potentially increasing the long-term capacity of the project. I urge you to make the following modifications for the FEIS:

1) Add a project goal which considers the long-term ability to improve transportation from the west. (2)

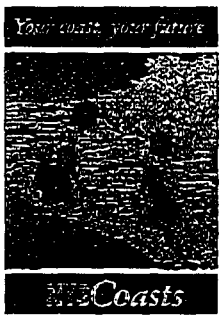
2) Evaluate the feasibility of modifying the Preferred Alternative - Option 2 in the future to extend the deep rock tunnels to the south and west thereby converting the proposed terminal to a through-station. This would have the added benefit of adding capacity to the project in the future. (3)

3) Eliminate the Preferred Alternative - Option 1 from consideration due to its higher cost and reduced transportation benefit to the region in the long run. (1)

Thank you for considering these comments.

Sincerely,

Richard H. Salmon, Jr.



DEPARTMENT OF STATE

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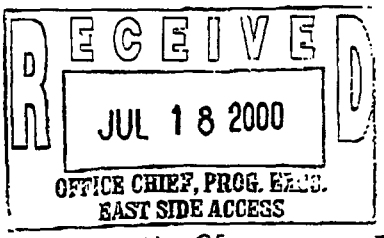

July 12, 2000

cc: A. Hefferman 7/18/00

Anthony F. Japha
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Re: F-00-520
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New York City

Dear Mr. Japha:

Thank you for making the two volume study entitled East Side Access: Draft Environmental Impact Statement, May 2000 (with appendices) available for our review.

In addition, we appreciate you forwarding - as requested in my June 15, 2000 letter to you - a copy of the two volumes to the New York City Department of City Planning, Local Waterfront Revitalization Program, Waterfront and Open Space Division, at 22 Reade Street, New York, NY 10007.

I have been in communication with representatives of that office of the NYC LWRP. At this time we have no comments on your proposed project. ①

As an agency which may be requesting federal funding for the project and/or which may be required to apply for federal permits for activities (including construction) in the State's coastal zone, you will be required to establish to the satisfaction of this Department and the NYC Local Waterfront Revitalization Program that the project will not adversely affect the coastal zone of the State or the City. You should make that analysis while examining the project's effects on the State's coastal policies as set forth in the State's Coastal Management Program and the City's coastal policies as contained in its Local Waterfront Revitalization Program. That analysis should be set forth in the Final Environmental Impact Statement (FEIS), preferably in a separate section of the document.

You are also reminded that as a State agency you are required to see to it that the project is carried out in consonance with the State's CMP and City's LWRP and the policies as set forth in their respective documents.

The Department of State's consistency review decision will be reached after: 1) completion of the FEIS; 2) our examination of your agency's analysis of the effects of the proposal on the State's coastal policies; and; 3) completion of review by the NYC Planning Department. 1

Kindly mail all ensuing documents to both this office and the NYC Department of City Planning, to the attention of the Local Waterfront Revitalization Program.

If we can be of any further assistance call (518) 474-6000. In all correspondence related to this proposed project, please refer to the Department of State's file number F-00-520.

Sincerely,

David E. Buerle
Coastal Resources Specialist
Consistency Review Unit

cc: NYC LWRP - Wilbur Woods

Committee for Better Transit, Inc. *bringing together users and experts since 1962*

31-40 56th Street • Woodside NY 11377
(718) RA 8-0091 or AS 8-0650

Dr. Stephen B. Dobrow
President

RECEIVED
JUL 13 2000
OFFICE OF REG. PROG. MGT.
EAST SIDE ACCESS

Re: DEIS for LIRR East Side Access
July 2000

CBT has supported LIRR access to Grand Central Terminal for several decades; the lower level of the 63rd St. Tunnel should not have sat around all these years. We don't want to be stuck with an uncompleted project for several more decades. The region has far more transportation needs than the expected funding can support. Thus, it is critical that the "gold plating" be removed from this project and the link be built in the most "streamlined" cost-effective manner. (1) (2)

The project should be evaluated starting with the minimum approach - namely:

- Connection from the tunnel to only two LIRR tracks at Sunnyside. (3)
- No Long Island City station (4)
- No new storage facilities (3)
- Minimum new construction at Grand Central Terminal (5)

To this, additions and modifications should be considered and the marginal cost/benefit analysis or its equivalent be completed on each change or group of changes. As part of this process, variations in assumptions, operating practices, service patterns, and institutional issues should be considered. (2)

It is our view that any rail projects in the region should be designed consistent with the goal of converting the existing discrete commuter rail lines into an integrated regional rail system with through-running and pattern operations. (6)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

RECEIVED
JUL 18 2000
OFFICE CHIEF, PROJ.
EAST SIDE ACCE

cc: Audrey Heffer mm 7/18/00

JUL 14 2000

Ms. Letitia Thompson
Regional Administrator
Federal Transit Administration
One Bowling Green, Room 429
New York, New York 10004

Class: EC-2

Dear Ms. Thompson:

The Environmental Protection Agency (EPA) has reviewed the draft environmental impact statement (EIS) for the East Side Access, in New York, Queens, and Bronx counties, New York (CEQ# 99000153). This review was conducted in accordance with Section 309 of the Clean Air Act, as amended (42 U.S.C 7609, PL 91-604 12 (a), 84 Stat. 1709), and the National Environmental Policy Act (NEPA).

The purpose of the proposed project is to improve access to the east side of Manhattan for commuters in the Long Island Transportation Corridor, which consists of Manhattan, Queens, Brooklyn, and Nassau and Suffolk Counties. The draft EIS evaluates four alternatives: no build; a Transportation System Management (TSM) alternative consisting of lengthening LIRR trains, modifying stations and improving service, and providing a contra-flow lane on the Long Island expressway for buses and taxis; and two build alternatives. Both of the build alternatives propose to extend Long Island Railroad (LIRR) service through the 63rd Street tunnel, and going under the Metro-North Tracks under Park Avenue and either ending at the existing lower level of Grand Central Terminal (GCT) (Build option1), or connecting into a new level below the lower level of GCT (Build Option 2). Build Option 2 is the identified preferred alternative.

The draft EIS discusses the capacity issues on the New York City subway lines from Queens and the difficulties for LIRR commuters who have destinations on the east side of Manhattan. While the build alternatives are expected to perform very well, as far as relieving the capacity problems on both the Queens subway lines and the overall LIRR system, while also reducing the amount of vehicle trips into Manhattan, we are concerned with the implications for other aspects of the system. (1)

Particularly we are concerned that the volume of LIRR passengers to GCT will seriously and adversely impact the Lexington Avenue subway. The draft EIS uses the amount of over capacity (V/C ratio of 1.22) on the Queens subway lines (the F and E lines), as a rationale for a need for action, however, that ratio will be nearly realized on the Lexington Avenue subway, (V/C ratio of 1.17), but there is no mitigation offered. The draft EIS discusses the possibility of the Manhattan (2)

East Side Access (MESA), Second Avenue Subway, but the document does not account for MESA in the environmental analyses nor as mitigation to relieve the pressures on the Lexington Avenue lines. To a certain extent, the completion of the East Side Access project could force an action on the Second Avenue Subway and makes for a more compelling case for the Second Avenue Subway's completion in conjunction with the completion of this project. (2)

We also noted with serious concern that the draft EIS did not analyze the TSM alternative as rigorously as the No Build and the two Build Options. For example, the draft EIS discusses the possibility that a new Queens ferry pier may be needed to accommodate future riders from increased train service to Long Island City; however, it defers the analysis of that possibility by stating that environmental impacts of that action would be addressed in future permitting actions, should those take place. Also, the air quality section attempts to dismiss the necessity for modeling the TSM alternative, claiming that it "...would not generate significant vehicular activity or affect traffic conditions significantly in the Manhattan study area." However, the TSM alternative will affect transportation operations in both Manhattan and Queens, as well as other projects that are planned to be completed, such as the first phase of the MESA Project, but those impacts to the transportation system are never fully fleshed out in the draft EIS. As such, claims of insignificant increases in bus volumes and traffic conditions may not be valid. Accordingly, we strongly recommend that the final EIS present a more comprehensive analysis of the environmental impacts of the TSM alternative. (3)

Another very serious concern for EPA, is that the draft EIS did not contain a cumulative impacts analysis for any of the alternatives. While the draft EIS contained a section called "Secondary Impacts", this section did not provide a cumulative impacts analysis listing projects and particular resources for analysis in the context of cumulative impacts. For the most part, this section reiterated the direct impacts of the project on locations, such as GCT, and the mitigation for the significant effects, but never took the step to also discuss other projects that may have an impact on those same resources. In accordance with NEPA and the CEQ implementing regulations, every draft EIS must discuss the cumulative impacts of all past, present, and reasonably foreseeable actions on the resources of the human and natural environment. With this in mind, the final EIS must have a cumulative impact analysis as outlined in the CEQ guidance for considering cumulative effects. (4)

The draft EIS presents a microscale Carbon Monoxide (CO) analysis for the year 2010 at ten receptor sites chosen across the study area using the New York City Environmental Quality Review and New York State Environmental Review Procedures guidance. In addition to the receptors chosen via the above guidance methodologies, the analysis should model the receptors which were modeled in the New York CO Attainment Demonstration SIP. Moreover, since it is quite typical for motor vehicle related emissions to increase in the outyears because of increases in vehicle miles traveled, the year 2020 should also be analyzed to be consistent with long range planning practices. We recommend that the final EIS contain an analysis of these intersections in addition to the ones modeled as well as providing information on 2020 conditions. (5)

We have a concern with the draft EIS's discussion of excavated materials and contaminated materials. The draft EIS discloses that the excavated material from the drilling of the 13 miles of (6)

tunnels through Queens and Manhattan will be brought up in Queens where it will be removed via rail and truck. We recommend that the final EIS further explore the options for beneficial uses of this material especially for the considerable volume of material that is generated in Build Option 2. (6)

Regarding hazardous materials, we are concerned with the quantity and type of contamination that has been found at the Sunnyside Yard/Yard A. This area has been designated as a Class II inactive hazardous waste site by New York State Department of Environmental Conservation (NYSDEC). Currently, Amtrak and NYSDEC are in the process of cleaning up the site. We want to encourage FTA's and MTA's commitment to avoid and minimize any interference or obstruction with that clean up effort, and in fact we would like to suggest that FTA and MTA examine opportunities to enhance and expedite the clean up efforts at these locations. While the draft EIS briefly discusses what may be done onsite with any contaminated materials, it did not provide information regarding where the material will be disposed once it is either treated onsite or not. The draft EIS also states that ground water that is encountered in construction will be sampled and analyzed; however, the document does not discuss how groundwater will be treated and disposed. We recommend that the final EIS describe the procedures that FTA would follow in order to meet the requirements of the Resource Conservation and Recovery Act (RCRA), such as 1) MTA or their contractor would become a hazardous waste generator upon extraction of any contaminated soils, 2) a generator identification number must be obtained in order to transport hazardous materials, 3) more specificity regarding on site treatment of contaminated groundwater and soils, and 4) the procedures that will be used to comply with the requirements for handling and disposing of hazardous waste. (7) (8)

The draft EIS discusses maintenance and cleaning operations at Highbridge Yard and Yard A, for example. While we appreciate the efforts to control and convey the run off of chemicals associated with these operations to specific sewer systems, we would also suggest that FTA and MTA examine options for pollution prevention. Pursuant to the Pollution Prevention Act of 1990 (PPA), "It is the policy of the United States that pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner whenever feasible, and disposal or other release into the environment should be conducted in an environmentally safe manner." We recommend that the final EIS discuss programs and practices that can be implemented at these facilities, such as recycling or reusing car cleaning chemicals, or treatment of maintenance materials before they enter the sewer system, that insure the project will comply with the PPA. We have enclosed is a Pollution Prevention checklist for Vehicle Maintenance. If you have any questions, please contact Danille Fuligni of our Pollution Prevention Team at (212) 637-3584. (9)

Based upon our review, we are rating this draft EIS as EC-2, Environmental Concerns, Insufficient Information, (see our enclosed "summary of rating definitions and follow-up actions"), because we have serious concerns regarding the equal treatment of alternatives, and the lack of a cumulative impacts analysis, as well as the air quality analysis and the disposition of hazardous materials. We would like to meet with you in the near future to discuss these issues. We look forward to working

with you on this project and others in the future. In the interim, should you have any questions, please feel free to contact David Carlson of my staff at (212) 637-3502.

Sincerely yours,

Robert W. Hargrove, Chief
Strategic Planning and Multi-Media Programs Branch

Attachment

cc: Anthony Japha, Chief Program Executive
Metropolitan Transportation Authority

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

RECEIVED
JUL 19 2000
OFFICE CHIEF, PROG. EXEC.
EAST SIDE ACCESS
cc: Audrey Heffernan 7/19

ER 00/384

JUL 17 2000

Ms. Letitia Thompson
Regional Administrator
Federal Transit Administration
One Bowling Green, Room 429
New York, New York 10004-1415

Dear Ms. Thompson:

This responds to a request for the Department of the Interior's review and comment on the Draft Environmental Impact Statement (DEIS) for the **Long Island Railroad East Side Access Project,** New York, Queens, Bronx, Nassau and Suffolk Counties, New York. Because of this project's potential or probable affects to Grand Central Terminal (a National Historic Landmark) and 22 other historic properties either listed or determined eligible for listing on the National Register of Historic Places, in the five counties involved, we are processing this case as a Section 4(f) as well as a DEIS.

SECTION 4(f) EVALUATION

We concur there are no prudent and feasible alternatives, however, we can only conditionally agree with measures to minimize harm to cultural resource values. We note the inclusion in the Appendices of this DEIS of a Programmatic Memorandum of Agreement (PMOA) among your agency, the Advisory Council on Historic Preservation, the Metropolitan Transportation Authority and the State Historic Preservation Officer (SHPO), but that document is yet to be signed. We understand that the SHPO is satisfied with the language of the PMOA as far as it goes, but there remains considerations being given to some of the other historic sites out onto Long Island which may result in further stipulations to be included. Therefore, we condition our agreement with measures to minimize harm to be explicitly consistent with the final/duly signed PMOA. (2)

DRAFT ENVIRONMENTAL STATEMENT

Historical and Archeological Impacts Mitigation

It seems clear there is potential for adverse effects to cultural values, if not measurable impacts in the project as it now stands. These are at least, in part, spoken to in **MITIGATION MEASURES** (F. for Historical Resources, Pg. 7-27/28, and E. Archeological resources Pg. 8-20/21). However, our concern for complete and

adequate protection and preservation of cultural resource values as presented above, is fully applicable to this DEIS. Therefore, we can only conditionally offer agreement to the Mitigation Measures as developed thus far in consultation with the SHPO, and urgently recommend that these measures be completed to the satisfaction of the SHPO and a dully signed PMOA be incorporated in the Final Environmental Impact Statement. (1)

We appreciate the opportunity to review and comment on this DEIS and look forward to seeing the Final Environmental Impact Statement, and a Section 4(f) Determination as well.

Sincerely yours,

Willie R. Taylor
Director, Office of Environmental
Policy and Compliance

cc:
Mr. Anthony F. Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, New York 10018

City of New York
Parks & Recreation

RECEIVED
JUL 21 2000
GENERAL CHIEF, PROG. EXEC.
EAST SIDE ACCESS
cc: A. Heffernan 7/21/00

The Arsenal
Central Park
New York, New York 10021

Henry J. Stern
Commissioner

Joshua R. Laird
Chief of Planning

(212) 360-3402
sirius@parklan.ci.nyc.ny.us

July 19, 2000

Mr. Anthony Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, NY 10018

Re: Project Name: East Side Access

Dear Mr. Japha,

The following specific comments are based upon our review of the Draft Environmental Impact Statement dated May 2000 for the East Side Access project. We apologize for the overdue response.

1. **Chapter 2: Project Alternatives**

NEW SUNNYSIDE STATION

The new station in Sunnyside, Queens, designed to buttress the burgeoning growth of the Long Island City CBD, will result in more pedestrian activity. This may necessitate the addition of open-space to accommodate the needs of the increasing number of workers and residents in the area. This could be achieved by creating a public plaza with concession stands (newspaper, food, etc.) and landscaped with trees and benches. ①

2. **Chapter 9: Transportation (GCT Area)**

PROBABLE IMPACTS OF THE PROJECT ALTERNATIVES (Preferred Alternative, Opt. 1) ②

Pedestrian Conditions at Street Level, page 9C-56 and 9C-57

A street tree survey for the project site should be conducted in conjunction with landscaping recommendations. Street trees are under the jurisdiction of Parks and are an important element of the urban design characteristics of the project site. All potential tree removals should be disclosed in the EIS. Any street trees removed by the applicant must be replaced pursuant to Parks' Basal Area Replacement Formula. A tree survey and removal/replacement plan must be reviewed and approved by the Commissioner. (2)

3. **Chapter 10: Air Quality**

PARTICULATE MATTER ANALYSIS

Effects of Rail Yard Activity, page 10-17 (3)

The statement "In terms of NYAR operations, only Blissville Yard would experience an increase in diesel locomotive operations" needs clarification. The DEIS should make clear the specific impact on air quality particularly at Fresh Ponds Yards, which sits adjacent to Mafera Park, and Highbridge Yard which is located across the Harlem River from Highbridge Park and near Macombs Dam Park.

4. **Chapter 17: Construction and Construction Impacts** (4)

Although the DEIS explains that most construction activities will generally be contained within the construction sites and/or underground, any possible construction impacts on open space (specifically Mafera Park at Fresh Pond Yard) should be disclosed in Chapter 17.

If you have any questions, please call me at (212) 360-3402.

Sincerely,

Joshua Laird

NJTRANSIT
The Way To Go.

Christine Todd Whitman
Governor

James Weinstein
Board Chairman

Jeffrey A. Warsh
Executive Director

RECEIVED
JUL 24 2000
CAPITAL CONST. PROG. EXEC.
EAST SIDE ACCESS

cc: A. Hefferman 7/24/00

July 19, 2000

Mr. Anthony F. Japha
Chief Program Executive
MTA/LIRR East Side Access
469 7th Avenue
New York, NY 10018

Re: Response to LIRR East Side Access DEIS

Dear Mr. Japha:

NJ TRANSIT staff has reviewed the executive summary of the Draft Environmental Impact Statement report (DEIS) for the Long Island RailRoad East Side Access project (ESA). You are to be congratulated for significantly advancing this much needed transportation project.

As you are aware, NJ TRANSIT has been working with the Metropolitan Transportation Authority, and with the Port Authority of New York and New Jersey, on the Access to the Region's Core (ARC) Study. As the ESA DEIS states, there has been coordination of these two projects, as well as other major studies, through the MTA's Long Range Planning Framework. I am hopeful that this coordination will continue as the ESA project advances through the FEIS and engineering design phases, and it would be reassuring to see a statement to that effect included in the upcoming FEIS report. (1)

Although a build alternative has not yet been selected for ARC, continued and active coordination with ARC is strongly recommended. Specifically, NJ TRANSIT recommends that the ESA project allow for a commuter rail connection between New York Penn Station and Grand Central Terminal as identified in the early phases of the ARC. In addition, it would be desirable for ESA to incorporate features to ensure the minimum disruption to GCT when the connection is advanced. (2)

I wish you good progress on this beneficial improvement to the region's transportation system.

Sincerely,

Jeffrey A. Warsh

cc: Mark Shaw, MTA Executive Director
Kenneth Bauer, LIRR President

SF 370090 NW - 12/98

Gary M. Ross
Lianne H Ross
Name: Jeffrey M. Ross
Address: 4 Lynbrook Court
Huntington, NY 11743

July 21, 2000

E. Virgil Conway, Chairman
Metropolitan Transit Authority
347 Madison Avenue
New York, New York 10017

Dear Chairman Conway:

I am writing in reference to a quality of life issue. I live in the Greenlawn/Huntington area. My community consists of homes on ½-1 acre lots. These homes are filled with children who enjoy swimming in their backyards and riding their bikes in the streets. Needless to say we are greatly concerned over recent reports that a parcel of land near our property, which is currently zoned residential, is being considered as a possible new railroad yard.

If permitted, the excessive noise associated with a railroad yard will cause havoc with my family's life. The operation of the railroad yard will interfere with sleep, telephone calls and young children playing outside. In short, the noise created by a railroad yard will turn our suburban home into a city sounding urban center. There are several industrially/commercially-zoned parcels of land adjacent to the train tracks between Manhattan and Port Jefferson. These industrially/commercially-zoned parcels should be used for the new railroad yard. There is simply no need to convert a parcel of residentially zoned property in the heart of our community into a railroad yard. (1)

Please help keep our community as a place where children swim and ride their bikes, and not a place known for its railroad yard. Thank you.

Very truly yours,

Jeffrey M. Ross
Lianne H. Ross
Gary M. Ross

AUG 7 2000
PRESIDENT'S OFFICE

KEVIN M. GARY
6 Bowdon Road
Greenlawn, New York 11740

July 21, 2000

Deputy Executive Director Mary J. Mahon
Metropolitan Transit Authority
347 Madison Avenue
New York, New York 10017

Dear Deputy Executive Director Mahon:

I am writing in reference to a quality of life issue. I live with my wife and two small children in Greenlawn, New York. Our home of seven years is a ¼ of a mile from the Long Island Railroad's train tracks. My community consists of homes on ½-1 acre lots. These homes are filled with children who enjoy swimming in their backyards and riding their bikes in the streets. Needless to say we are greatly concerned over recent reports that a parcel of land 600 feet from our front yard, which is currently zoned 2 acre residential, is being considered for a new railroad yard.

If permitted, the excessive noise associated with a railroad yard will cause havoc with my family's life. The operation of the railroad yard will interfere with sleep, telephone calls and young children playing outside. In short, the noise created by a railroad yard will turn our suburban home into a city sounding urban center. There are several industrially/commercially-zoned parcels of land adjacent to the train tracks between Manhattan and Port Jefferson. These industrially/commercially-zoned parcels should be used for the new railroad yard. There is simply no need to convert a parcel of 2-acre residentially zoned property in the heart of our community into a railroad yard.

I have spoken to my neighbors and they universally share my belief that a railroad yard should not be permitted on this property. Homes in the community are selling in the $350,000 to $500,000 range. If a railroad yard is permitted in this residential community we will not be able to give our homes away. As a result, our community, as a class, will lose many millions of dollars. This damage can be avoided if the MTA chooses to construct the railroad yard in an industrial area, and not in residential Greenlawn. However, if the MTA decides

(1)

to pursue the Greenlawn property, I, on behalf of the class, will have no choice but to exercise my legal rights at every step of the process. In addition, if the MTA should successfully obtain the Greenlawn property and the right to use it as a railroad yard, I, on behalf of the class, will also have no choice but to exercise my legal rights in order to recover the many millions of dollars lost in property value.

Please help keep Greenlawn as a place where children swim and ride their bikes, and not a place known for its railroad yard and litigation.

Very truly yours,

Kevin M. Gary

TOWN OF HUNTINGTON
LONG ISLAND, NEW YORK

MARK CUTHBERTSON
Councilman

July 26, 2000

RECEIVED
AUG 2 2000
PRESIDENT'S OFFICE

Mr. Kenneth Bauer
Acting President
MTA Long Island Railroad
Jamaica Station
Jamaica, New York 11435

Dear President Bauer:

Thank you for your letter in response to my inquiry regarding the MTA's plan to site a rail storage and cleaning facility in the heart of the Greenlawn community. While I appreciate you taking the time to respond, I am extremely dismayed and frankly shocked by the manner in which the MTA and Long Island Railroad has handled communication and the dissemination of information involving this highly sensitive issue, including the release of the Draft Environmental Impact Statement for the East Side Access project.

Some time ago, I contacted the Long Island Railroad's Government Relations Office seeking information on this project and received no response until your letter - six days before the close of the comment period for the East Side Access DEIS. All the spokesperson from your office could offer in response was his apologies. (1)

Clearly, this is not an adequate response and given an admitted error in the process, I am demanding that you re-open the comment period for the DEIS. This will allow professional staff from our Planning Department to conduct a thorough review of the document. It will also provide an opportunity for those residents who would be drastically impacted by this project to voice their concerns and receive answers from the MTA.

In the event that you choose not to take such action, we will explore all options to ensure that our voices are heard and concerns properly addressed.

And we have great concern.

In fact, you need not look any further than your own study for confirmation. Quoting from your DEIS, the proposed Greenlawn facility would be "inconsistent and potentially incompatible with residential neighborhoods to the north and south." The study goes on to conclude that "A rail yard on this site would be inconsistent with the Town of Huntington" Comprehensive Plan and with the public policy expressed by the Town's residential zoning on the site." ②

Given this fact and the fact that you have listed the Greenlawn rail yard as your number one preferred location for such a facility, I am also respectively requesting that you re-open your site selection process and seek locations that are suitable for such an intense use.

I am sure that you understand my disbelief and anger that a *public* benefit corporation would undertake such a controversial and potentially devastating project without notifying and gathering input from the involved community. ①

Should you choose to further advance the siting of an intense industrial use in the backyards of hard-working families, the Town of Huntington will stand in blank opposition every step of the process. Towards that end, I have enclosed a resolution of the Town Board that was adopted on July 25, 2000 expressing the Town's opposition to this facility and directing its departments to pursue all available avenues of opposition. I have also enclosed a copy of a recent Newsday story regarding the proposed facility.

On behalf of the Greenlawn community, I would like to extend an open invitation for you to visit Huntington and meet with our residents to gain a full understanding of why this rail storage and cleaning facility must be dropped from any further consideration.

Sincerely,

MARK CUTHBERTSON
Councilman

MC:dm

enclosures

Cuthbertson 3

TOWN OF HUNTINGTON
LONG ISLAND, NEW YORK

MARK CUTHBERTSON
Councilman

August 1, 2000

Mr. Kenneth Bauer
Acting President
MTA Long Island Railroad
Jamaica Station
Jamaica, NY 11435

Dear Mr. Bauer:

As a follow up to my letter of July 26, I would like to inform you that I am hosting an informational meeting regarding the MTA proposal to site a rail storage and cleaning facility in Greenlawn to be held at 7 p.m. Tuesday, August 15 at the Oldfield Middle School.

The purpose of the meeting will be to:

- Gather input on the MTA's proposal so that it can be forwarded to them.
- Outline the legal process in connection with the proposed project.
- Meet with State Senator Carl Marcellino and Assemblyman John Flanagan, who plan to attend.

I would like to invite the MTA to send a representative to hear the public comments and I urge you to include these comments as part of the DEIS process.

I would appreciate if you would let me know if an MTA representative plans to attend. I can be reached at (631) 351-3172.

Sincerely,

MARK CUTHBERTSON
Councilman

TN: 33649

RECEIVED
AUG 10 2000
PRESIDENT'S OFFICE

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 2
47-40 21ST Street, Long Island City, NY 11101-5407
Phone: (718) 482-4997 • **FAX:** (718) 482-4975
Website: www.dec.state.ny.us

RECEIVED
AUG 14 2000
OFFICE CHIEF, PROG. ...
EAST SIDE ACCESS
cc: D. Hefferman

Environmental Conservation 30 YEARS
John P. Cahill
Commissioner

July 27, 2000

Mr. Anthony F. Japha
Chief program Executive, ESA
Metropolitan Transportation Authority
LIRR East Side Access
469 7th Avenue
New York, NY 10018-7605

Re: LIRR East Side Access

Dear Mr. Japha:

Following are the New York State Department of Environmental Conservation's comment on the Draft EIS for the LIRR East Side Access project.

The Department has reviewed initial investigation work plans for the five (5) main sites: Grand Central Terminal, Highbridge Yard, Yard A, Sunnyside Yard, and Maspeth Yard. The Department staff conducted site visits of these five and the Fresh Pond Yard site, and provided generic comments that should apply to all sites, and specific comments for Highbridge Yard, Yard A and Sunnyside Yard based upon previous reports and/ or past knowledge of these sites. Some of these sites have significant contamination and contact with or spread of existing contamination as a result of project construction is likely. The investigation of hazardous waste sites is an iterative process, and the Department has not completed its review of any of these sites. The Department approval therefore should not be implied or inferred at this time The Department's Division of Environmental Remediation (DER) has the following comments on the DEIS' Chapter 14, Contaminated Material:

- The known contaminants of concern that could potentially be encountered during construction are PCBs, free petroleum and its volatile/ semi-volatile organic compounds, chlorinated solvents, pesticides, and metals. The investigations have covered past and current use of the sites, visual inspection of all potential areas of contamination (such as USTs or ASTs, PCB containing transformers, storage areas, areas of illegal dumping, etc). (1)

- Any environmental impacts present or inherent as a result of past site operations, but not caused by the construction, are not addressed by the DEIS. (2)

- In Manhattan, the GCT terminal is in unfractured bedrock, so there would be little soil removal. Environmental impacts are unlikely. The project recognizes the possibility of encountering perched water tables at the soil bedrock interface that could require product recovery as a result of some past spills. (3)

- Page 14-2: The description of Amtrak Sunnyside Yard as a Class 2 site is somewhat incorrect. A class 2 designation applies to a site which poses significant threat to Human Health *and/ or the Environment and where action is required.* (4)

- Page 14-2: The Department was not involved in the review of any investigation work plans for the Roosevelt Island location. The same is true of any new off-peak Storage Yards that are proposed to be built at Cerro wire, Hazeltine, Babylon, Yaphank West and East, Ronkonkoma, Pilgrim Hospital, and Riverhead sites. (5)

- Page 14-5 - Table 14-1, Project Evaluation Criteria: The rationale for proposing NYC Sewer Ordinance Criteria for certain metals as threshold levels for groundwater is not clear. A Long Island Well permit would need to be required if the construction would involve dewatering, and the permit conditions would specify the discharge criteria. All groundwater in the State of New York are classified GA, and Part 703 Class GA groundwater standards should be used at all sites, regardless of whether the groundwater is used for drinking or not. For soils, TAGM 4046 numbers should be used, except at sites where higher numbers are specifically approved with deed restrictions. (6)

- Page 14-6: The TAGM 4046 number of 50 ppm for individual SVOC in soil applies unless a lower number is specified. The Department does not recognize filtered samples, and only the unfiltered samples should be compared to the appropriate standard. (7)

- Page 14-7, Existing Conditions, Manhattan Alignment: Except for the cut and cover portion west of Park Avenue, all proposed construction is in deep bedrock. As a result, construction related environmental impacts from potentially contaminated soil and groundwater, if any, are expected to be minimal. (8)

- Page 14-7, Existing Conditions, Sunnyside Yard: The construction of tunnels through the Sunnyside Yard may cause the contaminants to dislodge, and the free petroleum plume or the dissolved chlorinated solvents plume and/ or the BTEX plume to expand and or migrate offsite. **The construction related impacts of these plumes and other contaminants have not been fully evaluated, and the Department at this time can not make an unequivocal statement that the proposed construction would not cause adverse environmental impacts.** The fact that the Sunnyside Yard is a Class 2 site, the project sponsors would need to closely coordinate the construction with Amtrak, the owners and operators of the Sunnyside Yard. It may be possible to partially or fully remediate the Yard prior to proceeding with the project construction. (9)

- Page 14-9, Table 14-3, Project Evaluation Criteria: As stated previously, all groundwater in the State of New York is considered Class GA regardless of its use or salinity concentrations. The Department questions reference to Class SD criteria in this instance. (10)

- Page 14-9, Existing Conditions, Yard A: It may be possible to justify same clean up standards as established for the Sunnyside Yard with the same or similar deed restrictions. (11)

If you have any questions, please contact me at the above address or telephone. Technical questions can be addressed to Thomas Lang or Hari Agrawal of Environmental Remediation at the DEC Region 2 office in Long Island City or by telephone at (718) 482-4995.

Sincerely,

Charles de Quillfeldt
Regional Permit Administrator

cc: T. Lang
H. Agrawal
T. Kunkel

THE CITY OF NEW YORK
DEPARTMENT OF HEALTH

Rudolph W. Giuliani
Mayor

Neal Cohen, M.D.
Commissioner

RECEIVED
AUG 14 2000
C.

cc: A. Hefferman

August 2, 2000

Mr. Anthony F. Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, N.Y. 10018

Dear Mr. Japha:

Thank you providing an Executive Summary of the draft Environmental Impact Statement for the East Side Access Project and for the opportunity to comment on same. At this time, the New York City Department of Health has no comments on the DEIS.

However, as the project progresses, the Agency would appreciate being kept informed especially with regard to the project's impact on public health. (1)

Again, thank you for sharing this document with the New York City Department of Health.

Very truly yours,

Allan H. Goldberg
Assistant Commissioner for Bureau Management
Regulatory & Environmental Health Sciences

RECEIVE
AUG 14 2000
cc: A. Jefferson

THE CITY OF NEW YORK LANDMARKS PRESERVATION COMMISSION
100 Old Slip, New York, NY 10005 (212) 487-6800

ENVIRONMENTAL REVIEW

MTA/SEQRA-Y — PROJECT NUMBER
05/22/00 — DATE RECEIVED

PROJECT MTA/LIRR EAST SIDE ACCESS

[ ] No architectural significance

[ ] No archaeological significance

w/in project area

[X] Designated New York City Landmark or Within Designated Historic District

[X] Listed on National Register of Historic Places

[ ] Appears to be eligible for National Register Listing and/or New York City Landmark Designation

[X] May be archaeologically significant; requesting additional materials (1)

COMMENTS

Comments for May, 2000 DEIS are as follows. (Archaeology review under separate cover (attached). The SHPO is lead agency for architectural review. LPC will consult with the SHPO with regard to their findings for this project. The DEIS text appears adequate for architecture. Any work on New York City designated landmark properties requires a permit from the LPC preservation department.

cc: SHPO

Gregg Sanders — SIGNATURE
08/03/00 — DATE

THE CITY OF NEW YORK LANDMARKS PRESERVATION COMMISSION
100 Old Slip, New York, NY 10005 (212) 487-6800

ENVIRONMENTAL REVIEW

MTA/SEQRA-Y — PROJECT NUMBER
05/22/00 — DATE RECEIVED

PROJECT MTA/LIRR EAST SIDE ACCESS

[ ] No architectural significance

[ ] No archaeological significance

[X] Designated New York City Landmark or Within Designated Historic District

[X] Listed on National Register of Historic Places

within project study area

[ ] Appears to be eligible for National Register Listing and/or New York City Landmark Designation

[X] May be archaeologically significant; requesting additional materials

(1)

DEIS, 5/2000

COMMENTS The SHPO is the lead agency for archaeological review. LPC will consult with the SHPO with regard to their findings for this project.

SIGNATURE

05/26/00
DATE

cc: SHPO

MORTON WEBER AND ASSOCIATES
ATTORNEYS AT LAW
201 NORTH SERVICE ROAD
SUITE 300
MELVILLE, NEW YORK 11747-3138

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MELVIN K. ROTH
OF COUNSEL

August 7, 2000

Via Fax (212) 668-2136
and First Class Mail

Mr. Anthony G. Carr
Deputy Regional Administrator
Federal Transit Administration,
Region 2
One Bowling Green, Room 429
New York, NY 10004

Via Fax (212) 695-4842
and First Class Mail

Mr. Anthony Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, NY 10018

Re: May 2000 Draft Environmental Impact Statement
MTA Long Island Rail Road East Side Access Project

Dear Messrs. Carr and Japha:

We represent The Taubman Company, which has filed with the Town of Oyster Bay an application for a special exception in connection with The Taubman Company's plan to build an upscale shopping mall on the former site of The Cerro Wire Company, which is located in Syosset, Town of Oyster Bay, County of Nassau, State of New York (the "Cerro Wire Site"). We are writing to provide our comments with respect to the Draft Environmental Impact Statement, dated May 2000 (the "MTA DEIS"), which was prepared by the MTA Long Island Rail Road in connection with its proposed East Side Access Project and which, unfortunately, contains several misstatements that need to be corrected in the Final Environmental Impact Statement for the East Side Access Project (the "MTA FEIS").

MORTON WEBER AND ASSOCIATES

The MTA DEIS identifies the Cerro Wire Site as one of two potential alternative sites for a new storage yard that is purportedly required in the vicinity of the Town of Huntington on the Port Jefferson Branch (the "LI Yard"). (See, e.g., MTA DEIS at S-6.) The MTA DEIS further states that The Taubman Company's proposal to build an upscale shopping mall, known as The Mall at Oyster Bay, on the Cerro Wire Site "is currently undergoing environmental review by the Town of Oyster Bay." (See MTA DEIS at S-7.) In fact, on June 13, 2000 the Town Board of the Town of Oyster Bay unanimously passed a resolution accepting as complete the Final Environmental Impact Statement for The Mall at Oyster Bay, dated May 2000 (the "Mall FEIS"), which was prepared pursuant to the New York State Environmental Quality Review Act ("SEQRA") and the regulations promulgated thereunder. The Mall FEIS, and the DEIS and appendices incorporated therein, thoroughly analyzed the environmental aspects of the Cerro Wire Site and The Mall at Oyster Bay project, which, as revised, will include 860,000 square feet of building area and two (2) anchor stores-- not 960,000 square feet and three (3) anchor stores as stated in the MTA DEIS. (Compare Mall DEIS at F-1 with MTA DEIS at 3-26.) (1)

Quite understandably, the MTA DEIS's treatment of the Cerro Wire Site was not as thorough as the Mall FEIS and the environmental studies incorporated therein. Indeed, the MTA DEIS candidly admits that "[t]he potential Long Island storage yard sites were not subject to Phase II investigations" in connection with the proposed East Side Access Project. (See MTA DEIS at S-40.) As a result, the MTA DEIS contains several unfortunate misstatements regarding the Cerro Wire Site, and these misstatements need to be corrected in the MTA FEIS. (See, e.g., MTA DEIS at S-6, S-14,2-27.) (2)

The Mall FEIS, which incorporates the Mall's DEIS and the appendices thereto, demonstrates that neither "hazardous materials" nor "contaminated materials" are present in environmentally significant quantities on the Cerro Wire Site. (See Mall FEIS at 2-42, 3-72 to 3-84.) For example, the Mall FEIS states, in pertinent part, the following:

MORTON WEBER AND ASSOCIATES

> Soil and groundwater quality at the project site was extensively investigated by numerous consultants between 1986 and 1992. The site was decommissioned, and remediation was completed to site-specific cleanup levels approved by the NYSDEC. The sampling and analytical methods were approved by the NYSDEC. After the remediation plan was completed, the NYSDEC delisted the site from the Registry of Inactive Hazardous Waste Disposal Sites.

(2)

(Mall FEIS at 3-79.) Similarly, the MTA DEIS also acknowledges that following (i) "site cleanup," (ii) "disposal of all remaining process chemicals and hazardous materials," and (iii) "extensive soil and groundwater testing," "the site was delisted by the NYSDEC and reclassified as 'DL' -- requiring no further action." (See MTA DEIS at 14-17.)

Please arrange for the MTA FEIS to correct all misstatements regarding the Cerro Wire Site. Moreover, please provide to us as soon as possible a copy of the MTA FEIS for our review and our files.

We appreciate your attention to this matter and your anticipated cooperation. If you should have any questions or comments, please do not hesitate to call me.

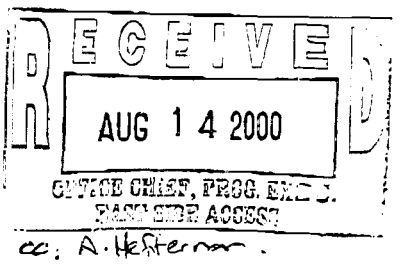
Sincerely yours,

Keith H. Archer

cc: Harry Murphy, Esq.

Weber\Taubman\MTA\Carr-Japha8-4-2000.wpd

ROBERT W. RAMAGE JR.
127 BUTTERCUP LANE
HUNTINGTON, NEW YORK 11743-3050
212-332-5110 (DAYS)
631-549-0070 (EVES)



August 8, 2000

Mr. Anthony Japha
Chief Program Executive
MTA/LIRR East Side Access
469 Seventh Avenue
New York, NY 10018

Re: Comments on East Side Access Draft Environmental Impact Statement dated May 2000

Dear Mr. Japha:

I am writing to offer several comments on the referenced DEIS. Although this letter is written beyond the "official" July 12th date for comments, I hope that you will receive this letter and incorporate a response to the comments offered in the official record. The justification for my late submission is that in our community—the Harborfields/Greenlawn community—the public only recently became aware of the planned Hazeltine rail yard and has just begun to access the impact—entirely adverse that it will have on our community. You should be aware that our local library only received a copy of the DEIS forwarded by Audrey Hefferman under a transmittal letter dated July 20th. Therefore, an allowance of additional time for comments seems only fair.

I would like to offer the following comments on several aspects of the project as described in the DEIS:

1. The proposed Hazeltime yard will have a very ADVERSE IMPACT on the Greenlawn community.

In addition to the noise, vibration, lighting and other harmful effects noted in your report, you fail to note that the community will lose 57 units of moderate-income housing planned for development. The DEIS notes correctly that this development is up for a zoning modification in late September 2000 but fails to recognize that various community groups have been working with the developer for more than five years to develop the land in a fashion that meets community needs. Under the developer's plan, additional housing, sorely needed in the community, will be built and 5 acres will be dedicated for playing fields and other public activities. Greenlawn's Tri-Village Little League in one of the most active on Long Island and is bursting at the seams for more space. Similarly, our community soccer programs need additional playing fields. Use of these five acres for these and other recreational programs will partially mitigate these needs. (1)

Second, your analysis of the Greenlawn community makes it seem like an upper middle class "white enclave". Nothing could be further from the truth. I think your statistics on community composition are out of date. As an example, in the 3,100 student Harborfields School System, more than 30 languages are taught in the English as a Second Language Program. We have built a mixed racial and cultural community over the years and this should be recognized in your study. (2)

With regard to the planned physical facilities, you should take into account that there is only a single track running east of Park Avenue toward the site. Further, the right of way is very narrow and, based on visual sightings, it would appear that additional right of way would have to be acquired if a second track were built. It is hard to see how the proposed yard would operate without an additional track. Installing an additional track would also likely mean relocating the 345KW power lines that run along the track. These likely changes and their impact are not at all considered in your report. Also, your report states that the space needed between tracks is 25' on centers. With sixteen tracks planned under the Preferred Alternative, plus an additional 25' on either side, a minimum width for the yard is likely to be 450' (18 x 25'). While I have not measured the distance from the current train track to (3)

Pulaski Road, I would be very surprised if it is 450'. If my analysis is correct, the land parcel is not wide enough to accommodate your preferred alternative. If the LIRR built an eight-track yard here and and an eight track yard in Hicksville, it would be harming two locations, and probably result in some duplication of facilities. This would not be optimum and make the operations problems more complex. (3)

Your analysis of the impact of the yard on abutting properties is incomplete, as it does not include any consideration of the potential adverse impact on BAE Systems to the east. This company, a unit of British Aerospace, employs over 600 people at its Greenlawn location. According to a friend who formerly worked there, the company engages in activities that would be severely adversely impacted by vibration and large masses of metal from the tracks and trains. More specifically, they engage in precision machining of microwave systems as well as field studies of antenna patterns relating to the transmission of signals. Much of their work is highly classified for the US Government and the defense industry. According to my friend (an experienced senior engineer), these activities would be likely be severely compromised by the vibration and presence of large metal masses. It is not beyond the realm of possibility that the community and even the State could run the risk of losing these 600+ "high technology" jobs. It is even conceivable that if BAE Systems were forced to consider a major relocation decision, all BAE Systems activities on Long Island might be curtailed or shifted elsewhere in the USA. The adverse impact of such an event would be great, not only on Greenlawn but also on the Town of Huntington, Suffolk County and the State of New York. I strongly encourage you to contact Mr. Ray Daughtery, President of this unit of BAE Systems, to confirm this information. (4)

Your report fails to describe in any detail whatsoever the operating advantages of the yard in Greenlawn. Further, your report states that the alternative site—Cerro Wire in Hicksville—is not at all desirable from an operating point of view. I do not believe this is true since that site is very close to the junction at Hicksville and would easily serve not only the Port Jefferson Branch but also the Ronkonkoma Branch. Given its much larger area, the absence of nearby housing, and its present industrial zoning and use, in the absence of extremely compelling operating reasons, I think Cerro Wire should be the preferred site. I recognize that a planned shopping mall is under consideration by its owner. However, if a trade-off is to be made between additional housing and another shopping mall, I think most people would favor housing. Long Island already has too many malls; many cannot support themselves now, and it is hard to see how another mall, particularly at that industrial location, can be justified. (5)

For the reasons set forth above, I strongly favor the Cerro Wire alternative site if the choice is only between the Greenlawn and the Hicksville sites.

II. THE DEIS FAILS TO CONSIDER ALL REASONABLE ALTERNATIVES FOR THE PORT JEFFERSON BRANCH YARD.

The DEIS only reports on two alternatives for the Port Jefferson Branch yard. However, in recent days as I have been riding the train, I note that there is a large undeveloped piece of land west of Oakwood Road and south of Rogue's Path in Huntington. The LIRR tracks run on the south edge. This land—approximately 209 acres—was formerly known as Froelich Farms and was acquired by the County in the mid-1990's. It is now called Froelich Farms County Park. The acquisition occurred after it was nominated by then Town Councilman James Gaughan for acquisition by Suffolk County even though it was not originally considered eligible by County Planning Commissioner Lee Koppelman under the terms of the Safe Drinking Water Legislation. In effect, pressure from local citizens to keep the land undeveloped forced its acquisition. (6)

This piece of land, in my opinion, is ideal for the yard. It is flat, not close to existing housing, and sufficiently roomy that a variety of layouts could be considered. In addition, based on the projected 2010 and 2020 traffic counts, future departures from Huntington will increase by over 50%. This will likely necessitate substantial additional parking facilities at Huntington. One alternative to building such facilities at already crowded Huntington Station

would be to build an additional station at the Oakwood Road/Rogue's Path location, incorporating possibly 1-2 additional parking garages. (This generic possibility is mentioned as a solution to parking problems generally in the Executive Summary but without any details.) This plan has the advantage of taking the vehicular traffic off of Route #110, which cuts through the heart of Huntington. Further, Oakwood Road is already a four lane state road and would, in my opinion, easily be able to handle the traffic. Building an additional stop with garage parking at this locaiton would also relieve some of the parking burden at Cold Spring Harbor just to the west, which is already utilized to capacity.

(6)

I recognize that the LIRR's obtaining use of this land from Suffolk County might take an act of the State Legislature. However, the attributes of this site seem so strong that I think you should thoroughly consider this site as an option. Also, the operating problems related to reverse train movements from the Cerro site would be minimized, as this site is so close to Huntington.

Finally, if this option is chosen, the Greenlawn and Cerro sites can be developed by their owners for their intended uses. Further, the potential adverse impact of the proposed Greenlawn yard on BAE Systems would be avoided.

III. THE LIRR PLAN FAILS TO MAKE LONG TERM PLANS FOR ADDITONAL RIGHTS OF WAY.

The DEIS explains that most growth in the labor force on Long Island will occur in Suffolk County. Therefore the goal of any transit improvement plan should be to increase capacity to move people from this area to New York City rapidly and safely. However, the current LIRR plan still leaves in place the three "spokes"—the Port Jefferson, Ronkonkoma, and Montauk Branch lines. There is no link to connect these lines east of Hicksville. I believe the LIRR planners should consider a right of way link from the Port Jefferson Branch (possibly at Stony Brook University or Kings Park) to the Main Line at or near Ronkonkoma. Similarly, a link between the Montauk Branch and the Ronkonkoma Line at Yaphank could be established. With these two links, the LIRR will gain greatly in scheduling and service flexibility and will essentially be able to run trains in loops. To me this seems the only way that adequate additional service can be provided in the long run (20+ years) to serve the expanding population of Suffolk County.

(7)

Under this scenario, the locations for the Port Jefferson Branch Yard should be reconsidered. I am aware of several large industrially zoned pieces of property off of Comsewogue Road in Port Jefferson which are bounded by the LIRR. With the links in place, it might be possible to put a yard near the end of the Port Jefferson line.

While acquiring additional rights of way may be difficult, they will be needed eventually and it is probably wise to acquire them now before Suffolk becomes even more built up.

Thank you for considering my comments. I look forward to your prompt response.

Very truly yours,

Robert W. Ramage, Jr.

Cc: Governor George Pataki, Albany, New York
Supervisor Frank Petrone, Town of Huntington, New York
Mr. Ray Daughtery, President, BAE Systems, Greenlawn NY

08/14/2000 MON 10:29 FAX

MTA-EASTSIDE ACCESS

Greenlawn Possible Rail Yard Site

By Oscar C. Johnson
STAFF WRITER

NEWSDAY, THURSDAY, JULY 20, 2000

Page 32 -A

(RANAGE)

Greenlawn residents rallied yesterday against a recently released study identifying their hamlet as a possible site for a new train yard.

At the edge of the 39.5-acre shrub-covered lot hedging the northeast corner of Pulaski and Lake Roads, Huntington town board member Mark Cuthbertson denounced the study by the Metropolitan Transportation Authority, the parent of the Long Island Rail Road, which showed that the Greenlawn lot is being considered for a 16-track maintenance and storage yard.

"Here is the MTA leadership advancing a plan that would destroy residential communities," he told the crowd of about 50 residents.

"They fail to solicit input or even notify those who would be affected."

The study seeks to meet maintenance and storage needs for 220 new trains that already have started arriving, LIRR spokesman Brian Dolan said. Funding for 476 additional cars is expected in 2002, he said.

Cuthbertson said his office called the MTA about three times starting in May in an attempt to verify rumors that the hamlet might be considered as a site, but to no avail.

Newsday Photo / Dick Yarwood

Greenlawn residents yesterday protest proposal for a rail yard at Pulaski and Lake Roads.

A May 24 letter to LIRR Acting President Kenneth Bauer also received no response, he said. It was not until July 6 — six days before the close of the public comment period — that the councilman was told about the study, he said.

"One of the things we are so upset with MTA about is the process. This is government at its worse," he said.

Dolan said a public hearing on the study was held in Manhattan on June 15. Long Island newspapers carried notices of the meeting, he said, and leaflets were placed on local trains three weeks prior.

"At this point we can't account for the delay in the response [to Cuthbertson's inquiries], he said. "But we extend our apologies."

According to the study, Greenlawn is one of six Long Island sites being considered for the rail yard, where trains would be cleaned, inspected and stored overnight. Other sites identified are in Babylon, Yaphank, Riverhead, Ronkonkoma and a site near Syosset.

Louis Bonavita, the developer who owns the property, said he was taken aback that his property is identified in the study. "I just found out last night," said a dismayed Bonavita, who said he has been working with residents and civic groups on plans to build 59 new homes and a five-acre park on the site.

Greenlawn resident Catherine Karafa, who lives on Bowden Street near the proposed site, said she just learned last night of the rail yard plans.

"How could they do this to us?" she said. "We'd rather go with the new houses and park. That's more consistent with the community."

013

Greenlawn Rallies Against LIRR Service Yard

(Continued from page 3)

rior operationally." The MTA is also considering the former Cerro Wire site in Syosset along the Port Jefferson Branch of the Long Island Rail Road.

The councilman's office received information from the community several months ago that the LIRR was considering building the storage facility. In mid May they tried to confirm this information with the MTA without success.

On May 24, Cuthbertson wrote a letter to Kenneth Bauer, acting president of the LIRR, requesting more information, stating that he had been told by their Public Affairs Office that "no information is available" regarding the project.

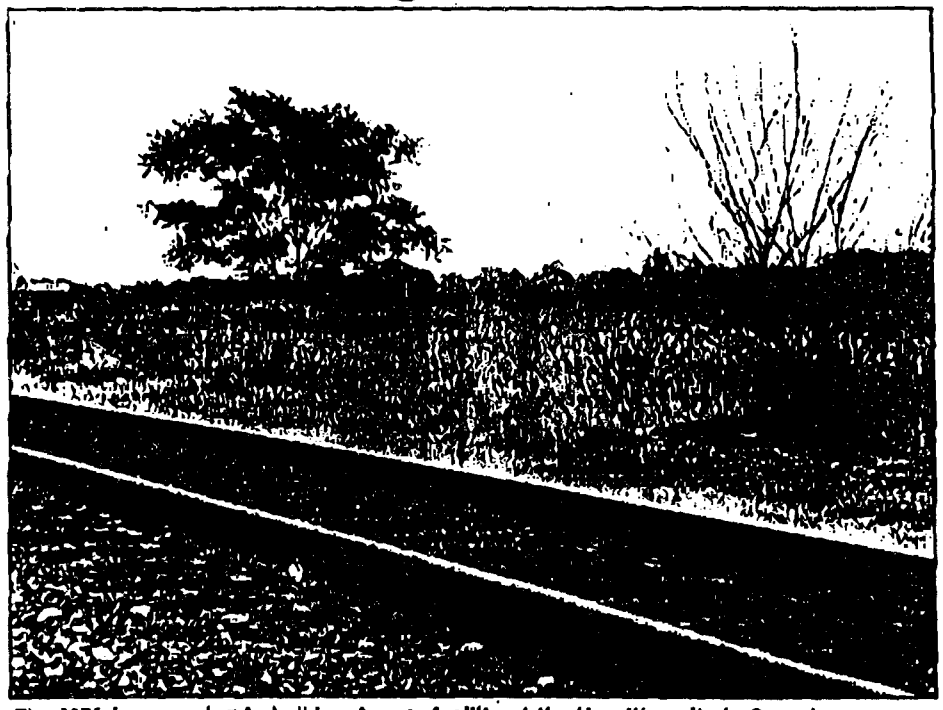
Yet, on May 17, Anthony F. Japha, Chief Program Executive of the MTA/LIRR East Side Access, had already written a letter to the Huntington Public Library enclosing the DEIS — which, by the way, was not opened until Tuesday of this week.

Meanwhile, the MTA did not provide the councilman or the Harborfields public library with a copy of the DEIS.

By the time Bauer notified Cuthbertson of the DEIS release and availability on July 6, there were only six days left before the close of the document's public comment period.

"This is government at its worst," Cuthbertson said. "Here is the MTA leadership advancing a plan that would destroy residential communities and they fail to solicit input or even notify those who would be affected. This is not the way for the public authority to conduct business. I call on them to reopen the environmental impact process for comments."

The proposed 20-acre facility would consist of 16 electrified storage tracks, each 1,600 feet long, plus parking for 80 employees. The site would be used for the nighttime storage and related servicing activities, overnight cleaning, which includes train wash equipment and ordinary servicing such as purging the sewage systems.



The MTA is proposing to build a storage facility at the Hazeltine site in Greenlawn on residentially zoned property owned by AFM Realty. Long Islander Photo Jayson Blocksidge

"This would be absolutely devastating to the Greenlawn community," Cuthbertson said. "It would change the complexion of a residential area and have a horrible impact on this part of town.

The MTA admits as much in its DEIS, stating: "the yard would be active and lit at night which would be inconsistent with the character of the surrounding residential community. Overall, development of a new rail yard at the Hazeltine site would result in significant adverse impact to the community character."

But the DEIS suggests that a "vegetative wall and buffer" would mitigate the impact.

The location for the proposed facility is currently owned by AFM Realty of Huntington Corporation. It is approximately 39.32 residentially zoned acres bordered by Lake Road to the west, Pulaski Road to the south, the LIRR to the north and Cuba Hill Road to the east.

Gary Weintraub, attorney for AFM principal Louis Bonavita, said there is a change of zone application pending before the town board. The property is currently zoned for 1-acre residential development, but the owner is trying change that to fit approximately 55 upscale single family residences on half-acre plots. As part of the plan, the developer has agreed to set aside five acres for the town to use as parkland. A public hearing for the zone change is scheduled to be held at the September 12 Town Board meeting.

Most Greenlawn residents prefer Bonavita's housing development to the storage facility, said Elaine Capobianco, president of the Old Field Home Security Council Civic Association.

Larry Silverman, Chair of the LIRR Commuters Council and member of the MTA Board, described the plan as "absolutely absurd" and the MTA community outreach efforts as inadequate.

A host of legislators including Suffolk County Legislator Allan Binder and New York Senator Carl Macelli io are working to urge Governor George Pataki to drop the Hazeltine site from consideration.

At next Tuesday's Town Board meeting, Cuthbertson will introduce a resolution directing the Town Attorney and Planning Department to explore all options to prevent the plan from proceeding.

"I can't think of any other project besides a power plant or a factory that would cause more of a change to the complexion in this part of the town," Cuthbertson said. "And we are going to fight it every step of the way."

JUL 14 2000 MON 10:29 FAX MTA-EASTSIDE ACCESS 014

Long Islander 7-20-2000 Page 21
(RAMAGE)

06/14/2000 MON 10:00 FAX

MTA-EASTSIDE ACCESS

GREENLAWN

LIRR Storage Facility Meets Opposition

By Jayson Blocksidge

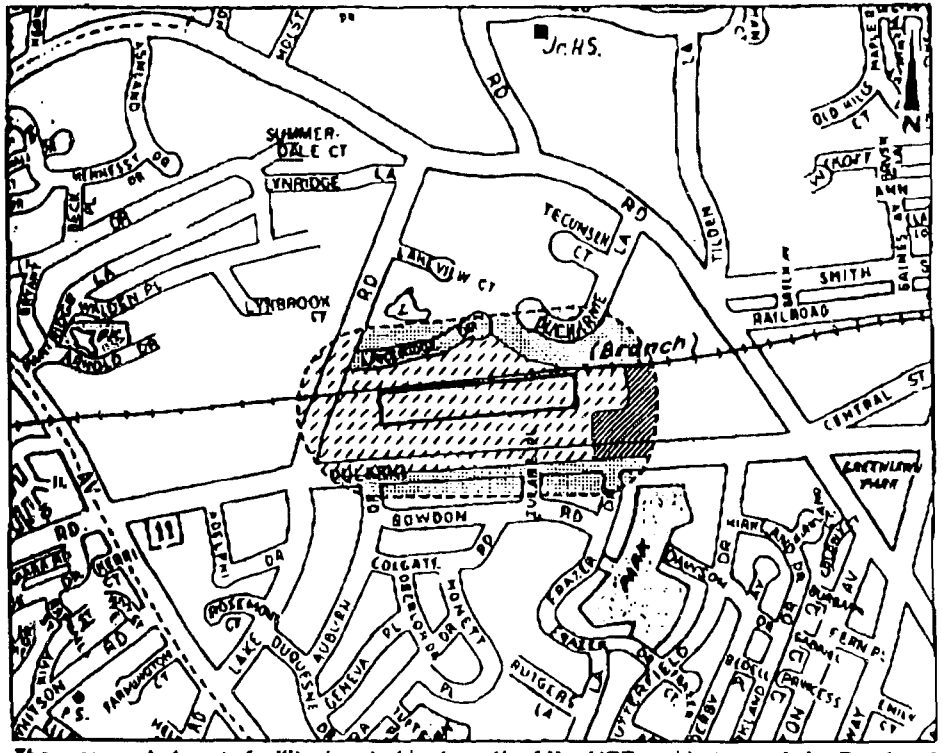
Many Greenlawn residents were surprised to discover pamphlets distributed by a local civic association Tuesday night alerting them to the Mass Transit Authority's (MTA) plans to site an electrified rail/storage facility in the heart of their community.

Though rumors of the project have floated around the community for the last few months, many people say that when questioned about the plan, the MTA was less than forthcoming.

But when Huntington town councilman Mark Cuthbertson finally confirmed the rumor and told community leaders that he planned to denounce the MTA's plans at a press conference on Wednesday, they rallied their troops.

"We mobilized volunteers on two hours notice," said Walter Rabe, president of the 500-member Greenlawn Civic Association. "We distributed hundreds of fliers. I kind of think the MTA is trying to sneak this into Greenlawn and not tell anyone about it."

Huntington Town Councilman Mark Cuthbertson demands the MTA to reopen the public comment period on plans to build a storage facility in Greenlawn.



The proposed storage facility, located just south of the LIRR and between Lake Road and Cuba Hill Road in Greenlawn, lies within several hundred feet of residential communities.
Long Islander Photo / Jayson Blocksidge

What's all the hub-bub about? Well, not many people knew about or had time to comment on the MTA's multi-billion dollar project which it claims is designed to improve rail access to and from Manhattan.

Dubbed East Side Access, the plan would put new storage and cleaning facilities on three branches to handle the addition of 220 electric cars required to operate new service to the Grand Central Terminal.

The MTA's Draft Environmental Impact Statement (DEIS), released in late May, identified the Hazeltine site in Greenlawn as "the preferred site primarily because its location east of the terminal/station at Huntington makes it supe-

(Continued on page 27)

(RAMAGE)

Page 3

Long Islander 6-20-2000

OVER

MTA Eyes Local Site For Yard

ouncilman Leads Fight Against Plan For Greenlawn Facility

By Rob Morrison

Notified just six days before the ing of a public comment period for Draft Environmental Impact ment (DEIS) for a proposed Long d Railroad (LIRR) electrified storage cleaning facility in Greenlawn, ington Town Councilman Mark ibertson has launched a fight to sh the plan.

"We've worked very hard to maintain tranquility within our hborhood," said homeowner and time area civic leader Elaine sibianco. "I can't believe that this ld happen. We will certainly fight."

Mr. Cuthbertson announced at a s conference Wednesday, July 19 the Metropolitan Transportation hority (MTA) is proposing to build facility on 30 acres of residential perty on the corner of Pulaski Road Lake Road in Greenlawn, adjacent he LIRR tracks.

"The siting of an electrified storage cleaning facility for Long Island road trains at this location would state the Greenlawn community cause irreparable harm to the lity of life for thousands of residents."

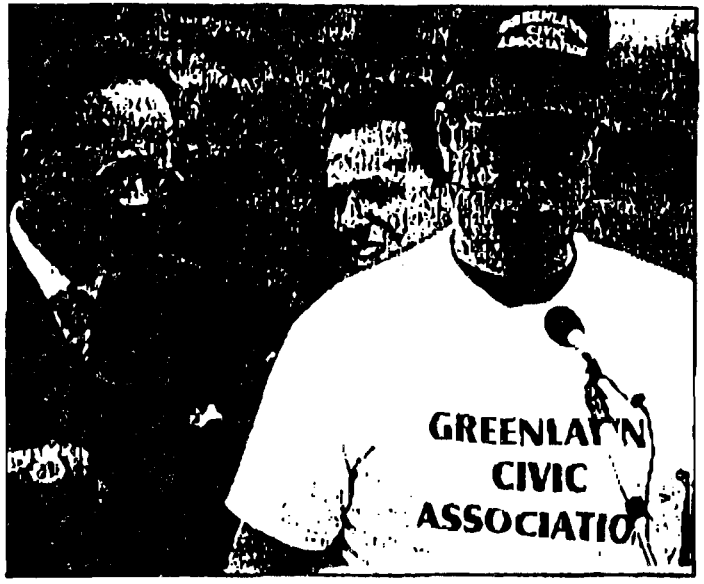
Cuthbertson said, "I am nbfounded that the MTA would even sider this property and I am anding that the Authority leadership re-open the election process to find a suitable location for this yard."

The abandoned lot is currently under review by Town Board for a zone change from one-acre idential development to half-acre residential to e room for a 57-home subdivision with a five-acre kland dedication to the Town of Huntington.

"It would be a terrible thing to see this for ething other than residential property," said Robert uti, the attorney representing the owner of the erty Louie Bonavita. "It's our intention to improve th houses on half acre lots."

According to Mr. Cuthbertson, the MTA did not ly the Town of its plans until July 6, less n a week before the public comment period to use the DEIS was over. After hearing about proposal in May, Mr. Cuthbertson was told MTA officials that there was no information the project available.

"One of the things we are so upset with the MTA ut is the process," Councilman Cuthbertson said. s is government at its absolute worst without any fication. A week before [the deadline] we were rmed by the MTA."



NOT HERE: Greenlawn Civic Association president Walter Ray protests the Metropolitan Transportation Authority (MTA) proposal to build a railroad yard at the corner of Pulaski and Lake Roads in Greenlawn while MTA board member Lawrence Silverman (left) and Town Councilman Mark Cuthbertson stand behind discussing the issue.

-Rob Morrison photo

The project, known as East Side Access, calls for the siting of new storage and cleaning facilities on three branches to handle the addition of 220 electric railroad cars required to operate service to the Grand Central Terminal. The MTA is considering two sites on the Port Jefferson line including the one in Greenlawn—which is at the top of the list—and the former Cerro Wire site in Syosset.

"I think the MTA's plan to put a railway yard here is obviously absurd," said Larry Silverman, MTA Board member and LIRR Commuters Council Chairman. "They want to be able to run equipment here and store it. We should not be put through this trauma."

According to the DEIS, obtained by **The Observer** this week, the new yards "would be used for nighttime storage and related servicing activities—overnight cleaning, ordinary servicing (toilets, etc.) and visual inspection." The DEIS further states that the proposed yards would "be incongruous with the quiet residential setting of the areas to the immediate north and south. The yard would be active and lit at night, which would be inconsistent with the character of the surrounding residential community." The DEIS goes as far as to say that the new yards would "result in significant adverse impacts to community character." The MTA, however, plans to install a vegetated buffer zone to mitigate some of these concerns.

"The MTA' study says it best," Mr. Cuthbertson said. "This is clearly unacceptable and must be removed from any further consideration. Here is MTA leadership advancing a plan that would destroy residential communities and they fail to solicit input or even notify those who would be affected. This is not the way for a public authority to conduct business."

Both Mr. Cuthbertson and Mr. Silverman, who is a member of the MTA board representing commuters, called upon community members and local and state legislators to push Governor George Pataki to squash the MTA's plan. They it is up to the governor to do the right thing.

"The MTA claims that is compiled a long list of potential site for a new rail yard but the DEIS only mentions six locations," Mr. Cuthbertson said. "This is unacceptable. It is ludicrous for the MTA to claim that only six locations exist between Port Jefferson and New York City to site an industrial operation."

Residents who attended Wednesday's press conference asked the public officials what they should do to help the fight against the MTA proposal. Mr. Cuthbertson urged them to write their State legislators. Mr. Cuthbertson reminded residents that the MTA has the authority to condemn the Greenlawn property for public use.

"For the last few months I heard rumors. I think the MTA is trying to sneak this into Greenlawn overnight and I don't think that's fair," said Walter Ray, president of the Greenlawn Civic Association. "We have to unite and fight them."

Mr. Cuthbertson said he did not want to over alarm the public about the MTA plan because he said a railroad yard would not pop up overnight, but he wanted to inform the public so taxpayers could unite against the proposal.

"This is a planning document," Mr. Cuthbertson said. "The plans take time. This is not going to happen overnight. We're going to be working very hard in the upcoming months to get more information."

The councilman said he will be proposing legislation at next Tuesday's Town Board meeting to direct the Town Planning Department and Town Attorney's office to investigate every option to fight the multi-billion railroad yard proposal.

Councilman Takes On MTA Over LIRR Yard

-story page 3

(RAMAGE)

05/17/2000 MON 10:30 FAX MTA-EASTSIDE ACCESS 016

EDITORIALS/COMMENTS

Fight Plan For Local Train Yard

The Greenlawn site selected by the Metropolitan Transportation Authority (MTA) for the new Long Island Rail Road (LIRR) train yard is unsuitable. While it has been evaluated to be operationally superior than a site in Hicksville because it is east of Huntington Station, it is too close to residential neighborhoods to be an appropriate location for such a facility – 16 electrified tracks with trains running in and out of a building all day and night to be cleaned, repaired or stored for peak hours.

More importantly, the process used by the MTA to arrive at this site was clandestine and blatantly violated the public trust.

The MTA has prepared a draft environmental impact statement (DEIS), a voluminous document that outlines its plans to initiate service from Long Island's three main LIRR branches to Grand Central Station. Service now is to Pennsylvania Station. Part of the DEIS includes an exhaustive site selection and evaluation process which identified the Greenlawn site as the preferred location for the train yard.

The Greenlawn land, a meadow on the corner of Pulaski Road and Lake Road, is adjacent to the LIRR tracks and to the former site of a Hazeltine manufacturing facility, 39.5 acres. The land is identified in the Town's master plan for parks and recreation as a suitable site for soccer and baseball fields. That would be a far more suitable use than a train yard.

A fundamental part of the State Environmental Quality Review Act (SEQRA) requires that environmental impact statements for land use plans include public input. Perhaps, because it is a state authority, the MTA is not legally required to comply with SEQRA. It should, however, be held to the same standard of notifying the public or, at the very least, informing local officials about its plans.

According to Huntington Town Councilman Mark Cuthbertson, who began this week to mobilize opposition to the Greenlawn site, not only did the MTA fail to notify or involve the public, it also concealed the process from the Town. Mr. Cuthbertson claims he asked the MTA verbally and in writing for information about the train yard review process and was ignored. He claims that the MTA did not provide him with a copy of the DEIS until six days before the public comment period, which ended July 12.

If what Mr. Cuthbertson says is true – there is no reason to doubt him – the public comment period is a farce and should not be taken seriously. The DEIS does not fulfill the public comment standard established by state legislation, therefore, it should be considered incomplete and to hold no merit.

There is much more involved in this case than simply a 39.5 acre site in Greenlawn. The plan includes doubling the number of trains on the LIRR's Port Jefferson line, which runs through Cold Spring Harbor, Huntington Station, Greenlawn and East Northport in the township of Huntington.

There will be a positive result of this plan for commuters but it comes at an environmental cost to homeowners and businesses along the Port Jefferson branch. There will be more noise, more air pollution, more traffic congestion and, in general, a disruption of the quality of life enjoyed by thousands of people.

From the days in the early 1970s, when former Northport State Senator Bernard Smith first authored the State Environmental Quality Review Act (SEQRA), a key ingredient of land use planning and review has required that the public be involved from the earliest possible time. That fundamental theory has been violated in this case.

At the very least, the public comment period should be re-opened so that the public can have an opportunity to comment. Otherwise, what the MTA holds out as public comment period is a hoax.

In addition, the train yard, while it may be a necessary evil to meet Long Island's growing transportation needs, does not belong any where near the corner of Pulaski Road and Lake Road. A far more isolated site should be found and residents, elected officials, and community leaders should join Councilman Cuthbertson in this fight.

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08/14/2000 MON 10:31 FAX

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Search was: froelich farms

Search type: Lead Paragraph, Text

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CNTL# 6308059
FN dialog(R)File 638:Newsday/New York Newsday
CZ (c) 2000 Newsday Inc. All rights reserved.
AN 06308059
Title GOP SAYS HALPIN BROKE A PROMISE
Newspaper name Newsday
JC (ND)
Date - Tuesday October 29, 1991
Author Charles V. Zehren. STAFF WRITER
Edition SUFFOLK
Section heading NEWS
Page number 27
word Count 515

Lead paragraph Republican State Sens. Kenneth LaValle (R-Port Jefferson) and James Lack (R-East Northport) made a rare appearance before a special meeting of the Suffolk legislature's Finance Committee yesterday to charge that Democratic County Executive Patrick Halpin has broken a promise to state lawmakers by proposing that money be diverted from a water protection fund to balance the 1992 budget.

In addition, the GOP legislators said during the meeting in Hauppauge, the $24-million transfer won't leave enough money for Suffolk's share to purchase the 209-acre **Froelich Farms** parcel in Huntington as planned.

TX_TX Halpin's chief deputy, Tom McAteer, dismissed the senators' testimony as nothing but a "political skit" coming eight days before Halpin faces re-election against challengers Assemb. Robert Gaffney (R-Miller Place) and Asharoken's Conservative Mayor William Kelly. He noted that LaValle is chairman of

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Gaffney's campaign committee and Lack is a strong Gaffney supporter.

McAteer said the $24-million transfer is legal and would not alter the Drinking Water Protection Program, which caps landfills and purchases environmentally sensitive land. Instead, McAteer said that if the GOP-dominated legislature rejects the fund transfer, it must find alternatives to balance the budget, and that could mean wide-scale layoffs and radical budget cuts. "Let's not believe that this isn't about the election," he said.

During their testimony, LaValle and Lack produced a letter from Halpin dated Aug. 1, 1988, when Suffolk was seeking approval of state legislation to enable the creation of the water protection fund that is financed through a quarter-cent of the local sales tax. Skittish over Halpin's insistence on a provision in the bill to use some of the money in the fund to stabilize property tax rates, Lack said he demanded a concession from Halpin. In the letter, Halpin said, "I expect and intend that the revenue will not be used to . . . reduce anticipated county budget deficits." Lack said that, based on that promise from Halpin, he obtained support for the measure from other members of the GOP-dominated Senate, who then approved the creation of the fund. LaValle, on the other hand, said it was precisely because he feared that the money would be used for purposes other than environmental protection that he voted against the bill. LaValle yesterday said the criticism of Halpin was timed to coincide with the Suffolk legislature's consideration of the $24 million transfer and not next week's election. "I really feel betrayed by Halpin," he said.

"Commitment is imperative in building confidence." While not questioning the legality of the transfer, Lack characterized Halpin's proposal as "immoral" and "unethical." "You are only as good as your word and your handshake in this business," Lack said. McAteer said Halpin's 1988 pledge "wasn't a promise, but what he intended. And things have changed drastically since then with the economy and the budget." Admitting that he has little in-depth knowledge of Suffolk's budget, Lack in responding to questions from Chairman Legis. Michael O'Donohoe (C-Northport) said the $24 million fund transfer raises serious doubts about the feasibility of the **Froelich Farms** purchase.

Subjects ELECTION; 1991; REPUBLICAN PARTY; DEMOCRATIC PARTY; CANDIDATE PATRICK HALPIN; EXECUTIVE; SUFFOLK COUNTY; ROBERT GAFFNEY; FINANCE

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Record 2 of 4 in Newsday and New York Newsday

Search type: Lead Paragraph, Text

Search was: froelich farms

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CNTL# 4807210
FN dialog(R)File 638:Newsday/New York Newsday
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AN 04807210
Title OWNERS REJECT PUBLIC OFFER FOR FROEHLICH **FARMS** BID NOT DISCLOSED; VALUE PUT AT $50 M
Newspaper name NEWSDAY
JC (ND)
Date - Friday October 28, 1988
Author Maureen O'Neill
Edition NORTH SHORE
Section heading NEWS
Page number 31
word Count 409
Lead paragraph The long-awaited offer for public acquisition of the 208-acre **Froelich Farms** for groundwater protection was placed on the table this week, and it was immediately rejected by the owners' representative. "I would not agree to sell it at anything near what was offered," said attorney Arthur Goldstein.
TX_TX Joan Scherb, Suffolk County commissioner of real estate, who met with Goldstein on Monday, said the offer was based on the county's appraisal of the property. She refused to disclose the figures on the undeveloped land, which runs along the west side of Oakwood Drive from a point south of the Long Island Rail Road tracks to north of Pulaski Road. There have been unconfirmed reports that the appraisal was in the neighborhood of $14 million.

Goldstein, who, at the request of the public officials, also refused the disclose the amount offered, said he told Scherb, "If

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you have confidence in the appraisal, you could condemn it." He said that his projection of the number of homes that could be built on the property would put the value of the land "in excess of $50 million."

Meanwhile, Goldstein said he told the officials that he was pressing a suit against the Huntington Planning Board for refusing to subdivide 25 acres of the site, on two parcels north of Pulaski Road, where R & V Co., a partnership which owns the **farms**, wants to create 21 homesites. An earlier suit is expected to go back to court because the Huntington Town Board has rejected a proposed settlement that would have allowed construction of 290 condominium units on the 91 acres at the south end of the property and the transfer of 117 acres of open land to the town. Attending the meeting with Scherb in Goldstein's Huntington office were Huntington Town Attorney Arlene Lindsay and Supervisor Toni Rettaliata's chief of staff, Laure Nolan.

"We're going to review" the situation, Scherb said, "and, if justified, revise the offer."

On Sept. 28, the town board voted to commit up to 35 percent of money received from Suffolk's groundwater protection program toward purchasing the **farms**. The state also has pledged $2 million toward the purchase of the property, which is in a groundwater protection area. The rest of the funds would come from the county. The town wants the county to take title and preserve the property.

The partners in R & V Co., are Victor Cynamon, Rubin Wagner and RABCO Huntington Development Corp.

Subjects FARM; TOWN OF HUNTINGTON; LAND; HOUSING; PLANNING; ZONING; LAWSUIT

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Search was: froelich farms
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CNTL# 4660003
FN dialog(R)File 638:Newsday/New York Newsday
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AN 04660003
Title THE POLITICS OF SPACE OFFICIALS SPLIT ON ACQUISITIONS
Newspaper name NEWSDAY
JC (ND)
Date - Sunday June 5, 1988
Author Kathleen Kerr
Edition NASSAU AND SUFFOLK
Section heading NEWS
Page number 03
word Count 2,104
Lead paragraph The well-manicured fairways of the Indian Hills Country Club that undulate down to the edge of Long Island Sound have become a battleground in the political skirmishing that has beset Suffolk County's open-space acquisition program.

The serenity of the 136-acre Fort Salonga golf course belies the increasingly heated debate it has spawned between Suffolk legislators and County Executive Patrick Halpin. Indian Hills has become a symbol for both sides in an escalating battle over whether Suffolk's $60-million plan to preserve environmentally sensitive land has turned into a political boondoggle instead.
TX_TX Halpin calls Indian Hills "the $40,000 Headline" - referring to publicity garnered by Legis. Michael O'Donohoe (C-East Northport), whose efforts to persuade the county to buy the land have so far cost $40,000 for an outside appraisal.

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O'Donohoe says Halpin should mind his own business. And Legis. Steven Englebright (D-Setauket), who helped craft Suffolk's open-space plan in 1986, says that buying the golf course may not make sense, but he defends the decision to appraise it as "a legislative courtesy."

The situation involving Indian Hills is not unique. Once designed as a $60million program to buy 28 parcels deemed worthy of preservation, proposals are pending to expand Suffolk's open-space program by 14 pieces of property. Those acquisitions, recommended by 10 different legislators, have been criticized by some who question their environmental value, which is based on a complicated set of factors decided upon by the county. And now some legislators say that a program designed to protect the environment has turned into a vote-getting mechanism designed to help legislators get re-elected. "I think it is political a lot of times," said Legis. Sondra Bachety (D- North Babylon), the legislature's presiding officer, who has asked the county to appraise a 13-acre wooded parcel in her district. "It's almost as if you go back and say to your constituents, 'Look what I saved for my district.' "

It is that sentiment, shared by Republican and Democratic legislators, that has the county executive warring with them over the future of the county's open-space program.

"This is a legacy we're going to be leaving future generations," Halpin said, questioning the value of some of their proposals. The open-space program began in 1986, when Suffolk allocated the $60 million to buy 28 properties - pine barrens, shoreline parcels and marshlands. The properties went through extensive planning and environmental reviews and were approved by the legislature as a package. To date, the county has finalized purchases of only 12 of those 28 properties and committed only $33 million of the $60 million. The remaining 16 are in various stages of negotiation, and some may never be purchased because the owners do not want to sell.

But in the past year lawmakers began quietly adding properties, one at a time, by separate resolutions.

Halpin charges that by doing this the lawmakers have bypassed necessary reviews, ordered costly appraisals for land that may never be purchased and included parcels of dubious environmental value. In addition, Halpin says he wants to stop the county's practice of hiring outside appraisers and make sure the county does not pay more than the appraised value. "The voters of Suffolk County recognize the importance of preserving open space, and they also don't want to see this become legislative pork barrel," Halpin said.

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"I think he should leave the land acquisition program alone," responded O'Donohoe. "Once he starts changing rules, it's going to become pork barrel legislation."

The legislators' recent actions have also caused the county to overspend the $307,000 that was budgeted for appraisals, to add $190,000 to that pot, and to appraise parcels that they acknowledge have slim if any chances of being purchased.

Since the original 28 parcels were approved, 10 different legislators have sponsored 14 additional properties that are in various stages of the process leading to inclusion in the program. Some have not been acted on yet, some are being appraised, and three have been approved for acquisition.

Although Halpin is opposed to some parcels, such as the golf course, he has supported some others, such as Clam Island, a sand spit in Noyac that Halpin on Thursday agreed to add to the program. And he argues that all the new properties should be subject to environmental and planning reviews. Englebright, an ardent environmentalist who heads the legislature's parks committee, says he agrees with Halpin in principle but objects to submitting the 14 new properties to the same reviews that the original parcels underwent because the county executive and Planning Director Lee Koppelman are "dictatorial" when it comes to open space. Under the provisions of the original program, Koppelman's planning department reviewed prospective purchases.

"The basic question is legislators were introducing their own recommendations for property, and all the county executive wanted was to have reviews," counters Koppelman, whose office was involved in reviewing and recommending the original 28 parcels.

While the legislature can order the county executive to negotiate to buy properties, the confidential negotiations are conducted by Halpin's real estate commissioner, who is unlikely to countermand his wishes. Among the additional properties coveted by the legislators are two golf courses, an old horse farm, land near an Islip creek, two **farms** in Huntington, the Smithtown mansion once owned by a former mayor of New York City, and shorefront properties on the East End. Some of these properties are:

Orowoc Creek, a four-acre parcel in Islip, sponsored by Legis. George Nolan (D-Islip). Halpin vetoed a legislative resolution to buy the property for up to $400,000 after discovering it was appraised at only $268,000.

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Englebright had said the higher price was necessary to allow for negotiations. The legislature overrode the veto and instructed the real estate division to begin negotiations.

Indian Hills, the golf course sponsored by O'Donohoe. Halpin says the property has little value as environmentally sensitive land. It is being appraised, after the legislature overrode another Halpin veto. The Hauppauge Country Club, another golf course, sponsored by Legis.

Donald Blydenburgh (RSmithtown). The property's environmental value has also been questioned by Halpin. It has changed ownership in the last year, driving the potential cost to the county upwards as much as 50 percent. The Deepwells mansion, sponsored by Legis. Michael D'Andre (R-St.

James). D'Andre charges Halpin will only support his proposal in exchange for D'Andre's support of the county executive's plan to extend a quarter-cent increase in the county sales tax; Halpin denies the charge and questions whether Deepwells is worthy of being added to the list, although he admits it has historical value. A mansion on the land once belonged to William Gaynor, New York City mayor from 1910 to 1913. Old Field Horse Farm, sponsored by Englebright, a 13-acre horse farm that is used to show horses. The farm, at the tip of a fragile salt marsh, is being appraised.

The **Froelich** and Wicks **Farms**, sponsored by Legis. James Gaughran (D- Huntington), which have been at the center of controversy for many years.

Neighbors have tried for many years to get the properties preserved as an open-space buffer, while a developer proceeds with plans to build condominiums. An appraisal is under way.

"Many of the proposals are coming in because of pressure on the legislators from citizens who are saying they don't want to see the land in their backyards developed," said Suffolk's assistant planning director, Arthur Kunz. "But you have to ask dispassionately if development is really bad."

In addition to questions raised by the new properties, Newsday has found that in cases where the county has purchased properties, it has often paid substantially more than appraisals submitted by the private appraisers the county hired, after reappraisals by county staff. Halpin's real estate commissioner is trying to end the practice of using outside appraisers. Deputy Real Estate Commissioner Robert Sgroi, who was commissioner until Halpin took office, says that as the county

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negotiated with land owners, real estate prices soared - forcing the county to review the value of certain parcels and increase the appraised value.

"Over an extended period, real estate values increased," Sgroi said, justifying the county's expenditures. "And sometimes we had to appraise a property several times."

In seven of the 12 cases where the county has closed on a property, the county appraisers arrived at higher figures than the outside consultants had and used their findings to justify higher purchase prices. Camp Barstow, a former Brookhaven Girl Scout camp, exemplifies the problem with escalating property values and fluctuating appraisals.

Appraisals on the property ranged from $2.6 million to $4 million - the price the county eventually paid - over a sevenmonth period, according to county documents.

Joan Scherb, the new commissioner, says she will institute a different policy. She also said she plans to hire more county appraisers to decrease the county's use of private firms and to discontinue the practice of multiple outside appraisals. In at least six cases, the county has paid for two or more appraisals, spending $1,500 to $10,000 each time. Sgroi says understaffing was the reason the department used private appraisers in the past.

Despite the costs of appraisals and the ongoing political struggle between Halpin and the legislature, environmentalists defend some of the proposed additions and urge both sides not to lose sight of the original intent to preserve undeveloped land.

Andrew Walker, director of the Long Island chapter of the Nature Conservancy - a non-profit conservation group that acquires environmentally sensitive land and that has assisted Suffolk in some of its purchases - agrees with Halpin that potential purchases should first be reviewed by the planning department.

"We have a concern about adding parcels," Walker said. "I think any open- space piece of land has to undergo some sort of environmental review; there has to be some consensus that this is property that should be protected. But Walker also believes that the legislatorss' push to buy land in their districts should not be dismissed as merely political. "Saving land is a funny business. Open-space areas represent a cultural and natural history heritage," Walker said. "It's my sense that a lot of legislators are responding to a genuine desire in their communities to preserve a way of life and a landscape."

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Pet Properties - Proposed additions to the open-space program that are under consideration by the legislature, with unofficial estimates of value where available

Parcel: 1. Hauppauge Country Club

Legislative sponsor(s): Donald Blydenburgh (R-Smithtown)

Estimated value/status of proposal: $20 million, no action yet

Parcel: 2. Clam Island, Southampton

Legislative sponsor(s): Fred Thiele (R-Sag Harbor) Estimated value/status of proposal: $3 million, legislature approved purchase

Parcel: 3. Land around Orowoc Creek, Islip

Legislative sponsor(s): George Nolan (D-Islip)

Estimated value/status of proposal: $268,000, legislature approved purchase

Parcel: 4. Barcelona Neck, East Hampton

Legislative sponsor(s): Fred Thiele (R-Sag Harbor)

Estimated value/status of proposal: Appraisal under way

Parcel: 5. Old Field Horse Farm

Legislative sponsor(s): Steven Englebright (D-Setauket)

Estimated value/status of proposal: $700,000-$1 million. Appraisal under way, proposed town-county joint purchase

Parcel: 6. Ram Island Causeway, Shelter Legislative sponsor(s): Fred Thiele, (R-Sag Harbor)

Estimated value/status of proposal: Appraisal under way

Parcel: 7. **Froelich** Farm, Huntington

Legislative sponsor(s): James Gaughran (D-Huntington)

Estimated value/status of proposal: Appraisal under way

(RAMAGE)

Parcel: 8. Wicks Farm, Huntington

Legislative sponsor(s): James Gaughran (D-Huntington)

Estimated value/status of proposal: Appraisal under way

Parcel: 9. Indian Hills County Club, Huntington

Legislative sponsor(s): Michael O'Donohoe (C-East Northport)

Estimated value/status of proposal: $15 million, appraisal under way

Parcel: 10. Deepwells Estate, Smithtown

Legislative sponsor(s): Michael D'Andre (R-St. James)

Estimated value/status of proposal: Appraisal under way

Parcel: 11. Wooded area near Great East Neck Road, North Babylon

Legislative sponsor(s): Sondra Bachety (D-North Babylon),

Estimated value/status of proposal: Appraisal under way

Parcel: 12. Scattered parcels, Lindenhurst

Legislative sponsor(s): Richard Schaffer (D-Lindenhurst)

Estimated value/status of proposal: Appraisal under way

Parcel: 13. 20 acres at Panamoka Lake, Brookhaven

Legislative sponsor(s): Gregory Blass (R-Jamesport)

Estimated value/status of proposal: $1.1 million, legislature okayed purchase, proposed joint town-county acquisition

Parcel: 14. Lustgarten Nursery, Brookhaven Legislative sponsor(s): Gregory Blass (R-Jamesport)

Estimated value/status of proposal: Appraisal under way

SOURCE: Suffolk County Real Estate Department

Caption GRAPH, PHOTO, MAP

Newsday Photo by Dick Kraus-A view of the clubhouse at the Indian Hills Country Club, one of the properties involved in the open space controversy.

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Newsday Graph by Brigitte-Pet Properties. Proposed additions to the open-space program that are under consideration by the legislature - See end of text. Map of SUFFOLK COUNTY Showing location of proposed additions to the open-space program - see microfilm.

Subjects SUFFOLK COUNTY; LAND; CONSERVATION; INVESTIGATION; PORT JEFFERSON; POLITICS

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AN 04203170
Title LEGISLATORS OK GROUNDWATER STUDY
Newspaper name Newsday
JC (ND)
Date - Friday July 17, 1987
Author Maureen O'Neill
Edition NASSAU AND SUFFOLK
Section heading NEWS
Page number 33
word Count 364

Lead paragraph The State Legislature has approved a $300,000 fund for the study of groundwater protection and specifically targeted nine areas on Long Island, including the controversial farmlands on West Pulaski Road in Huntington. The legislation, which still requires the signature of Gov. Mario Cuomo, would authorize the Long Island Regional Planning Board to draw up water-management programs for the nine areas to maintain the water quality in the critical groundwater recharge areas.

TX_TX Lee Koppelman, chairman of the regional planning board, said he was "extremely gratified" that the measure had passed since the studies, which will take about two years, could open the way to obtaining up to $20 million over five years for watershed protection.

"We're so thrilled," said Jeanne Waters, president of the Huntington Farmlands Association, who said the bill, which would take effect Sept. 1, took three years to pass both houses

(RAMAGE)

in Albany. The study would include the 208-acre **Froelich Farms** and the 98-acre Wicks farm, both on West Pulaski Road.

The town is considering a proposal to build 290 condominiums on 91 acres of **Froelich Farms,** with 117 acres to be donated to the town for open space. The plan has drawn opposition from community groups hoping to save the farm.

But Koppelman cautioned that, "I don't want to kid anyone that the study is going to preserve the Froehlich Farm. We've passed the need for a study to save it. The only thing to save it is cash."

Arthur Goldstein, attorney representing the developers, said that the anticipation of the civic groups "is pie in the sky." He said that that 208 acres would cost $40 million to $50 million dollars" and "no one is going to pay that when they can get 117 acres for free."

The other areas to be studied on Long Island include the North Hills area of North Hempstead; the northeastern villages in Oyster Bay; the West Hills area of Huntington; the Oak Brush Plains of Huntington and Babylon; the Setauket Pine Barrens of Brookhaven; the Central Pine Barrens of Brookhaven, Riverhead and Southampton; the South Fork Morainal Forest in Southampton and East Hampton, and the Hither Hills area of East Hampton.

Subjects NEW YORK STATE; TOWN OF HUNTINGTON; WATER; REPORT; LONG ISLAND

Previous

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(RAMAGE)

Copy to: Ken Bauer
Grace
Tony Jupiter

OWEN H. JOHNSON
SENATE VICE PRESIDENT PRO TEMPORE

CHAIRMAN
SUBCOMMITTEE ON L. I. MARINE DISTRICT

COMMISSIONER
ATLANTIC STATES
MARINE FISHERIES COMMISSION

THE SENATE
STATE OF NEW YORK

PLEASE RESPOND TO:
☐ DISTRICT OFFICE:
23-24 ARGYLE SQUARE
BABYLON, LONG ISLAND, NY 11702
(631) 669-9200

☐ ALBANY OFFICE:
ROOM 811
LEGISLATIVE OFFICE BLDG.
ALBANY, NY 12247
(518) 455-3411

INTERNET ADDRESS:
ojohnson@senate.state.ny.us

cc: Chris Stout

August 30, 2000

Marc V. Shaw, Executive Director
Metropolitan Transportation Authority
347 Madison Avenue
New York, N.Y. 10017

SEP 2000 RECEIVED

Re: Proposed Expansion of the LIRR Babylon Train Maintenance & Storage Yard

Dear Executive Director Shaw:

I am writing to make you aware of my strong opposition to the Metropolitan Transportation Authority's (MTA) proposal to expand the Long Island Rail Road's (LIRR) Babylon Train Maintenance and Storage Yard located in the hamlet of West Islip.

Unfortunately, I was only recently made aware of this ill-conceived proposal through local news reports. Let me be brief and to the point: this proposal should go no further as it is totally unacceptable to the various elected officials of **all** the municipalities surrounding the Babylon Yard; the local residents of West Islip and Babylon Village; and myself. To propose the condemnation of commercial and residential properties, thereby uprooting families and causing the loss of jobs, to expand a facility that has clearly proven itself to be extremely intrusive and a nuisance to the residential community that abuts it on its northern perimeter is absurd. While I understand the need for locating additional storage on the Babylon line for new train cars that will be added to the fleet over the next few years, I cannot approve of the expansion of a facility in a community that has suffered for decades from the negative impacts of the operations of the Babylon Yard. (1)

In observing the problems that have occurred with the proposed train storage sites in other localities, and considering the strong opposition to the Babylon Yard expansion, I would strongly recommend that, in the future, the MTA confer directly with state representatives before recommending such projects in their respective districts. (2)

Very truly yours,

Owen H. Johnson
Vice President Pro Tempore

OHJ:rwg

COUNTY OF SUFFOLK

COUNTY LEGISLATURE

PAUL J. TONNA
PRESIDING OFFICER

HENRY L. BARTON, JR.
CLERK

September 19, 2000

Mr. Kenneth Bauer
Acting President LIRR
Jamaica Station
Jamaica, NY 11435

Dear Mr. Bauer:

Enclosed please find a copy of the following **sense resolution** that was adopted by the Suffolk County Legislature on September 12, 2000:

> **Sense Resolution No. 114-2000** - MEMORIALIZING RESOLUTION REQUESTING METROPOLITAN TRANSPORTATION AUTHORITY (MTA) TO REJECT GREENLAWN RAIL YARD LOCATION

It would be appreciated if you would indicate the **sense resolution number** should you wish to respond. If you have any questions, please contact Donna Barci at (631) 853-4074 or write to me at the Suffolk County Legislature, P.O. Box 6100, Hauppauge, New York 11788-0099.

Very truly yours,

Henry L. Barton, Jr.
Clerk of the Legislature

Enc.
HLB:db

RECEIVED
SEP 25 2000
PRESIDENT'S OFFICE

Sense No. 114 -2000 LOT 8/8/00
Introduced by Legislator Binder, Cooper

MEMORIALIZING RESOLUTION REQUESTING METROPOLITAN TRANSPORTATION AUTHORITY (MTA) TO REJECT GREENLAWN RAIL YARD LOCATION

WHEREAS, the MTA is considering two sites on the Port Jefferson branch of the Long Island Railroad for the siting of a new storage and cleaning facility to handle the addition of 220 electric cars required to operate new services to the Grand Central Terminal, viz., the former Cerro Wire site in Syosset and the Greenlawn site referred to as the "Hazeltine site"; and

WHEREAS, the draft environmental impact statement for this project has referred to the Greenlawn site as the preferred site for the new rail yard; and

WHEREAS, using the Hazeltine site would disrupt and adversely affect nearby residential communities because the rail yard is inconsistent with the character of the quiet residential communities to the north and south of the proposed site, and because the yard would be very active and well lit at night; now, therefore, be it

(1)

RESOLVED, that this Legislature hereby requests the MTA to reject the Hazeltine site in Greenlawn, Suffolk County, as a site for the new electrified rail storage and cleaning facility for electric cars to be operated by the MTA; and

RESOLVED, that the Clerk of this Legislature is hereby directed to forward copies of this Resolution to Governor George E. Pataki; to the Majority Leader of the New York State Senate Joseph L. Bruno; to the Speaker of the New York State Assembly Sheldon Silver; to the Minority Leaders of the New York State Senate and the New York State Assembly; to each member of the Long Island delegation to the New York State Legislature; to each member of the Board of the MTA; and to the President of the LIRR.

DATED: SEP 12 2000

s:\memres\mr-mta-site

October 6, 2000

Mr. Anthony G. Carr
Deputy Regional Administrator
Federal Transit Administration, Region II
One Bowling Green, Room 429
New York, New York 10004

Dear Mr. Carr,

As a long time Huntington resident and Greenlawn resident as well, I am horrified after recently learning of a proposed MTA Storage Yard facility for the Greenlawn area off of Pulaski and Lake Roads. The MTA idea is completely unsuitable to this well established residential area. The existing property appears to be former farm lands that has regenerated to the natural woodlands that it once was, something that is rare to have in this area of Suffolk County. The various residential developments and specialty built houses within about 300 feet or so of this property would make the MTA proposed yard facility very negatively impacting of the residential communities and their property values as well as inflict social and physiological impacts to all Greenlawn residents. (1)

One has only to walk thru the Greenlawn Village and stroll thru the residential streets adjacent to the undeveloped property site to realize that this is a quaint and comfortable little Town area, without the hubbub that is common and detractful to other communities. There is a tranquil quality without the fast paced atmosphere, in Greenlawn, and construction of the MTA storage yard will detract from the unique qualities that many of us have found living here. (1)

I read thru the DEIS in our Harborfields Library. For your information, this local library did not receive this report until after the hearing was held, and so was beyond the capability of local residents like myself to respond and comment to the MTA and LIRR. The 45 day comment period did not really apply to our local residents. It appears there was insufficient dialogue and awareness of the MTA Storage Yard Proposal by Greenlawn residents, because only one informational meeting had been listed as being held in Suffolk County on June 8, 1999 to discuss environmental studies relating to the storage yards. There should have been a effort by MTA to notify the local Town Supervisor, the Town Planning & Environment Department, and perhaps a local civic association. After all, the MTA had begun over a year ago to "short list" its possible yard locations and the "Hazeltine" site was one of those selected as being suitable. I do not believe that a single Legal Notice being placed in a newspaper such as the Newsday or the NY Times is sufficient notification of a Agency proposed action, because of the enormous public funding required and the large project scope of design and construction. Were any Legal Notices placed in the Suffolk News and other local papers? I believe that the Federal Government NEPA policy was not administered in good faith as there appears to be evidence of insufficient notification and awareness given to the effected local residents. (2)

There were many informational meetings listed for the New York City area, and yet only a single meeting held for Suffolk County to discuss environmental issues and studies. Was that meeting acutally advertised appropriately and held in Suffolk County? (1)

I believe there should have been two Official Public Hearings, one in Manhattan as carried out, and one in Long Island to enable all the possible effected communities to be aware and provide comment. It would have been appropriate to hold it in a Government Building that is central to Yaphank, Huntington, Babylon, and Oysterbay Town residents; the State Office Building in Hauppauge could have been selected to have the necessary Public Hearing. (2)

I hereby request that other involved Government Agencies with Authority such as the Federal Transit Administration, and the Long Island Rail Road will make the MTA more accountable to insure that all communities effected by this project are given the proper notification and awareness, and are able to give public comment before the Project Preferred Alternatives are further developed. I know that the Town of Huntington and Greenlawn residents would have given their comment and advisement that this MTA proposed site is directly in conflict to the residents expectations and ongoing development plans for this private property. (2)

The MTA has given much more weight to its engineering and operational considerations than it had to the environmental impact considerations, in selection of the "Hazeltine" site as the preferred site location. Evidently, the Cerro-Wire site, that is already zoned for light and heavy industrial use and has been used for such purposes for many years, was not selected over the Hazeltine site because the DEIS reports the presence of contaminated materials that would need to be mitigated and shopping mall proposals for that site. The DEIS says the proposed MTA yard would not be a significant adverse impact to the Cerro-Wire site on page 3-39, and further says " At Hazeltine converting a field to a rail-yard would represent a significant change in the use of the site. Rail uses would be a marked contrast from the existing residential neighborhood to the north and south". (3)

Other report information says the residents at the Cerro- Wire site are not situated to be in view of the site, outside that 400 foot buffer radius area that would separate the yard from the residences, and there is ample industrial activity surrounding the Cerro-Wire site at present (Waste Dump, DOT maintenance yard, and other industrial/ commercial building uses.

However, the DEIS states that there would be direct visual impact based on the flatness of the Hazeltine site with surrounding residences, and the higher position of houses north of the tracks, and mentions that 35 residences would fall within the 400 foot buffer area MTA has proposed for its separation of their yard from the rest of the Town developments.

Under Economic Considerations, the DEIS cites positive economic gains for the Cerro- Wire site based on possible Mall Development, yet it fails to mention any possible economic gains for the Hazeltine site which has long ago been planned for residential housing development. (4)

I strongly believe that residential housing will contribute monies and revenue to the Greenlawn area and Town of Huntington, in the form of property taxes, and purchases that one makes in their community to live there. In fact, the types of houses being built in the area have all been in the $350,000 to $450,000 dollar range, and this obviously adds value to the community neighborhoods real estate values.

I believe that the engineering and operational considerations, such as the benefits of shorter power line requirements, elimination of "dead head or reverse movements", and the fact that the ground is already flat as opposed to sloped such that earth excavation is eliminated , are less important reasons to prefer the Hazeltine site, based on the DEIS acknowledged adverse impacts. Any extra costs for engineering and operational considerations to put the yard at a different site would be negligible compared to the costs of lost house resale values, lost residential development related revenues and taxes, and the hard to quantify costs associated with the change in social and physiologic character that the area would experience. How do you measure the lost future opportunities of Greenlawn residents for future residents, future businesses and companies wanting to establish themselves here, all based on the diminished value of Greenlawn by the MTA storage yard preference. (3)

Use of your own storage yard site selection criteria (6 criteria total) in their order as presented, should have immediately disconsidered the Hazeltine site because it conflicts with the criteria item " Should not be near sensitive land uses such as residences, hospitals, schools, and parkland". This criteria seems more important than the last criteria listed - "risk of acquiring liability for environmental contamination should be minimized", and a reason the Cerro-Wire site was not as preferred. (3)

I have specific concerns for the environmental impacts caused by an MTA Storage Yard at "Hazeltine" and they are as follows:

1.There are natural ponds north just north of the train tracks that would indicate there is natural water springs and aquifers within the impacted site area. Is this not one of the criteria that would make the Hazeltine site as unsuitable rather than preferred? (5)

2. Will the local Water Authority service be in anyway impacted by the MTA need for water to wash its trains? The local residents rely on this Water service as we do not have individual ground wells. Currently, there are no demands for water service at the property, and proposed resident water uses would be minimal against the demands the M.A. facility would create. **Why are there no figures for volumes and consumption demands, and assessments of impact to the local Water Authority systems found or studied in the M.A. DAIS?** (5)

3.There is no mention of what chemical processes or what chemical treatments and chemical compounds would be introduced to the wash water waste that will be significant in volume. (5)

(Concern # 3 continued);
The train undercarriages see a lot of oily type and perhaps carcinogenic compounds and substances that might emanate from the train equipment and gear. How will that scummy and inorganic waste material be eliminated from the wash water once it has cleaned the train? Will M.A. ever begin service - repair type operations to electric or mechanical systems on the train cars, as cooling/ air-conditioning systems, brake cooling systems and other train components that would involve removal and disposal and replacement of chemicals and chemical compounds? (5)

4. The DEIS mentions tile - field type drainage for water waste discharging and regeneration into the ground (hence reintroduced into the aquifer system) , yet no other prior water treatment process is called for. **I believe the field tile drainage is inappropriate without prior water treatment processes that remove chemical compounds and inorganic materials and compounds, oils , scum and the like. The tile field would become ineffective shortly after usage because of the inability of the ground to continue to absorb scum materials and unnatural chemical compounds.** There are vast clay layers in the area, and these drains would have to be placed well below that to drain- leach anything. I believe that any M.A. Storage Yard must have its own waste water treatment facility to properly process the water prior to its re-introduction back into the ground. **Currently there is no extra demand for water use by the property, and there is no chemical & toxic wastes, and other train related waste products generated by the private property. Are you willing to compromise and contaminate the ground soils and the ground waters as a cost of providing your transportation improvements?** (5)

5. The stored train cars to be moved around the storage yard will require train engines to roll them, causing extra noise by the engine loads needed. There will be air-brake associated noise during these operations, and the general steel to steel noise of slow rolling stock on the tracks. The engaging and dis-engaging of the train couplings will create noise.
Currently there is no noise emanating from the property and there will also be much less noise created by residential use and development of this property. (5)

6.There be fencing and perhaps barbed wire atop the fencing to discourage vandalism as the M.A. proposes. That will also include lighting to light the entire facility grounds. **These necessary features (fencing and lighting) will have a profound visual and social impact upon the community**. The M.A. plan of providing a buffer of trees and perhaps landscaped treatment will not sufficiently buffer the Yard from the community. Noise, visual impacts, and lighting emissions that "cast a halo" will not be effectively diminished by these proposed treatments. (5)

7.The removal of human wastes from train car bathrooms creates environmental toxic substances that can be unpleasant and negative to the air quality of the community, even if removed and stored into vast sewage storage tanks for later pumping and disposal. There should be no in ground seepage- leaching type basins that rely on the natural ground layers to filter the effluents into the ground as it creates a point discharge effect. (5)

(Concern # 7 continued);
The report mentions 16- very long (1600ft) sewage tanks presumably for above ground storage use for this "black water effluent" storage, and these tanks themselves will be subject to potential overfilling and pumping hazards that may cause spillage to the adjacent grounds. There is a high potential for the immediate area with residences to encounter odors normally found at a sewage treatment facility. **Why didn't the DAIS offer engineering estimations of the volumes of such waste, the frequency of need to pump out the storage tanks to empty them, and estimation of how quickly these tanks would become filled, and where the wastes would be delivered and how, for treatment elsewhere? There are no current odors or toxic substances being generated by the property as it is now.** (5)

8. **How are the traffic conditions during peak hours changed or effected at the location where the tracks cross Park Avenue , by siting the Storage Yard at "Hazeltine"?** From my own observation, this location has heavy volumes across the tracks already during peak commuter times. **Will there possibly need to be a grade separation project proposed in the next 30 years from completion of the Yard based on future rail needs, and movements perhaps related to the yards function and location on the northern branch line?** If a grade separation were determined desirable based on future expectational needs and traffic volumes, is there possibility that the tracks would have a conflict with the "Hazeltine" proposed site which is flat and at approximate equal elevation to the existing track line? Any such change in elevations needed in the future would likely have a direct negative impact to the community. (5)

9. There is no indication in the DAIS that the 80 or so M.A. Yard employees would be assigned there from other current assignments elsewhere, or would be hired from the locality. There is no indication of the wages for these employees. If the wages are not comparable to the surrounding wage earners who live here, isn't there a likelihood that the Town and Community would benefit less; perhaps the employees would not be able to afford to live in the immediate area. Would this create extra commuter burdens on the roadways with less benefit than would be caused by new potential residents that would live and commute from the Hazeltine property. (5)

In summary, it appears there are substantial issues that should be addressed by the M.A. before it goes ahead any further in its completion of either its project Design Reports or any of the process stages that the Federal Government and State Government require to advance this project any further. It is more appropriate, given all the above concerns to re-evaluate the idea of this Greenlawn property as being feasible to the project needs, and to come to a realistic selection of a different location to be mentioned as feasible in the draft design report. The various Long Island Communities effected by these proposed MTA Storage Yards should be fully made aware of all the potential effects, and public informational meetings should be planned in the immediate future. Only then could important public comment be obtained to be considered for the MTA Proposed Project Work.

(In Summary continued);
The revised DEIS, based on this valid and important public comment that was not heretofore effectively and responsibly obtained by MTA, would better constitute a Official Project Documentation and Report . Without revisions or change in these proposed Storage Yard selections and preferences, there should be a hold off of State and Federal Funding which becomes another major Taxpayer investment responsibility for the distant future.

I sincerely hope that you will direct these concerns to the Management and Project Managers of M.A., LIRR, and State and Federal Agencies involved with this project, so that the community can have a better sense that the Government Agencies who represent the Public Interests are effectively doing so, and are sensitive to the effected local communities. I hope to hear from your office as well.

Only two days ago, the Newsday papers reported that MTA has postponed any action on the proposed Yard acquisition for about two years. This is good news but only a temporary relief as it does not address any long term commitment not to acquire this property.

Thank you in advance for your efforts to be yet made that will allay the concerns that we all share in this community. I apologize for the length of this letter that was necessary to describe my comments, concerns and questions. It is however, much less in volume to the large DEIS that we all were offered to read "after the fact" as our only source of information to understand your large Project.

Sincerely yours,

Gene Gaye
17 Tulip Street
Huntington, New York 11743

cc: Mr. Anthony F. Japha, Chief Pgm Exec., MTA/ LIRR East Side Access
MTA Headquarters
Ms. Pamela Burford, Director of Planning And External Relations, LIRR
Governor G. Pataki
State Senator Carl L. Marcellino
State Assemblyman John J. Flanagan
Congressman Gary Ackerman
Huntington Town Supervisor Frank P. Patrone
Huntington Town Board; Councilperson Marlene Budd; Councilman Mark Cuthbertson
Ms. Elaine Capobianco, Pres., Oldfield Home Security Council and Citizens Associatio